Factors Influencing Supplement Use and Doping among Adolescent Athletes in New Zealand

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2020

School of Sport and Recreation

A thesis submitted to

Auckland University of Technology

in fulfilment of the requirements for the degree of

Doctor of Philosophy

Abstract

Doping has long been associated with elite level sport, among athletes who seek to dishonestly enhance performance and defeat their opponents. Owing to the predominant rationale behind doping, and the nuanced performance climate which underpins youth sport, it is unsurprising that these behaviours have infiltrated adolescent sport (Backhouse et al., 2015). Doping is considered a maladaptive behaviour which threatens the integrity of sport and poses deleterious consequences to adolescent athletes (Blank et al., 2016; Elbe & Brand, 2016). The acknowledged complexities of this behaviour are suggested to differ by context and population (Degenhardt et al., 2010). However, there is much which remains unknown about factors which influence the occurrence, and prevention, of doping during the developmental period of adolescence.

Focused on the prevention of doping among adolescent athletes, a pragmatic philosophical position underpinned this thesis. Through the voices of adolescent athletes, athlete support personnel and stakeholders, this thesis sought to identify factors which influence supplement use and doping among adolescent athletes (SUDAA) in New Zealand (NZ). In pursuit of practical insights, this thesis adopted an explanatory, sequential mixed methods research design and conducted three studies.

Study one sought adolescent perspectives regarding factors which influence SUDAA through a nationwide survey. A large cohort of adolescents (aged 13 to 18 years) revealed widespread supplement use (92%), moderate doping consideration (42%), limited doping intent (3.8%) and doping (2.5%). Further regression analysis identified factors which increased the odds of SUDAA, doping intentions and consideration. These influential factors included subjective norms, descriptive norms, ego-oriented motivational climate and sport confidence sourced through self-presentation. Conversely, volition and sport confidence sourced through mastery were associated with decreased odds of doping, doping consideration and doping intentions among adolescent athletes.

Study two sought the perspectives of current and recent adolescent athletes, and athlete support personnel, regarding factors which influence SUDAA. These multiple perspectives revealed three major themes to influence SUDAA including performance climate, identity and authority. Methodological triangulation then integrated evidence from studies one and two, within which convergent, complementary and silent evidence were identified. Inferences from the integrated data revealed orientations, autonomy, norms, body image and behaviour as major themes which influence SUDAA. These inferences informed the design of study three

which sought stakeholder perspectives on outcome-oriented solutions to reduce SUDAA. Six stakeholders with experiential knowledge in adolescent sport identified focus areas, influential audiences and effective approaches they perceived pivotal to effectively reduce SUDAA.

Inferences made through the integration of evidence from all phases of research informed a socio-ecological perspective to observe interactions between factors and audiences which influence SUDAA at intrapersonal, interpersonal and cultural levels of adolescent sport. From this perspective, it was revealed that performance priorities, performance enhancing behaviours, normative influence and athletic body image increased SUDAA, while volition and a mastery focus reduced these behaviours. The evidence shows that athlete-centred approaches alone are unlikely to reduce SUDAA in the absence of other changes in adolescent sporting environments. This thesis concluded with the provision of practical recommendations which inform a whole of sport approach to reduce SUDAA.

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Attestation of Authorship

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

31 July 2020

Signature *Date*

Acknowledgements

I would first like to acknowledge my supervisors Dr. Tony Oldham and Dr. Sarah-Kate Millar. I am humbled that you, my critical friends, joined me on this journey. Your wisdom and support were vital for me to develop the skills and confidence to complete this thesis. Thank you also for inspiring my thinking - you changed how I see the world for which I will always be grateful.

It is with sincere gratitude that I thank Scott for providing me the support, grounding and understanding I needed to make this happen. Thank you for always believing in me and for every sacrifice you made throughout this adventure. I also want to thank my Mum, Dad and Tam for the many ways you supported me and my wee family to ensure we ended this journey in one piece. The way you each have my back will always be what drives me forward.

I also acknowledge the Drug Free Sport New Zealand (DFSNZ) Board and wider team for supporting my involvement in this research. I thank you for this opportunity and look forward to the outcomes of this work contributing to the efforts of this organisation.

I would also like to thank Dr. Robert Borotkanics whose expertise was pivotal to my growth as a quantitative researcher. Your encouragement, knowledge and post-it note supply were critical to my perseverance in an otherwise daunting undertaking.

Thanks also to Sue Knox for your kind words in the final hours, and expertise to glue this thesis together. Ram Anciro, I want to thank you for your efficiency, optimism and ability to 'get it'. Sheree Simpson, I also thank you for your assistance to transcribe the audio recordings from study two. Your respective contributions to this thesis are appreciated and it was a pleasure working with each of you.

I would also like to extend my thanks to the many participants and stakeholders who so generously contributed to this research. Your insights and experiences were critical to the outcomes of this thesis and I thank each of you for sharing them with me.

I dedicate this thesis to the incredible people lost, and welcomed, during this journey. First, I wish to dedicate this research to my grandmothers who shared my excitement about embarking on this thesis shortly before we said our final goodbyes. I know you were with me on this adventure, and I thank you. Secondly, I dedicate this thesis to my son who joined me during this journey and inspired me every day throughout. Hugo, I hope that my determination and passion to complete this thesis has instilled in you the resolve to live your dreams - whatever they may be.

Ethics approval

Study one: Ethics approval was received from the Auckland University of Technology Ethical Committee (AUTEC) on 11th December 2017, reference 17/175 (Appendix A).

Study two: Ethics approval was received from AUTEC on 29th November 2018, reference 18/373 (Appendix B). Note: a contractor was recruited to transcribe all audio-recordings from each focus group in study two. Appendix B acknowledges AUTEC's receipt of a completed transcriber confidentiality agreement.

Study three: Ethics approval was received from AUTEC on 24th September 2019, reference 18/373 (Appendix C). Note: this was an amendment to the ethics approval provided for study two.

Chapter 1 Introduction and Literature review

1.1 Introduction

1.1.1 Chapter introduction

The purpose of this chapter is to introduce this thesis by providing background to the context of sport as well as supplement use and doping among adolescent athletes (SUDAA). This chapter is structured in two sections; first, a brief history of doping and adolescent doping is shared and strategies to prevent these behaviours are introduced. These historical accounts are followed by the rationale, aims, objectives and structure of this thesis. The second section of this chapter provides a comprehensive review of literature which is relevant to SUDAA. This literature review is framed by three overarching themes: adolescent doping, theoretical approaches of previous research and prevention programmes which seek to reduce these adolescent behaviours. Areas remiss of sufficient understanding in the literature are also revealed in this review. This chapter is followed by the methodology of this thesis, presented in chapter two.

1.1.2 The context of sport

Sport has been described as a unique context underpinned by contrasting principles (Franke, 1978). The first of these sporting principles is the "spirit of sport" (p. 1) which the World Anti-Doping Agency (WADA) have described to embody intrinsic sporting values including fair play, character and respect (World Anti-Doping Agency, 2017). The spirit of sport implies that athletes and their support personnel participate with integrity, fairness and respect for themselves and others (Melzer et al., 2010). Through this lens, sport is considered to enhance participants' health, well-being, and ethical development (Kavussanu et al., 2002). Competition is the second principle of sport proposed by Franke (1978). This sporting principle is captured by epithets such as faster, higher and stronger (The International Olympic Committee, 2020). The principle of competition is acknowledged as a predominant discourse in contemporary sport which underpins an apparent need to do what is required to win (Johnson, 2012; Mudrak et al., 2018). It is this competitive discourse that researchers have agreed is a driving factor for problematic behaviours in sport which challenge its perceived moral and ethical nature (Boardley & Kavussanu, 2007; Knop, 1996; Shields & Bredemeier, 2007). While the principle of competition has an integral place in sport, its negative consequences indicate that participation cannot be assumed a universal good (Goldberg et al., 2007). Moreover, a purist view of the spirit of sport does not accurately reflect the extent to which athletes will go, in order to satisfy their drive for competition. It appears a harmonious balance between the

opposing principles of sport is required to uphold its integrity, in ways which respect the inherent contest of athletic pursuits. Until this balance is reached, the paradox between these sporting principles underpins the nuanced context in which athletes and their supporters are embedded with mixed consequences.

1.1.3 Doping

Doping has been viewed as an intentional, outcome-oriented behaviour (Petróczi, 2013). From this perspective, doping is considered an example of cheating to gain an unfair advantage over competitors (Barkoukis et al., 2011; Hodge et al., 2013; Maravelias et al., 2005). Doping has also been described as an anti-social and maladaptive behaviour which threatens the spirit of sport and opposes the concept of sportspersonship (Barkoukis et al., 2011; World Anti-Doping Agency, 2015). Moreover, doping challenges the notion of a "level playing field" (Elbe & Brand, 2016, p. 32). Elsewhere, doping is defined as the violation of one or more of ten anti-doping rules established in the World Anti-Doping Code (World Anti-Doping Agency, 2020d). These rules include the use, attempted use, trafficking or possession of prohibited substance(s) as well as evading or tampering with doping control procedures (Drug Free Sport New Zealand, 2020f; World Anti-Doping Agency, 2015). More commonly, doping is considered the use of banned substance(s) or method(s) to enhance sporting performance (Yager & O'Dea, 2014; Zucchetti et al., 2015). Banned substances are detailed in the Prohibited List which is established, and annually updated, by WADA (World Anti-Doping Agency, 2020a). When used, substances and methods included in the Prohibited List may risk athlete health, have the potential to enhance performance and violate the spirit of sport (Donahue et al., 2006; Smith et al., 2018; World Anti-Doping Agency, 2020a). Despite its prohibition, doping has occurred in athletes younger than 10 years of age (Nicholls, Cope, et al., 2017) and is an issue at all levels of sport.

Doping is a complicated issue which is suggested to occur due to a complex interaction of factors (Elbe & Barkoukis, 2017; Erickson et al., 2015). Evidence shows that athletes' exposure to these factors has resulted in doping to varied extents, across different competitive levels and sporting codes (Backhouse et al., 2015). Further, Nilsson and colleagues (2004) identified that factors which influence doping are not universal and instead differ by audience and sporting context. Researchers have therefore placed importance on identifying factors which influence doping in specific populations and environments (Kirby et al., 2011; Verroken, 2000). Despite increased international research in this field, there remains a dearth of evidence on factors which influence doping in NZ.

A brief history of doping

Performance enhancing practices date back more than 5,000 years to the Ancient Greek Olympic Games (Kim & Kim, 2017). The issue of doping, as it is now recognised, came to prominence in 1886 as the suspected cause of a British cyclist's death during a 600km road race. The issue of doping re-emerged in 1904 when an Olympic marathon winner required resuscitation due to pre-race substance use (Prokop, 1970). Historical accounts of doping show that advances to prevent this behaviour were slow as it was not until 1928 that the International Amateur Athletics Federation[1] attempted to combat doping by prohibiting athlete's use of specific substances (Bowers, 2012). Much later, doping controls were conducted at the 1968 Olympic Games in Mexico City, which reflected an understanding that doping had become a serious international issue (Tricker & Cook, 1990). In preparation for the 1976 Olympic Games in Montreal, the International Olympic Committee (IOC) produced a comprehensive banned substance list (Percy, 1978). However, it was not until 1999 that WADA was founded, and 2004 when the inaugral World Anti-Doping Code[2] was published (Smith et al., 2018). Today, substances and methods which are banned for use, possession and trafficking in sporting contexts are published annually in WADA's Prohibited List (World Anti-Doping Agency, 2020a). The World Anti-Doping Code, and its associated rules, are enforced around the world by National Anti-Doping Organisations. Drug Free Sport New Zealand (DFSNZ) is NZ's National Anti-Doping Organisation and is responsible for implementing the World Anti-Doping Code through detection, deterence, regulation and education programmes (Drug Free Sport New Zealand, 2020d). Despite the long history of doping in sport, this overview shows that the global fight against doping has evolved slowly. As substantive anti-doping practices have only been established in the past 50 years, efforts to prevent doping could be considered in their infancy. Thus, there remains much to understand about factors which influence doping and ultimately, how these behaviours can be prevented.

A brief history of adolescent doping

Admissions of doping from high-profile athletes including Marion Jones, Lance Armstrong and Jose Conseco have reinforced a common perception that doping is a problem isolated to elite level sport (Hodge et al., 2013). Less attention has been devoted to doping among adolescent athletes, despite evidence of its prevalance in this population since the 1980's (Johnson et al., 1989; Windsor & Dumitru, 1989). Adolescent doping emerged as a global issue in the 1990's

[1] The International Amateur Athletics Federation is now known as the International Association of Athletics Federation (IAAF).

[2] The World Anti-Doping Code is the fundamental document which aims to harmonise and advance universal anti-doping efforts. World Anti-Doping Agency. (2015). *The World Anti-Doping Code.* https://www.wada-ama.org/sites/default/files/resources/files/wada-2015-world-anti-doping-code.pdf

with evidence revealing this behaviour in the UK (Korkia & Stimson, 1997; Williamson, 1993), Australia (Handelsman & Gupta, 1997), South Africa (Lambert et al., 1998), Canada (Melia et al., 1996) and Sweden (Nilsson, 1995). Amidst concerns of an adolescent epidemic, initiatives to prevent doping were implemented. Early preventative measures with adolescent audiences were underpinned by a "detection-deterence approach" (Elbe & Brand, 2016, p. 32). This approach resulted in school-based doping controls and enforced consequences for positive results. The most notable of these detection-deterrence approaches occurred in 2007 as $USD 3 million was allocated to 45,193 doping control tests among school-aged athletes throughout Texas (Woolf & Swain, 2014). Despite this investment, only 19 positive test results were reported (0.04%) and a renewed preventative approach was taken to deter, rather than detect, adolescent doping (Assael, 2009; Woolf & Swain, 2014). Today, doping controls among adolescent athletes continue globally (Woolf & Swain, 2014). In fact, young athletes have recently returned positive samples, and been sanctioned, for doping in NZ (Drug Free Sport New Zealand, 2020b; Sports Tribunal of New Zealand, 2018). Due to its very prohibition, and the potential to 'get caught', developmental literature has indicated that athletes may have an increased propensity to engage in doping during adolescence (Ciranka & van den Bos, 2019). While doping control remains an important element of deterring and detecting these behaviours, the literature indicates that an isolated detection-deterence approach is insufficient to prevent doping during the developmental period of adolescence.

1.1.4 The prevention of adolescent doping

According to literature, substance use is commonly initiated during adolescence (Degenhardt et al., 2016; Eisenberg et al., 2014). Further, adolescent athletes are considered a high-risk population for doping (Barkoukis et al., 2016; Dunn & White, 2011). Consequently, it is recommended that measures to prevent doping begin early in an adolescents' sporting pathway (Backhouse et al., 2009; Backhouse et al., 2012; Sarafino et al., 2008). Fortuitously, adolescence has been considered a viable period for the prevention of doping due to the malleability of evolving personality characteristics, attitudes, morals and identity (Backhouse et al., 2007; Lentillon-Kaestner et al., 2011). This malleability provides an opportunity for anti-doping orientations to be developed among the adolescent population. Based on the evidence, it appears that efforts to prevent doping may have greatest effect during early adolescence before these behaviours are initiated. Additional to education, WADA has identified three further strategies to prevent doping and thus preserve the spirit of sport. As detailed in the following section, these prevention strategies include: detection (i.e., doping controls, investigations), deterrence (i.e., anti-doping rules, sanctions) and enforcement (i.e., application of these rules when violated) (World Anti-Doping Agency, 2020b).

The prevention of adolescent doping through detection, deterrence and enforcement

There remains insufficient evidence to support the effectiveness of detection-deterrence approaches to prevent doping during adolescence (Goldberg et al., 2007; Levy & Schizer, 2015). Moreover, detection-deterrence approaches have previously had a "boomerang effect"[3] (Lucidi, Mallia, et al., 2017, p. 3). For example, outcomes of the SATURN (Student Athlete Testing Random Notification) initiative showed that adolescent's exposure to a detection-deterrence approach was associated with an increased risk of doping (Goldberg et al., 2007). The reasons for this effect remain unclear however developmental characteristics may have drawn adolescents toward doping when considered a risk behaviour (Ciranka & van den Bos, 2019). The "invincibility fable" (Berger, 2017, p. 409) is another adolescent characteristic which may explain the ineffectiveness of detection-deterrence approaches. That is to say that adolescents may believe themselves exempt from, or invincible to, the negative consequences of doping (Laure et al., 2004). Adolescents' perceived invincibility may therefore minimise the intended deterrent effects of doping control during this developmental period.

When socially constructed consequences are enforced, the effect of detection-deterrence approaches to gain behavioural compliance among adolescents has also been challenged (Miller & Rollnick, 2002; Skinner, 1974). Further, Lazuras, Barkoukis, Mallia, et al. (2017) suggested that adolescent's knowledge of possible consequences from doping (i.e., sanctions from sport) were outweighed by the perceived benefits of engagement in this behaviour. Subsequently, Lucidi, Zelli, et al. (2017) found that doping consequences were weak deterrents for adolescents who had doped or were tempted to do so. The narrow perspective of a detection-deterrence approach appears imbalanced as it seeks to detect behaviours which have already occurred. Moreover, the aspect of enforcement in this approach does little to prevent these behaviours among adolescents who perceive doping to pose a risk or offer a reward. Literature also indicates the potential resistance of adolescents with doping experience, toward the authorities who regulate these behaviours through a detection-deterrence and enforcement approach.

The prevention of adolescent doping through education

Of the aforementioned strategies to prevent doping (World Anti-Doping Agency, 2020b), education remains the only approach in which adolescents are active agents in the occurrence,

[3] The boomerang effect occurs when exposure to doping prevention results in increased engagement in this behaviour, in opposition to its intended effect. Lucidi, F., Mallia, L., Alivernini, F., Chirico, A., Manganelli, S., Galli, F., Biasi, V., & Zelli, A. (2017). The effectiveness of a new school-based media literacy intervention on adolescents' doping attitudes and supplements use. *Frontiers in Psychology, 8*(749), 1-9. https://doi.org/10.3389/fpsyg.2017.00749

or avoidance, of this behaviour. Initiatives to prevent doping through education have been encouraged "to promote behaviour in line with the values of clean sport and to help prevent Athletes and other Persons from doping" (World Anti-Doping Agency, 2020b, p. 4). While holistic in concept, this approach renders itself vulnerable to the perception of compliance whereby athletes receive anti-doping education as a mandatory component of their involvement in sport. Despite the encouraged implementation of anti-doping education, there remains a lack of evidence to indicate best practices for these initiatives to prevent doping (Sagoe et al., 2016; Smith et al., 2018). Alongside a lack of best practice, literature has stressed the need for developmentally appropriate and audience specific education to prevent doping (Backhouse et al., 2009; Ciranka & van den Bos, 2019; Woolf & Swain, 2014). A paucity of evidence remains to pinpoint effective approaches to prevent doping through education thus indicating an area which requires greater understanding.

The National Institute on Drug Abuse (2018) has stated that adolescent substance use is determined by the extent of an individuals' exposure to factors which influence engagement or avoidance. With this understanding, greater exposure to factors which influence doping is anticipated to increase the likelihood of adolescent doping whereas greater exposure to protective factors may reduce these odds. According to literature, combinations of risk and protective factors, and the outcomes of exposure to them, will differ by audience, participant age and context (Nilsson et al., 2004). As echoed by Overbye et al. (2013), there exists a need for a robust understanding of factors which influence why and when adolescent athletes will (and will not) dope, in order to prevent these behaviours.

1.1.5 Factors which influence doping during adolescence

Understanding factors which influence adolescent doping has been suggested as fundamental to the development of effective prevention measures (Haugen et al., 2013; Woolf & Swain, 2014). While studies have investigated factors which influence adolescent doping, factors which deter these behaviours are also important to understand (Nation & Heflinger, 2006). Without consideration of protective factors, knowledge transfer (KT) and fear-based education programmes have focused on the consequences of doping and ineffectively prevented this behaviour (Lentillon-Kaestner et al., 2011; Sas-Nowosielski & Swiatkowska, 2008). Based on literature, it appears greater prevention of adolescent doping will occur through a holistic view of factors which both influence and deter these behaviours.

While a broad range of individual, contextual and situational factors have been revealed to influence adolescent doping, supplement use has been consistently associated with these behaviours (Ntoumanis et al., 2014; Smith et al., 2018). When used to enhance performance,

Barkoukis et al. (2015) suggested that supplement use correlated with doping from behavioural and cognitive perspectives. As a behaviour, adolescent supplement use to enhance performance may become habitual and sequentially progress to doping (Smith et al., 2018). Yager and McLean (2020) explained this sequential behaviour as having a gateway effect while others identified a co-occurrence between supplement use and doping to enhance performance (Calfee & Fadale, 2006; Lucidi et al., 2008). Cognitively, supplement use has been associated with doping intentions, norms and attitudes toward this prohibited behaviour (Backhouse et al., 2013; Ntoumanis et al., 2014). It is important to note that, in and of itself, supplement use to enhance performance has been considered inappropriate and unnecessary among healthy adolescents (Desbrow et al., 2014; Maughan et al., 2007). The identified associations between these behaviours, and their co-occurrence, indicate that a focus on reducing adolescent supplement use (to enhance performance) may have a positive influence on decreased doping.

The literature has revealed the importance of understanding factors which influence SUDAA to identify practical solutions to reduce, or prevent, these behaviours. Further, importance has been placed on understanding these behaviours in the respective contexts in which they occur or are perceived (Backhouse et al., 2009; Petróczi & Aidman, 2008; Zucchetti et al., 2015). The requirement for contextual knowledge derived from previous research which revealed differences between factors which influence SUDAA by country, culture and sporting community (Backhouse et al., 2013; Degenhardt et al., 2010; Gucciardi et al., 2011). These differences heighten the need to understand factors which influence SUDAA in NZ for these behaviours to be reduced in this sporting environment.

1.1.6 Thesis rationale

This thesis was conceptualised from an acknowledged need to better understand factors which influence SUDAA in NZ sporting contexts. It is anticipated that comprehensive knowledge of these factors will afford the best opportunity to develop practical solutions to reduce SUDAA. Thus, this programme of research seeks the previously unheard perspectives and lived experiences of adolescent athletes, support personnel and stakeholders to gain a holistic understanding of factors which influence SUDAA. Underpinned by a pragmatic worldview and an explanatory, sequential mixed methods research (MMR) design, this thesis aims to generate evidence-based, outcome-oriented solutions to reduce these behaviours. The results of this initial research from NZ sporting contexts are also anticipated to enhance international scholarship regarding SUDAA and thus contribute to global anti-doping efforts.

For clarity, throughout the remainder of this thesis, the term *doping* refers to the use of banned substances or methods to enhance sporting performance. Similarly, *supplement use* is considered the use of a supplement product to enhance sporting performance. The terms *prevent* and *reduce* are used interchangeably throughout this thesis. While prevention implies a behaviour has not yet initiated (primary prevention), reduction is indicative of efforts to minimise established behaviour(s) (secondary prevention). Further, supplement use and doping among adolescent athletes is abbreviated to SUDAA throughout this dissertation.

Aims

This thesis aims to:

- Quantitatively examine factors which influence SUDAA in NZ sporting contexts through the development, implementation and analysis of a nationwide survey (study 1).
- Develop a deeper understanding of quantitative evidence (study 1) by exploring factors which influence SUDAA through the voices of current and recent adolescent athletes as well as athlete support personnel (study 2).
- Obtain stakeholder perspectives of outcome-oriented solutions to reduce SUDAA based on their experiential knowledge in NZ sport and in consideration of evidence from preceding phases of research (study 3).
- Provide practical recommendations to reduce SUDAA in NZ sporting contexts.

Objectives

The objectives of this thesis are to implement a robust explanatory, sequential mixed methods programme of research which:

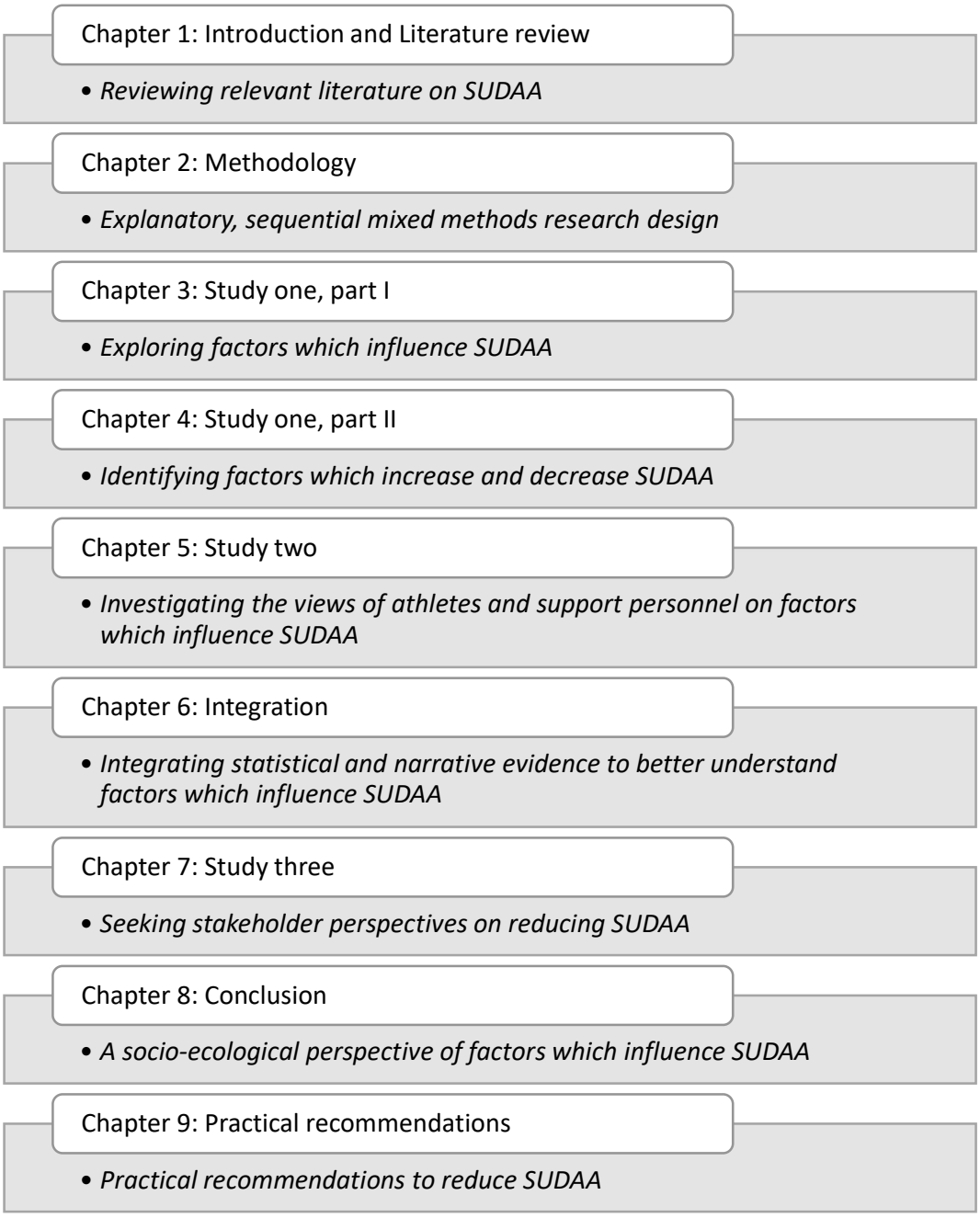
- Investigates the influence of salient factors on increased or decreased odds of supplement use, doping, doping consideration and intent among adolescent athletes.
- Raises awareness of factors which influence SUDAA throughout NZ sporting contexts.
- Provides an evidence base which positions SUDAA as a relevant issue in sport.
- Affords an opportunity for adolescent athletes, support personnel and stakeholders to contribute to solutions which reduce SUDAA in their practical environment.
- Contributes to a global understanding of factors which influence SUDAA.

Thesis structure

This thesis consists of nine chapters and three studies as displayed in Figure 1.

Figure 1

Thesis structure



Note. SUDAA = Supplement use and doping among adolescent athletes.

This programme of research is introduced in the present chapter which includes a critical review of literature. The initial chapter of this thesis contextualises SUDAA, reveals previous theoretical approaches to research in the field and describes programmes which aim to prevent these adolescent behaviours. Chapter two provides a methodological overview of the pragmatic paradigm, MMR design and research questions (RQs) which underpin this thesis.

Rationale for the decisions made in this thesis' research design are also detailed in chapter two.

Study one is presented across two chapters. Chapter three explains the quantitative data collection methods, procedures and tools used to conduct this cross-sectional, nationwide survey. The descriptive results of this survey are also presented and discussed in chapter three. Chapter four details the statistical procedures used to analyse a subset of quantitative data from study one. The results presented in chapter four identify factors which increase and decrease the odds that adolescent athletes will use supplements, dope, intend to dope or consider doping in NZ sporting contexts.

Chapter five presents the research design and participant criteria for study two as informed by the outcomes of study one. The qualitative data collection procedures, tools and methods used to analyse narrative evidence in the second study of this thesis are also detailed. The voices and lived experiences of current and recent adolescent athletes, as well as athlete support personnel, provide a deeper understanding of factors which influence SUDAA in chapter five.

Chapter six describes the processes used to integrate and interpret the quantitative evidence obtained in study one and the narrative data collected in study two. In chapter six, data are integrated through joint displays from which inferences are drawn and discussed in consideration of evidence. Chapter seven presents the participant criteria and research design of study three as informed by the outcomes of data integration in chapter six. The research methods used in this dedicated phase of stakeholder participation are also described in chapter seven. Stakeholder perceptions of practical solutions to reduce SUDAA are then revealed through narrative evidence which is discussed in consideration of relevant literature.

The conclusion of this thesis is presented in chapter eight in consideration of integrated evidence from all components in this programme of research. The outcomes of this thesis are then discussed in consideration of its aims, RQs and existing evidence. The researcher's prospective reflections, strengths and limitations of this thesis are also provided in chapter eight, followed by directions for future research. The contributions that this thesis makes to its field of research are also revealed in chapter eight. Chapter nine then culminates this thesis with the provision of practical recommendations to reduce SUDAA as informed by evidence generated through this programme of research. Aligned to the pragmatic nature of this thesis, these recommendations are intended for use by sports organisations and stakeholders with audiences identified to influence SUDAA. These recommendations provide audience specific components of a collective approach to reduce SUDAA in NZ sporting contexts.

1.2 Literature review

1.2.1 Search methods

A combination of online and manual search methods were used to identify relevant sources of literature regarding SUDAA. To find peer reviewed literature of relevance to the occurrence and prevention of these behaviours, a range of online databases were searched including: Academic Search Premier, ERIC, JSTOR, ProQuest Central, Psychology and Behavioural Sciences Collection, PsycINFO, Scopus, SPORTDiscus with full text (EBSCO), Social Sciences Citation Index (SSCI) and Web of Science. Additional sources of literature were searched online using relevant websites including: DFSNZ, Sport New Zealand (SportNZ) and WADA's Social Science Research Project catalogue (World Anti-Doping Agency, 2020c). Google scholar was also examined using key search words (listed below), to ensure relevant literature had not been missed in previous searches. Manual searches for relevant literature were also conducted, primarily using the AUT Library search engine and DFSNZ hard copy resources. To enhance efficiencies in the storage, review and reference of literature, a specific library was established using EndNote referencing software. This EndNote library housed all available citations and content for relevant sources.

Key search words, and combinations, included: doping, anti-doping, adolescence, adolescent doping, adolescent athlete, adolescent supplement/substance use, adolescent development, doping behavio(u)r, performance enhancing behavio(u)r, socio-cognitive theory, behavio(u)ral theory, motivational theory, stakeholder participation, motivational climate, stakeholder engagement, and adolescent substance use prevention.

1.2.2 Doping during adolescence

In this thesis, adolescence is considered the developmental period between childhood and adulthood (Sawyer et al., 2018). For consistency with the NZ schooling system, this thesis considers adolescence as ages 13 to 18 years. According to Backhouse et al. (2015) the international prevalence of doping during adolescence is between 1 and 5%. These global estimates differ from earlier research which found that 25.8% of adolescents had doped (Goulet et al., 2010). Therefore, the true extent of doping among the adolescent athlete population is unknown. Despite widespread discouragement of doping in the literature, adolescence remains a high-risk phase for the initiation of this behaviour (Eisenberg et al., 2014; Field et al., 2005; Wichstrom, 2006).

During adolescence, doping has been suggested to begin most commonly at 14 years of age and to reach its highest prevalence at 15 years of age (Bahrke et al., 2000; Hejabi et al., 2015; Stilger & Yesalis, 1999). Some studies have reported doping during childhood and prior to the

age of 10 years (Nicholls, Cope, et al., 2017). Further concerns about these behaviours are evident in literature which has argued that doping among adolescent athletes is increasing (Ruiz-Rico et al., 2017; White & Noeun, 2016; Woolf et al., 2014).

Literature has reported that risks exist in multiple domains for any person who uses prohibited substances (Nicholls, Madigan, et al., 2017). Evidence has stressed however that the negative effects of doping are salient during adolescence (Blank et al., 2016; Elbe & Barkoukis, 2017; Zucchetti et al., 2015). For example, adolescent doping has been reported to pose deleterious and irreversible risks in physical and psychological domains (Anderson et al., 1997; Maravelias et al., 2005). The physical health effects of adolescent doping include hepatic dysfunction, myocardial infraction, unfavourable changes in lipid profile and early closure of epiphysial plates (Bird et al., 2015; Rogol, 2010; Sagoe et al., 2016; Wichstrom, 2006). Psychological health effects of adolescent doping include increased depression, anxiety, aggression and body image concerns (Reardon & Creado, 2014; Rogol, 2010). Alarmingly, doping is suggested to increase adolescent suicide risk by two to four times compared to non-dopers (Irving et al., 2002; Lindqvist et al., 2014; Pallesen et al., 2006).

Behaviourally, adolescent doping is influential to habituation, dependence and addiction to substances used to enhance performance (Backhouse et al., 2013; Irving et al., 2002; Pope et al., 2012). When initiatied during adolescence, it has been suggested that doping behaviours may continue into adulthood and thus may have long-term consequences (Gomez & American Academy of Pediatrics Committee on Sports Medicine and Fitness, 2005; Lazuras et al., 2015). The behavioural risks associated with doping appear far reaching as they have increased the likelihood of tobacco, alcohol and illicit drug use among adolescents (Lorang et al., 2011; Miller et al., 2005; Nilsson et al., 2001). Behavioural risks of adolescent doping also include the practice of polypharmacy (Dodge & Hoagland, 2011; Kanayama et al., 2008). Polypharmacy occurs when several substances are used, often in excess of their suggested dose, to enhance or counter the effects of doping (Ip et al., 2011). More colloquially referred to as “stacking” (p. 6), polypharmacy is said to increase the health risks associated with doping when single substances are used (Smith et al., 2018). Further, these risks have been suggested to increase among adolescents who typically use less sophisticated substances (Woolf et al., 2014). The significant and multifaceted risks of adolescent doping present a clear need for age appropriate initiatives to prevent these behaviours.

Adolescent decision-making about doping

Much of the literature has described doping to occur through a rational, deliberate and linear decision-making process which is underpinned by choice (Goulet et al., 2010; Petróczi, 2013).

In contrast, others have questioned the extent to which the decision to dope is based on logic (Elbe & Barkoukis, 2017; Elbe & Brand, 2016; Hanson, 2009). As the majority of previous research has focused on adults, its results have questionable relevance to the developmental characteristics of adolescence. For example, a key consideration of adolescent decision-making is continued pre-frontal cortex development (Grootens-Wiegers et al., 2017). On-going development in this area of the brain is fundamental to doping as it is responsible for considered decision-making, impulse control and the ability to process conflicting information (Grootens-Wiegers et al., 2017; Steinberg, 2005). The literature has commonly suggested that late maturation of the pre-frontal cortex presents challenges for adolescents to make analytical and rational decisions which are based on logic and comprehension of potential consequences (Berger, 2017; Grootens-Wiegers et al., 2017).

Literature reveals developmental characteristics that render previous explanations of doping unsuitable among adolescent populations. The suggestion that decision-making about doping is rational appears a moot point among adolescents who are yet to develop the cognitive abilities required to make linear and considered choices. Instead, adolescent thought is argued to be based on emotions and assumptions (Berger, 2017; Kahneman, 2011). In contrast to adult cognitions, adolescent decision-making is also inclined to be irrational, intuitive and impulsive (Berger, 2017; Grootens-Wiegers et al., 2017). The speed of intuitive thought among adolescents results in decision-making which happens quickly and without sufficient consideration of necessary factors. The pace of this process during adolescence is due to increased myelination between areas of the brain which control emotions and action (Hartley & Somerville, 2015). The rate and irrationality of adolescent decision-making is also suggested to accelerate when a behaviour is perceived to pose a risk, or offer a reward (Chein et al., 2011; Ciranka & van den Bos, 2019). Adolescents' propensity to engage in risk or reward-oriented behaviours are also believed to increase through peer influence (Ciranka & van den Bos, 2019; Shulman et al., 2016; Steinberg, 2008). The reviewed literature has revealed aspects of adolescent development which render previous explanations of decision-making about doping, inappropriate among this population.

The developmental characteristics of adolescent decision-making also have practical implications regarding doping which is considered a risk behaviour by the very nature of its prohibition (Johnson, 2012; Morente-Sánchez & Zabala, 2013). Adolescent decision-making about doping may also be influenced by its perceived rewards when considered an efficient means to enhance performance (Luschen, 1993; Morente-Sánchez & Zabala, 2013). The socially mediated nature of sport offers a context in which adolescent vulnerabilities to peer influence, group conformity and the need for social acceptance are ever present. In

consideration of literature, the social context of sport contains several factors which increase the speed, and decrease the consideration, of adolescent decision-making (Berger, 2017; Ciranka & van den Bos, 2019; Santrock, 2014). As such, the dynamic context of adolescent sport exposes athletes to several factors which may heighten their vulnerabilities to SUDAA. To reduce these behaviours it is therefore important to understand developmental characteristics which may influence adolescent decision-making in sporting contexts.

Adolescence as a priority audience for doping prevention

Literature has consistently advocated for preventative, anti-doping education to begin early in the sporting journey (Backhouse et al., 2009; Braun et al., 2009; Morente-Sánchez & Zabala, 2013). Accordingly, researchers have argued that adolescent athletes should be prioritised in efforts to prevent doping (Backhouse et al., 2012; Sarafino et al., 2008). Based on this literature, it is fitting that WADA have recognised youth athletes as a target group for anti-doping education in their International Standard for Education (World Anti-Doping Agency, 2020b).

In agreement with Sarafino et al. (2008), Smith and colleagues (2018) suggested that adolescence provides a "window of opportunity" (p. 15) for the primary prevention of problematic behaviours such as doping. Primary prevention aims to thwart the initiation of a behaviour which is critical during adolescence when actions are likely to become habitual and remain into adulthood (Backhouse et al., 2009; Farrington & Hawkins, 1991). This view was substantiated in previous research which found that up to 30% of adults who doped had initiated the behaviour before the age of 20 years (Pope et al., 2014). Primary prevention is also important from a practical perspective as fiscal and human resources may more effectively prevent the initiation of doping than they could minimise established behaviours (secondary prevention), or remediate their effects (tertiary prevention) (Backhouse et al., 2009).

From a developmental perspective, adolescent characteristics appear well-suited to the effectiveness of primary prevention (Berger, 2017). This potential effectiveness is due to adolescents' amenability to change through the on-going development of their beliefs, attitudes, values and norms (Cieciuch et al., 2016; Smith et al., 2018; Woolf & Swain, 2014). This assumed malleability also makes adolescence a viable phase for the development of anti-doping attitudes and orientations (Ialongo et al., 2001; Lentillon-Kaestner et al., 2011). These outcomes have promising long-term benefits as the perspectives developed during adolescence may remain throughout adulthood (Backhouse et al., 2009; Smith et al., 2010). The preventative opportunities available during adolescence are however finite as perceptual

and behavioural change is reportedly difficult following this developmental period (National Institute on Drug Abuse, 2003). Considering the unique characteristics of adolescent development, and the viability of doping prevention during this phase, it appears critical to understand and address factors which influence doping among adolescent athletes.

Factors which influence adolescent doping

Despite evidence that doping is influenced by several factors which interact in a complex way (Erickson et al., 2015), previous research has predominantly explored the effect of isolated, intrapersonal variables on adolescent doping, intention or likelihood. For example, Lazuras and colleagues (2015) found that anticipated regret from doping, attitudes towards doping, self-efficacy beliefs and social norms predicted adolescent doping intentions. Later, Lazuras, Barkoukis, Mallia, et al. (2017) discovered that anticipated regret from doping had a protective influence on doping intentions among adolescents who used supplements. That is, adolescents who used supplements, and anticipated they would feel regret if they doped, had fewer doping intentions. Further, Blank and colleagues (2016) revealed that a fear of failure, ego-orientations and depressive mood were influential to adolescent doping susceptibility. Previous research has also revealed the influence of adolescent attitudes toward doping on engagement (Lee et al., 2008; Petróczi & Aidman, 2009). Meanwhile, investigations of knowledge found that a lack of awareness about doping, and information received from unreliable sources, were influential to adolescent doping (Duncan et al., 2018; Fürhapter et al., 2013; Kim & Kim, 2017). These examples illustrate the piecemeal way in which knowledge of factors which influence doping have emerged. These isolated perspectives provide useful information about the influence of single factors on SUDAA; however, their narrow scope insufficiently captures specific processes in context. Further, the fiscal and practical constraints of doping prevention are unlikely to extend to anti-doping initiatives which are specific to population subsets. Thus, this siloed knowledge contributes to challenges faced in translating the outcomes of doping research to practical sporting contexts (Gatterer et al., 2019).

Despite the varied, isolated factors revealed to influence doping, supplement use has been consistently associated with this behaviour. For example, research found that supplement use for the purpose of performance enhancement was influential to, and associated with, adolescent doping (Dodge & Jaccard, 2008; Lucidi et al., 2008; Mazanov et al., 2008). Further, adolescent supplement use has been considered instrumental to the development of habitual substance use to benefit performance, attitudes which tolerate doping and doping intentions (Braun et al., 2009; Ntoumanis et al., 2014; Smith et al., 2018). Supplement use has also been described as an example of “substance creep” (Smith et al., 2018, p. 14). Namely, supplement use has been considered a preliminary behaviour on a sequential, developmental trajectory

which normalises doping (Backhouse et al., 2013; Hildebrandt et al., 2012). In some literature, this trajectory has been described as having a gateway effect (Yager & McLean, 2020; Yager & O'Dea, 2014). In light of the association between supplement use and doping, it is unsurprising that Mallia et al. (2013) found that adolescent supplement users were up to ten times more likely to dope than their non-using peers.

The influence of supplement use on doping is concerning as adolescent supplement use has been considered a normative discourse in contemporary sport (Hoffman et al., 2008; Moston et al., 2015). As adolescent supplement use has been suggested to initiate early and increase with age (Garthe & Maughan, 2018; Hoffman et al., 2008), it appears that consumption gains momentum during this developmental period. This discourse, and its association with doping, indicates a need to prevent supplement use before it becomes a habitual practice to enhance performance. In light of the identified associations between these behaviours, a reduction in adolescent supplement use may have a positive effect on the prevention of doping.

The social nature of adolescent sport

Sport has been identified as an important context for the development of friendships and social approval during adolescence (Schaefer et al., 2011; Woolf & Swain, 2014). According to Rees et al. (2007), when adolescents form friendships and seek social approval, their intentions and behaviours commonly replicate those observed or perceived among their peers. As such, adolescents may be more disposed to doping when engaged in contexts which encourage this behaviour (Petróczi & Aidman, 2008; Ruiz-Rico et al., 2017; Wiefferink et al., 2008). With similarities to research on broader substance use, literature on doping has shown that adolescent perceptions of peer consumption are influential to personal use (Hawkins et al., 1992; Papadopoulos et al., 2006). Perhaps unsurprisingly, adolescents have been described as vulnerable to peer influence and descriptive norms (Berger, 2017). These vulnerabilities have important implications for SUDAA in social contexts where these behaviours may be observed or perceived.

In sporting contexts, adolescents are surrounded by support personnel who are influential to their behaviours, perceptions and experiences (Backhouse et al., 2009; Laure & Binsinger, 2005). These support personnel include parents, coaches and team managers however may also comprise of medical professionals and staff from sports organisations. A consistent view in the literature is that the decisions, orientations and views of support personnel influence how adolescents experience sport. For example, athlete support personnel have been found to influence adolescents' attitudes toward substances, and their consumption (i.e., supplements) (Berger, 2017; Garthe & Maughan, 2018; Yager & O'Dea, 2014). Further, previous research has

revealed that support personnel were associated with the likelihood of adolescent doping (Kindlundh et al., 1998; Lucidi et al., 2008) thus highlighting their influential role in SUDAA.

Literature has also revealed adolescent vulnerabilities to the control of support personnel. For example, Hodge et al. (2013) revealed that athletes' attitudes about, and engagement in, doping were influenced by autonomy controlling influences[4] oriented toward this behaviour. The literature has also shown the important influence of support personnel's control of adolescent autonomy. Specifically, the control exerted by support personnel has been suggested to thwart adolescents' basic psychological needs and to "undermine their rational and autonomous decision-making" (Berger, 2017; McNamee, 2009, p. 115). These controlling behaviours may therefore lead adolescents to engage in behaviours without question. As such, the encouragement, or repudiation, of SUDAA by support personnel appear pivotal to adolescent's respective engagement, or avoidance, of these behaviours. The influence of athlete support personnel on SUDAA is reinforced in sporting contexts by adolescent vulnerabilties to the control which may exist in the athlete-athlete support personnel dynamic. Informed by literature, the influence of support personnel on adolescent autonomy appears a critical factor in SUDAA which requires greater understanding.

Normative influences on adolescent doping

A consistent view in the literature is that adolescents are exposed to various social norms which influence SUDAA when supportive of doping (Backhouse et al., 2015; Dodge & Jaccard, 2008). This may be explained by adolescent vulnerabilities to the influence of social norms as attributed to specific aspects of brain development (Grootens-Wiegers et al., 2017). In sporting contexts, social norms have been influential to poor decision-making about substance use and have increased the odds of doping among adolescents who feel pressured to do so (Lentillon-Kaestner & Carstairs, 2010; Smith et al., 2010). Evidence has also revealed that social norms are influential to adolescents' attitudes toward doping, doping intentions and engagement (Lazuras et al., 2015; Ntoumanis et al., 2014; Zucchetti et al., 2015). Conversely, social norms oriented away from doping have influenced the avoidance of SUDAA (Donovan et al., 2002; Overbye et al., 2013; Smith et al., 2010). Evidence has also shown that norms cannot be generalised as they are specific to communities, cultures and countries (Backhouse et al., 2013; Degenhardt et al., 2010; Zucchetti et al., 2015). As cultural and contextual nuances may render social norms specific to individual audiences, it is important to generate knowledge

[4] Autonomy control is the action(s) of other people, or socio-contextual factors, which thwart adolescents' ability to experience self-determination. Ntoumanis, N., & Standage, M. (2009). Morality in sport: A self-determination theory perspective. *Journal of Applied Sport Psychology, 21*(4), 365-380. https://doi.org/10.1080/10413200903036040

about factors which influence these behaviours in the environments they occur. Therefore, a broad view of adolescent social contexts are required to gain an accurate understanding of factors influential to SUDAA therein.

Adolescents have also been described as characteristically sensitive to norms related to body image (Berger, 2017). This developmental sensitivity may explain why adolescents have cited enhancing appearance as a reason for doping in previous research (Backhouse et al., 2015; Kanayama et al., 2008). A focus on appearance has been described to heighten during this developmental phase due to the self-conciousness associated with "adolescent egocentrism" (Berger, 2017, p. 408; Elkind, 1967; Santrock, 2014). Egocentric perspectives are important to consider in the context of SUDAA as appearance priorities have previously influenced these behaviours as a weight change strategy (Bloodworth & McNamee, 2010; Field et al., 2005; Murray et al., 2016). Furthermore, adolescent exposure to normative body imagery in varied media may reinforce their appearance obsessions and provide visual examples of what they consider acceptable (Field et al., 2005; Frison et al., 2013). Literature has also shown that media have an influential role as a source of information and promotion regarding SUDAA (Frison et al., 2013; Rowe & Toner, 2003; Smolak et al., 2005). The recognised influence of media on SUDAA is concerning as Shaw et al. (2009) found this content commonly disregarded the risks associated with doping.

Literature has shown the influence of social and appearance related norms, alongside developmental characteristics, on vulnerabilities to SUDAA. The literature has also revealed that SUDAA may not only be influenced by other persons in an adolescents' immediate context but by broader factors in their sporting culture (i.e., appearance related, cultural norms). In light of appearance norms in the media, and their common association with supplement marketing, developmental vulnerabilities to these norms may have a role in SUDAA which necessitate further knowledge.

The climate of adolescent sport

Evidence has shown that adolescent athletes consistently cite enhancing performance as the predominant reason for doping (Backhouse et al., 2015; Sagoe et al., 2014). Literature has suggested that this drive to enhance performance has greater likelihood when adolescents feel pressured to win or to meet performance expectations (Bergeron et al., 2015; Johnson, 2012). It is therefore unsurprising that the performance related reasons cited for adolescent doping have been underpinned by characteristics of ego-oriented motivational climates (i.e., winning priorities, outperforming others) (Nicholls, 1989; Smith et al., 2008). Ego-oriented climates are relevant to SUDAA as they have been associated with athlete's perceived need to do what is

required to perform. These perceptions have resulted in doping to meet expectations or to keep up with the demands of competition (Johnson, 2012; Sas-Nowosielski & Swiatkowska, 2008). Further, ego-oriented climates have also been associated with adolescent doping intentions and consideration (Johnson, 2012; Kavussanu et al., 2002; Ntoumanis et al., 2017).

In contrast, mastery-oriented environments which prioritise skill development and improvement tend to deter adolescents from SUDAA (Degenhardt et al., 2010; Johnson, 2012; Smith et al., 2010). Mastery-oriented climates have also been suggested to influence adolescent's rejection of doping when exposed to relevant situations (Degenhardt et al., 2010; Elliot et al., 2004). This evidence posits the importance of establishing mastery-oriented climates in adolescent sport to protect athletes from SUDAA by prioritising athlete welfare over performance (Backhouse et al., 2017; Johnson, 2012). The influence of motivational climate on SUDAA appears to be determined by the ego- or mastery-orientation which exists in a given context. As such, it is important to identify the orientations of motivational climates in respective sporting environments to understand their influence on SUDAA.

1.2.3 Theoretical approaches to previous research

Social theories

Considered a social problem, doping has been investigated using theories from the field of social psychology (Chan, Hardcastle, et al., 2015; Efverström et al., 2016). Predominant social theories used in doping research are introduced in this section and include Social Learning Theory (SLT, Bandura, 1977), Social Cognitive Theory (SCT, Bandura, 1986) and Social Norms Theory (SNT, Berkowitz, 2005).

Social Learning Theory (SLT)

The SLT considers how dynamic and continuous interactions explain the reciprocal influence between individuals and their environment (Bandura, 1977; Johnson, 2012). Further, the SLT seeks to understand patterns of behavioural initiation, persistence and abstinence as a result of an individual's environmental interactions (Akers & Jensen, 2006). These interactions have been suggested to influence social learning through the interactive principles of differential association and reinforcement, definitions, and imitation (Akers, 2009; Akers & Jensen, 2006; Kabiri et al., 2018).

Evidence has consistently revealed associations between the interactive variables of SLT and adolescent substance use (DeMartino et al., 2015; Ford & Ong, 2014; Kelly et al., 2017). For example, variables from the SLT have explained increased doping likelihood among individuals who knew others that doped (differential association) and who doped without detection

(differential reinforcement) (Kabiri et al., 2019). Further, athlete's association with others who viewed doping positively (definitions), and observations or knowledge of doping among others (imitation), increased their likelihood of engaging in this behaviour (Kabiri et al., 2019). The extent of learning which takes place through these environmental interactions is suggested to depend on the extent to which an individual is exposed to influential others and media sources (Backhouse et al., 2009; Lee et al., 2004). Of relevance to this context of research are suggestions that social learning is most influential in primary group settings (e.g., with teammates and coaches) and secondary group settings where individuals do not share a personal connection (e.g., training venues) (Akers & Jensen, 2006; Kabiri et al., 2019). The SLT therefore indicates that adolescents may learn through their observations of SUDAA, and exposure to its promotion, in their sporting context.

Social Cognitive Theory (SCT)

The SCT posits that learning occurs in social environments through dynamic interactions between individuals, environments and behaviours (Bandura, 1986). A key construct of SCT, which differentiates it from SLT, is the consideration of self-efficacy (Lucidi et al., 2008). Self-efficacy represents an individual's perception that they are able to control and regulate their engagement in, or avoidance of, specific behaviours (Bandura, 1977). Through the SCT, doping is considered a maladaptive and anti-social behaviour which has been related to an individual's self-regulation and social context (Lucidi et al., 2008; Mallia et al., 2016). The SCT, and it's respective constructs, have been considered a legitimate means to investigate adolescent doping behaviour and thus have frequently underpinned research in the field (Lucidi et al., 2008; Sekulic et al., 2016; Zelli, Lucidi, et al., 2010). As the SCT pertains to an individual's self-regulation, and perceived behavioural control (PBC), it is necessary to understand the influence of adolescent interactions in their social environment on these constructs. For example, autonomy controlling behaviours among support personnel have influenced SUDAA (Hodge et al., 2013). Used in isolation, the SCT fails to capture these dynamic effects and thus provides an incomplete view of factors which influence SUDAA.

Social Norms Theory (SNT)

A further social theory relevant to SUDAA is the SNT. The SNT assumes that an individual's actions are influenced by their perceptions of others' behaviour as well as what others expect and will accept (Hahn-Smith & Springer, 2005). In the context of this research, the SNT would consider adolescent's perceptions of the extent to which people important to them would approve if they doped (subjective norm). The SNT would also consider adolescent's beliefs about the prevalence of doping in their sporting environment (descriptive norm) (Lazuras et al., 2015; Rivis & Sheeran, 2003).

Originally used in the context of youth substance use, SNT has investigated the normative influence of peer alcohol use on personal consumption among college students (Berkowitz, 2004, 2005). Berkowitz (2004) found that an overestimation of alcohol consumption among peers was influential to increased personal use. In contrast, underestimated peer consumption had an opposing effect and decreased college student's alcohol use (Berkowitz, 2004). Doping research underpinned by the SNT similarly found that adolescent's perceptions of subjective and descriptive norms influenced their engagement in this behaviour (Eisenberg et al., 2014; Johnson, 2012). The SNT however does not consider the cultural norms which may have a subliminal influence on SUDAA, nor intrapersonal factors which may intrinsically affect these behaviours.

Behavioural theories

The Theory of Reasoned Action (TRA, Fishbein & Ajzen, 1975) and Theory of Planned Behaviour (TPB, Ajzen, 1988) are behavioural theories which are commonly used in doping research.

Theory of Reasoned Action (TRA)

The TRA posits that intentions are an immediate determinant of behaviour (Fishbein & Ajzen, 1975). This theory suggests that intentions are influenced by an adolescent's perception of normative pressure to perform a behaviour (subjective norm) and their favourable or unfavourable feelings about a behaviour (attitudes) (Dodge & Jaccard, 2008). In the context of doping, the TRA therefore assumes that an individual's perceptions of normative pressure to dope, and their attitudes towards this behaviour, have a linear influence on their doping intentions (Dodge & Jaccard, 2008). Previous research has established that these assumptions work in an opposing direction regarding doping. That is, non-positive attitudes toward doping, and perceived anti-doping norms, have predicted adolescent's intentions to avoid doping (Dodge & Jaccard, 2008). Tenets of the TRA (and TPB) consider situational and motivational factors which influence deliberate behaviour and are therefore consistent with literature which suggests that doping is an intentional and premeditated behaviour (Lucidi, Mallia, et al., 2017; Petróczi, 2013). Key criticisms of the TRA are presented in the section which follows.

Theory of Planned Behaviour (TPB)

As an extension to the TRA, the TPB was conceptualised to explain volitional behaviour (Ajzen, 1991). The TPB assumes that behaviours occur through logical and rational decision-making processes through which individuals evaluate the information available to them (Richard et al., 1998; Ryan & Carr, 2010). Consistent with the TRA, the TPB assumes that intentions predict behaviour. In contrast to the TRA, the TPB considers the influence of PBC on intentions (Murnaghan et al., 2009). The TPB therefore assumes that PBC, norms, and attitudes mediate

the influence of any other factor on an individual's behaviour (Ajzen, 1991). As the TPB is capable of considering non-volitional behaviour by measurement of PBC, it is among the predominant theories to have predicted adolescent doping, and anti-doping, intentions (Chan, Hardcastle, et al., 2015; Goulet et al., 2010; Zelli, Mallia, et al., 2010).

Key criticisms of these behavioural theories include the lack of consideration given to the extent to which an athlete experiences volition. Further, the TRA and TPB suggest that intentions are formed through subjective norms and attitudes. Thus, these theories insufficiently account for complex interactions between a broad range of factors which influence doping (Erickson et al., 2015). Accordingly, Fishbein and Cappella (2006) and Rivis and Sheeran (2003) have criticised these theories for their inadequate consideration of normative influences (e.g., descriptive norms) and situational factors (e.g., situational temptation). These criticisms were corroborated in research which found that SUDAA was influenced by additional variables including affective processes, motivational regulations and anticipated regret (Conner & Armitage, 1998; Lazuras et al., 2015; Sandberg & Conner, 2008). Despite their widespread use to identify doping intentions, the TRA and TPB appear incompatible with developmental characteristics which render adolescents unlikely to make rational, linear or volitional decisions (Berger, 2017; Grootens-Wiegers et al., 2017). These inconsistencies raise questions as to the suitability of the TRA and TPB in research with adolescent populations. Lastly, it is important to note that while the TRA and TPB assume that intentions will precede behaviour, their presence does not indicate that SUDAA will occur. As such, use of the TRA and TPB provide useful insights about the influence of specific constructs on doping intentions, however they insufficiently capture the broad range of factors which may result in SUDAA.

Motivational theories

Self-Determination Theory (SDT)

The SDT seeks to understand the orientation, causes and consequences of individual motivation (Gillet et al., 2010). The premise of the SDT is that the extent of an individual's self-determination depends on the satisfaction of their basic psychological needs for autonomy, competence and relatedness (Deci & Ryan, 2000; Vallerand & Losier, 1994). An important aspect of the SDT is identifying an individual's motivation on a continuum which is influenced by socio-contextual factors (Deci & Ryan, 2002). At one end of this continuum is extrinsic motivation (doing an activity for reasons other than the activity itself) and at the other resides intrinsic motivation (doing an activity for its own sake and/or the pleasure it provides). A separate state is amotivation which indicates an absence of motivation (Vallerand & Losier, 1994).

The SDT has been used in previous research underpinned by the assumption that doping is an individually motivated behaviour (Petróczi, 2007). Specifically, the SDT has measured the effect of an athlete's self-determination and motivation on their doping engagement, intentions and consideration (Chan, Dimmock, et al., 2015; Hodge et al., 2013; Mudrak et al., 2018). For example, Mudrak et al. (2018) found negative associations between less self-determined motivation and adolescent's ability to keep winning in proportion. These findings are important in consideration of the predominant competitive discourse in adolescent sport in which a lack of self-determination may have negative implications for doping. This discourse has further relevance to SUDAA where contextual influences and motivational climates have been considered important determinants of an individual's situational motivation and self-determination (Smith et al., 2010). This evidence is noteworthy during adolescence when athletes are vulnerable to influences which control their decision-making (McNamee, 2009). For example, the presence of autonomy control in an ego-oriented motivational climate has been suggested to undermine self-determination and to justify anti-social behaviours (i.e., doping) as a means to an end (Gillet et al., 2010; Hodge & Gucciardi, 2015). Comparatively, autonomy supportive climates have been considered central to the satisfaction of individuals' basic psychological needs and their engagement in pro-social behaviours (i.e., anti-doping) (Gagne, 2003). The importance of self-determination in this context was substantiated in research by Chan, Dimmock, et al. (2015) which revealed that self-efficacy, attitudes toward doping and perceived norms were influential to doping avoidance. Based on this evidence, it appears that autonomy support[5] may be an influential ingredient of an adolescent's self-determination not to engage in SUDAA and thus should be considered in preventative efforts.

Knowledge gained from the previous use of SDT has provided useful insights to interactions between motivation and doping however broader consideration of contextual motivation is required to understand factors which influence SUDAA at all levels of the sporting context. While identifying the orientation of adolescent's motivation for SUDAA is important, the SDT is limited in this context as it insufficiently reveals how socio-contextual factors interact to influence an individual's self-determination. As such, Hodge et al. (2013) and Ntoumanis and Standage (2009) have recommended that future research on pro- and anti-social behaviours use the SDT with consideration of contextual motivational variables (e.g., motivational climate, autonomy support and autonomy control) (Hodge et al., 2013; Ntoumanis & Standage, 2009).

[5] Autonomy support is the action(s) of other people, or socio-contextual factors, which consider adolescents' feelings and views, and foster their ability to experience self-determination. Ibid.

Criticisms of previous research

A key criticism of previous research has been the wide variation of theories and models used to investigate doping. While it has been established that doping is influenced by a wide range of isolated factors, variations between research methods and items used have presented challenges for findings to be compared (Lazuras, Barkoukis, Loukovitis, et al., 2017). Moreover, the use of isolated theories contrast the outcomes of previous research which found that doping occurred due to a complex interaction of influential factors (Erickson et al., 2015; Hauw & McNamee, 2015; Lazuras et al., 2015). These criticisms are supported by Barkoukis et al. (2013), who claimed that one-dimensional approaches have provided narrow perspectives and partial explanations of doping behaviour. Further, the use of single theories have been considered insufficient to identify causal interactions between constructs and to capture the broad range of factors which influence doping (Backhouse et al., 2007; Johnson, 2011). Similarly, previous research has been criticised for the attention paid to specific behaviours (e.g., doping and supplement use) at the expense of focusing on factors which influence athlete perspectives of doping (Johnson, 2011). According to Mees et al. (1968), it is important to generate an understanding of these perspectives, and to address them early, as they have been considered a challenge to alter once internalised.

In response to the criticisms of previous research, integrative approaches have been implemented to investigate doping using "novel theoretical models" (Backhouse et al., 2015, p. 7). Based on the assumption that broader theoretical perspectives may provide more comprehensive explanations of doping behaviour, these unique approaches have measured variables from several theoretical models in single studies (see Blank et al., 2016; Lazuras et al., 2015; Lucidi et al., 2008). For example, Lazuras and colleagues (2015) used an integrative model to investigate distal and proximal predictors on adolescent doping intentions. This model used a broader range of variables than available through isolated use of the TPB (Fishbein, 2009). Another example of an integrative approach is the Sport Drug Control Model (SDCM) by Donovan et al. (2002). The SDCM included the Health Belief Model (HBM) which is a behaviour change model concerned with actions which address specific health issues (Becker, 1974; Donovan et al., 2002). Outside of these integrated approaches, and despite knowledge of the complexities of doping, Lazuras, Barkoukis, Mallia, et al. (2017) pointed out that isolated factors continue to be investigated in this field. The narrow perspectives available through isolated approaches contrast the promise of comprehensive views afforded when doping is investigated through integrated methods. In light of the complexities known to influence doping, and the continued use of isolated theories which investigate single factors, it appears this field of research has been slow to respond to advances in knowledge.

Areas which require greater understanding

This review of literature has revealed several areas which require further research to advance contemporary understanding of what influences SUDAA and to inform the design and direction of its prevention. A specific area which requires greater understanding is the role of autonomy in SUDAA. Previous explanations of doping which have been articulated in this chapter posit doping as a volitional behaviour (Petróczi, 2013). This perspective of volition collides with adolescent sporting contexts in which the influence of autonomy controlling contexts on doping has been substantiated (Hodge et al., 2013). While increased autonomy has been defined as a developmental characteristic of adolescence (Berger, 2017; McNamee, 2009), insufficient knowledge remains about the role of adolescent autonomy on SUDAA. Specifically, respective aspects of the autonomy construct require interrogation in this context; internal perceived locus of causality (IPLOC), volition and PBC (Ng et al., 2011). Literature has highlighted the need for greater understanding about the role of each aspect of adolescent autonomy on SUDAA from developmental and contextual perspectives.

While the influential role of support personnel and stakeholders on SUDAA in adolescent sporting contexts have been established (Backhouse et al., 2015; Kavussanu et al., 2002), the perspectives of this population on these behaviours have been overlooked in extant literature. Outside this field of research, stakeholder participation has become an emerging trend to investigate issues influenced by, or influential to, individuals in these roles (Boaz et al., 2018; Sloan, 2009). In light of the influence of support personnel and stakeholders on SUDAA, alongside a paucity of literature on the perspectives of this population, there remains much to learn from the voices and lived experiences of this cohort.

1.2.4 Adolescent prevention programmes

Despite useful insights drawn from previous research and anti-doping programmes, best practices to reduce SUDAA remain elusive (Backhouse et al., 2009; Smith et al., 2018). While WADA has placed emphasis on the empiricial evaluation of prevention programmes, their scarce conduct has resulted in a lack of evidence on effective approaches to prevent SUDAA (Sagoe et al., 2016; World Anti-Doping Agency, 2016). From the small number of evaluations which have been conducted, inconclusive, contradictory and statistically insignificant outcomes have failed to advance knowledge of how to prevent SUDAA (Backhouse et al., 2014; Backhouse et al., 2012; Hauw, 2017). In the absence of clear best practices, varied approaches continue to underpin efforts to prevent doping. The results of effective prevention programmes in the fields of adolescent substance use (e.g., alcohol, illicit drugs) and problematic behaviour (e.g., bullying) provide useful insights to the prevention of SUDAA. The

design and outcomes of these programmes, and those which aimed to prevent SUDAA, are summarised in the section which follows.

Knowledge transfer (KT)

KT, or information dissemination, is the approach most commonly used in previous doping prevention programmes (Backhouse et al., 2007). According to Canning et al. (2004), KT was a common educational approach in the 1980s which was driven by the TRA (Ajzen & Fishbein, 1980), TPB (Ajzen, 1985) and HBM (Becker, 1974). In attempts to prevent doping, KT occured through the provision of technical and factual information to athletes about WADA's Prohibited List, doping control processes and consequences of doping (Sas-Nowosielski & Swiatkowska, 2008; World Anti-Doping Agency, 2016). In this context, KT approaches assumed that the dissemination of technical information would influence athlete behaviour and thus, prevent doping (Canning et al., 2004; Lentillon-Kaestner et al., 2011; Sagoe et al., 2015).

In contrast to its objectives, KT approaches appeared in some cases to have had a boomerang effect whereby adolescent's exposure to information about SUDAA increased their engagement (Goldberg et al., 1991; Sjöqvist et al., 2008; Wanjek et al., 2007). This effect was consistent with the outcomes of KT approaches to reduce illicit drug use among adolescents (Strasburger, 1989; Tennant et al., 1973). These effects may have been explained in part by athletes' use of knowledge gained to engage in a cost-benefit analysis (Backhouse et al., 2013; Lazuras, Barkoukis, Mallia, et al., 2017). For example, athletes may compare what they stand to lose if they use supplements or dope, with the benefits they perceive from these behaviours. The boomerang effect may also have been due to the aforementioned developmental characteristics through which adolescents have heightened response to behaviours which pose a risk, or offer a reward (Chein et al., 2011). For example, if KT positions doping as a risk (e.g., by emphasising its prohibition), or to offer a potential reward (e.g., by stating its possible performance benefits), adolescents may have greater inclination to engage in their use. Importantly, the boomerang effect identified through KT implied that athletes were receptive to doping and had placed value on its perceived benefits which should be considered in preventative efforts.

Despite the prevalence of KT approaches, researchers have considered this an insufficient method to deter or prevent doping and illicit substance use when used in isolation (Backhouse et al., 2009; Hanson, 2009; Singler & Treutlein, 2010). In contrast, merit has been identified in KT as a component of multimethod approaches to prevent adolescent doping. Evidence of these multimethod approaches were observed in the following programmes: Adolescents Training and Learning to Avoid Steroids (ATLAS), Athletes Targeting Healthy Exercise and

Nutrition Alternatives (ATHENA), and HERCULES (Goldberg & Elliot, 2005; Sagoe et al., 2016). Evaluations of these programmes suggested that KT had a role in the prevention of SUDAA within developmentally appropriate, multimethod approaches (rather than in isolation). Further, adolescents' heightened propensity to engage in behaviours that offer perceived risk or reward indicate that KT may have greater effect when the prohibition and performance enhancing potential of doping are not areas of focus in preventative initiatives. The ATLAS, ATHENA and HERCULES programmes which included KT as components of their multimethod approaches to prevent SUDAA are summarised below.

The Adolescents Training and Learning to Avoid Steroids (ATLAS)

The ATLAS programme aimed to prevent doping among adolescent males in the USA (Goldberg & Elliot, 2005; Goldberg et al., 1996). This multimethod programme comprised of seven, 45-minute KT sessions and seven, 45-minute strength and Life skills training (LST) sessions. Each session was delivered by coaches and peers, in a team environment, through cooperative learning techniques. Strength training and the development of life skills were fundamental components of this programme which aimed to provide practical doping refusal skills and healthy alternatives to doping (Botvin et al., 2003). Evaluation of the ATLAS programme found that participants had increased strength training and nutrition self-efficacy following their engagement. Participants also completed the ATLAS programme with decreased attitudes towards doping and fewer doping intentions (Goldberg & Elliot, 2005). Outcomes of the ATLAS programme indicated that the combination of practical and theory-based sessions, which included KT and LST, had a positive effect on reducing SUDAA. As the ATLAS programme was evaluated in the USA, and developed for male sports teams, its effectiveness remains unknown in alternate countries, with other genders or in individual sports.

The Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA)

The ATHENA programme had many similarities to ATLAS however was designed for adolescent female participants (Elliot et al., 2004; Goldberg & Elliot, 2005). ATHENA consisted of eight, 45-minute sessions led by coaches and peers in school time. Core focus areas of this programme included the reduction of harmful behaviours, the promotion of healthy behaviours, and increased awareness of media influences. Immediate evaluation of the ATHENA programme showed its positive effects on the development of drug refusal and decision-making skills, less positive attitudes towards doping and decreased initiation of this behaviour (Elliot et al., 2008). It should be noted that the effects of this programme were only short-term as its immediate outcomes had attenuated within nine-months of participation (Smith et al., 2018). It is anticipated that these outcomes owed to the fact that the primary ATHENA intervention was not followed by booster sessions. These outcomes were consistent with other adolescent

substance use prevention programmes which did not implement booster sessions and whose immediate effects decreased over time (Ellickson et al., 1993; Skara & Sussman, 2003). As part of a multimethod approach, the ATHENA programme has shown the effectiveness of LST on the prevention of SUDAA. Long-term evaluation of this programme however suggests that the retention of immediate outcomes from isolated interventions should not be assumed without the provision of booster sessions. These booster sessions would have several fiscal and human resource implications for which additional evidence on long-term effectiveness is required.

HERCULES

The HERCULES programme was based on ATLAS and ATHENA however was not gender specific (Sagoe et al., 2016). With similarities to the multimethod approach of ATLAS and ATHENA, the HERCULES programme included several theoretical and practical components. For example, theory-based sessions included elements of KT while practical sessions included LST. Immediate outcomes of this programme were measured through baseline and post-test results from adolescents in a control group (CG), a knowledge transfer only group (KT) and an experimental group (EG) who were exposed to practical training as well as KT. As a result of involvement in HERCULES, EG participants had increased strength training skills and greater understanding of the negative effects of specific doping substances. As it is unclear if these outcomes influenced adolescent's engagement in doping, long-term evaluation of the HERCULES programme is required to assess its effectiveness over time.

Taken together, the ATLAS, ATHENA and HERCULES programmes have shown that a combination of theoretical and practical elements can have a positive influence on preventing SUDAA when delivered over sequential sessions. For example, theory sessions included in these programmes presented balanced information on the consequences of SUDAA alongside the benefits of effective training and nutrition practices (Elliot et al., 2004; Sagoe et al., 2016). The HERCULES programme also included theory sessions on ethics in sport and coping with peer pressure (Sagoe et al., 2016). To reinforce normative outcomes from theory sessions, participants practiced refusal skills to doping offers and presented media messages about SUDAA to their peers (Elliot et al., 2004; Goldberg et al., 1996). In practical sessions, ATLAS and HERCULES participants engaged in supervised strength training sessions where they learnt appropriate weightlifting techniques (Goldberg et al., 1996; Sagoe et al., 2016). Further, ATHENA participants engaged in food classification activities where emphasis was placed on the role of carbohydrates in sport and as a nutritional requirement of adolescence (Elliot et al., 2004). The use of contextually grounded methods in these programmes have shown that LST, and combined theory and practical sessions, are effective approaches to reduce SUDAA.

Life skills training (LST)

The aim of LST is to develop personal and social skills to prevent problematic behaviours (Botvin et al., 1995). The skills focused on in LST have included communication, drug refusal, resistance to pressure, awareness of media influences and healthy body image (Backhouse et al., 2009; Smith et al., 2018). Effective aspects of ATLAS, ATHENA and HERCULES were attributed to their respective practical training components which developed positive alternatives to problematic behaviours through LST. For example, ATLAS developed strength training skills as an alternative to doping while drug refusal and decision-making skills were obtained through participation in ATHENA (Elliot et al., 2008; Goldberg & Elliot, 2005).

LST has also been used outside of the field of doping where it has reduced problematic behaviours and substance use among adolescents (Botvin et al., 2003; Byrne & Mazanov, 2005; Faggiano et al., 2005). Botvin et al. (2003) also revealed that the positive outcomes of LST on adolescent substance use prevention endured into adulthood. Moreover, LST has effectively prevented alcohol use and smoking among pre-adolescents (Botvin et al., 2003). These findings indicate that LST offers an appropriate approach for a broad range of athletes (i.e., pre-adolescents) for whom long-term, anti-doping outcomes may be achieved. Based on available evidence, LST appears a contextually and developmentally appropriate approach to equip adolescents with the necessary skills to address factors which influence SUDAA.

Fear-based approaches

Lucidi and colleagues (2017) described “scare-based” (p. 2) techniques that had been used to prevent adolescent doping. Otherwise considered a fear-based approach, this technique assumed that instilling concern about the negative consequences of a behaviour would cease or prevent adolescents’ engagement. In the context of doping, negative consequences include detrimental health effects and bans from sport. A body of evidence has shown that fear-based approaches are an ineffective doping deterrent among adolescents who have doped or are tempted to do so (Lentillon-Kaestner et al., 2011; Lucidi, Zelli, et al., 2017; Santos, 2015). In contrast to their intent, fear-based approaches have also failed to increase adolescent beliefs about the negative consequences of substance use (i.e., doping) (Faggiano et al., 2005; Lucidi, Mallia, et al., 2017; Roe & Becker, 2005).

From a developmental perspective, the ineffectiveness of fear-based approaches to prevent adolescent substance use may be explained by a characteristic “invincibility fable” (Berger, 2017, p. 409). This characteristic indicates that an adolescent may believe themselves exempt from the harm and consequence that others may experience from doping (Berger, 2017; Johnston et al., 2011; Laure et al., 2004). Further research also found that information about

the negative health effects of doping was disregarded by adolescents who perceived these dangers to be exaggerated or who knew others that doped without negative consequence (Denham, 2009; Pallesen et al., 2006). On the basis of available evidence, fear-based approaches appear unlikely to reduce or prevent supplement use or doping during the developmental period of adolescence. The effectiveness of fear-based approaches appears even less likely among adolescents who have doped, have temptations to dope, or who perceive that others dope without ill effect.

Ethical decision-making training

Elbe and Brand (2016) developed an ethical decision-making training programme to prevent doping among adolescent athletes in Germany. Participants were assigned to an experimental group (EG), knowledge transfer group (KT) or a control group (CG). EG participants spontaneously reacted to 18 hypothetical, ethical scenarios over six sessions. KT participants engaged in six, online theory sessions through the anti-doping education programme of Germany's National Anti-Doping Agency. CG participants did not engage in any form of prevention.

All participants completed a pre- and two-week post-test which unintendedly found that EG participants had more positive attitudes toward doping in post-test results. These results showed that ethical decision-making training had a boomerang effect on adolescent attitudes toward doping. In contrast, KT and CG participants reported no changes in attitudes towards doping. Positively, post-test results revealed that EG participants felt more prepared to encounter doping situations, had increased awareness of factors to consider if faced with doping and were more able to demonstrate their opinions about this behaviour (Elbe & Brand, 2016). Initial evidence from this prevention programme indicate that ethical decision-making training may be a promising approach to prepare adolescents for doping situations however not to effect attitudes toward doping. It is unclear if this programme was implemented beyond its original measurement however further evaluation is required to ascertain the effect of ethical decision-making on SUDAA.

Project-based learning approaches

Barkoukis and colleagues (2016) aimed to prevent doping among 12-18-year-olds in Northern Greece using a project-based learning approach (Kilpatric, 1918). Participants were assigned to an experimental group (EG) or a control group (CG). All participants completed identical pre- and post-tests, before and after a 20-hour block of classroom time. EG participants collaborated with peers in the design, presentation and discussion of projects which addressed specific units related to doping including doping side effects and nutrition as a doping

alternative. CG students did not receive classroom content about doping. In comparison to CG participants, and in contrast to the intent of this programme, post-test assessments revealed elevated descriptive doping norms among EG participants as a result of project based learning (Barkoukis et al., 2016). The post-test results also showed that EG participants, in comparison to CG students, had more negative attitudes toward supplement use and believed that doping was harmful to the integrity of sport. Interestingly, no change was found in EG participants' attitudes toward doping. Initial insights to this project-based learning approach indicate its effectiveness may be limited to addressing adolescent supplement use and perceptions of sports integrity. As consistent with other programmes, evidence from long-term evaluations of this programme are unavailable, therefore more comprehensive insights remain elusive.

Media literacy training (MLT)

Lucidi and colleagues (2017) aimed to prevent doping among 13-19-year-old high-school students in Italy using a cognitive approach to enhance their media literacy (Potter & Foulger, 2004). Participants were assigned to an EG or CG and completed identical pre- and post-intervention assessments. The CG participated in usual curriculum content while the EG engaged in twelve, 90-minute sessions which were delivered twice in each month of the school year. These multimethod sessions focused on increasing EG participants' recognition and critical evaluation of appearance imagery in sport media. The intent of this approach was to reframe EG participants' views on negative imagery and to develop positive ways to consume visual content. The first eight sessions were led by high-level athletes, communication, pharmacology and sport psychology experts. The final four sessions were supervised by communication and sport psychology experts however were peer-led as students worked collaboratively to develop anti-doping media messages and sensitisation campaigns for their peers. This level of interactivity was informed by evidence of similar approaches that had increased the effectiveness of media literacy interventions (Banerjee & Greene, 2006).

Following six months of implementation, MLT had decreased supplement use among EG participants who also reported positive changes in their attitudes and views of illegal performance and appearance enhancing substances. Peer interaction was an aspect of MLT which contributed to the effectiveness of this programme as adolescents shared their views on doping and worked collaboratively to develop anti-doping sensitisation campaigns (Lucidi, Mallia, et al., 2017). A unique aspect of this programme was the facilitators' provision of opportunities for autonomy as adolescents engaged in peer-led activities and subsequently presented collaborative media campaigns to their class. These results suggest MLT is a promising method to prevent SUDAA for the purposes of performance and appearance

enhancement. These results also show the benefits of adolescent autonomy in the prevention of doping.

Interestingly, the behaviours prevented through MLT were those that participants were most frequently exposed to through media. Thus it appears that MLT may have greatest effect on preventing behaviours which are visible in adolescents' practical contexts (i.e., supplement use to enhance appearance). In contrast, MLT appears an ineffective method to prevent doping intentions, or to alter perceived subjective norms, among adolescent athletes. These outcomes were consistent with the use of MLT in broader health domains where Se-Hoon et al. (2012) found engagement to have a null effect on altering subjective norms. The available evidence does not indicate if EG participants reported prospective intentions to dope, or perceived subjective norms, therefore the lack of change recorded after MLT should be interpreted with caution. Consideration of participants' age and comprehension should also be made when interpreting their perceived subjective norms and self-reported intentions to dope (Lucidi, Mallia, et al., 2017).

While follow up evaluations remain necessary to understand the long-term effects of MLT on SUDAA, its immediate outcomes suggest this approach may have a positive effect on reducing supplement use. While it doesn't appear that MLT decreases adolescent doping, associations between supplement use and doping (Ntoumanis et al., 2014) indicate that by reducing supplement use, MLT may have an indirect influence on decreasing doping. Further, MLT appears an effective approach to address views of illicit performance and appearance enhancing substances which is a characteristic priority during this developmental period.

Social influence (SI) approaches

SI approaches are underpinned by social theory and as such, include aspects of SLT and SNT. Key tenets of SI approaches therefore posit that adolescent behaviours, perceptions and beliefs may be shaped by their interactions with others and environmental norms (Slattery-Walker, 2007). Consistent with SLT, SI approaches suggest that problematic behaviours initiate as a result of observing and imitating the actions of others (e.g., peers), or those indicated by influential sources (e.g., social media) (Backhouse et al., 2009; Bandura, 1977). In line with the SNT, SI approaches consider the influence of perceived norms on adolescent behaviour (Berkowitz, 2004). Based on these propositions, the importance of reinforcing positive norms (i.e., anti-doping), while challenging the perceived acceptance and prevalence of problematic behaviours (i.e., doping), are crucial aspects of the SI approach (Berkowitz, 2004, 2005).

Among adolescents, the effectiveness of SI approaches to prevent problematic behaviours and substance use (e.g., alcohol, illicit drugs) has been substantiated (Canning et al., 2004; Eisen et

al., 2002; McGrath et al., 2006). Further, Canning et al. (2004) revealed the long-term benefits of SI approaches as the on-going evaluation of one preventative programme showed its intended effect up to three-years post implementation. The literature reviewed suggests SI approaches provide a promising technique to prevent SUDAA with enduring outcomes.

1.2.5 Strengths and limitations of previous prevention programmes

Strengths

The prevention programmes reviewed in this section have exposed a range of strengths for consideration in future approaches to prevent SUDAA. Firstly, the complementary nature of theoretical and practical approaches had a positive effect on the prevention of doping among male and female adolescents (e.g., ATLAS, ATHENA) (Goldberg & Elliot, 2005; Sagoe et al., 2016). These multimethod approaches align with WADA's recommendation that anti-doping education should provide athletes and others with the "information, values and life skills they need to remain clean" (World Anti-Doping Agency, 2016, p. 5). These suggestions indicate a transition from previous isolated KT approaches to the combined use of components from extant programmes with contextual and developmental suitability to target audiences.

Second, the use of peer-learning appears a promising approach to enhance the relevance and impact of efforts to prevent SUDAA (Barkoukis et al., 2016; Lucidi, Mallia, et al., 2017). Additionally, merit has been shown in the inclusion of support personnel in efforts to prevent SUDAA through collaborative development and facilitation of initiatives (Barkoukis et al., 2016; Elliot et al., 2008; Goldberg et al., 2000).

Finally, SI approaches which include aspects of SLT and SNT appear a viable approach to prevent SUDAA. For example, an effective approach to reduce SUDAA through SLT may include increasing adolescents' exposure to initiatives in which anti-doping behaviours are observed and learnt (e.g., healthy nutrition practices) (Goldberg & Elliot, 2005). A further SI approach which may reduce SUDAA through SNT is the promotion of positive social norms about anti-doping through community wide, multimedia campaigns (e.g., billboards, social media). Previous use of this approach has effectively reduced acceptance of, and engagement in, problematic adolescent behaviours (i.e., substance use) (Backhouse et al., 2009; Berkowitz, 2004). This evidence posits that community wide approaches which increase adolescent's exposure to anti-doping practices, and reinforce anti-doping norms, have potential to reduce SUDAA. As international estimates suggest a minority of adolescent athletes have doped (1-5%, Backhouse et al., 2015), it not anticipated that the majority of individuals in this population will engage in this behaviour. A SI approach therefore offers a novel way to harness, and reinforce, the normative abstinence from doping among this population. As

adolescents are vulnerable to social norms (Dodge & Jaccard, 2008), a SI approach appears a practical, and theoretically grounded, solution to reinforce an anti-doping norm in sporting contexts and thus reduce SUDAA.

Limitations

Several limitations emerged in this review of prevention programmes. One limitation was the isolated implementation and evaluation of programmes in single countries including: ATLAS and ATHENA (USA), HERCULES (Sweden), and Ethical decision-making (Germany). The isolated nature of these evaluations present challenges to reliably compare their outcomes with other cultures, contexts and populations. While unknown, it is anticipated that varied outcomes would be obtained from expanded implementation of these programmes due to the norms which exist in respective countries, cultures and communities (Backhouse et al., 2013; Degenhardt et al., 2010; Zucchetti et al., 2015). These challenges indicate that universal best practices to reduce SUDAA may be unattainable owing to the contextual nuances of varied sporting environments. As such, these outcomes highlight the need for population specific research and tailored initiatives to prevent SUDAA. Wider implementation and evaluation of these programmes are, however, required to substantiate these assumptions.

A further limitation of these prevention approaches was that long-term evaluation data were only available for the ATLAS and ATHENA programmes (Goldberg & Elliot, 2005). As such, many insights generated in this review were based on isolated experiments and should therefore be interpreted with caution. Further limitations exist with the ATLAS and ATHENA programmes regarding their relevancy to adolescent sporting contexts more broadly. Firstly, these programmes focused on team sport environments (e.g., basketball) and referenced specific performance enhancement substances (e.g., steroids). This narrow scope has limited the transferability of these programmes, and their outcomes, to individual (rather than team) sports and with regards to additional substances (Backhouse et al., 2009). Further, it has been over 25 years since the ATLAS and ATHENA programmes were designed. According to Barkoukis et al. (2016), these dated initiatives have questionable relevance to contemporary populations and adolescent sporting contexts. For example, supplement use is prominent discourse in adolescent sport today however it is unlikely that these behaviours were addressed as currently required, in the original design of ATLAS and ATHENA. Further, advances made in doping research throughout the past 25 years will not be recognised in the content or approach of original ATLAS and ATHENA programmes.

To conclude, the literature revealed that previous prevention programmes have experienced greater effectiveness through multimethod approaches which included the development of

practical skills to address factors associated with SUDAA. Previous approaches have also shown merit in the collaborative design of preventative initiatives with peers and athlete support personnel prior to their implementation in practical sporting contexts (Backhouse et al., 2009; Goldberg & Elliot, 2005). Evidence from the field of substance use has also shown that problematic behaviours can be prevented when adolescents have reduced exposure to factors known to increase a behaviour, alongside greater exposure to factors which decrease its occurrence (National Institute on Drug Abuse, 2003, 2018). Literature therefore suggests that SUDAA may be prevented through increased exposure to autonomy support and self-determination (Chan, Dimmock, et al., 2015), alongside decreased exposure to ego-oriented sporting climates (Blank et al., 2016).

The literature also revealed that identifying factors which influence SUDAA is critical to understanding and preventing these behaviours. The evidence has argued that, to effectively reduce SUDAA, consideration of the developmental characteristics of adolescent athletes is also required (Haugen et al., 2013; Woolf & Swain, 2014). Further, the importance of understanding factors which influence SUDAA in the contexts they occur has been highlighted due to their uniqueness to respective countries, cultures and sporting communities (Backhouse et al., 2013; Degenhardt et al., 2010; Zucchetti et al., 2015). To summarise, the literature has provided a dichotomous perspective on what is required to effectively reduce SUDAA. From one perspective, the literature posits a need to develop a robust understanding of the individual factors and developmental characteristics which influence SUDAA in respective sporting contexts. From an alternate perspective, the evidence has shown the need for careful consideration to be given to normative and contextual influences on SUDAA in adolescents' practical environment. When combined, these perspectives offer outcome-oriented solutions to reduce SUDAA with greater effect, relevance and transferability to sporting contexts.

1.3 Chapter summary

This chapter introduced this thesis and provided a comprehensive review of literature and evidence of relevance to SUDAA. In the introduction, the rationale, aims and objectives of this thesis were presented, followed by an outline of its structure. A review of literature was then provided as relevant to the developmental, normative and contextual factors which have been associated with SUDAA. The theories which underpin previous research on SUDAA were then detailed before approaches to prevent adolescent doping and other problematic behaviours were explored. The introduction and literature review presented in this chapter informs the MMR design and theoretical positioning of this thesis which is presented in chapter two.

Chapter 2 Methodology

2.1 Chapter introduction

This chapter provides an overview of the methodology which underpins this thesis. Beginning with an introduction of the pragmatic theoretical paradigm, this chapter reveals the rationale for its use in this mixed methods research (MMR). Decisions made in the design of this explanatory, sequential MMR are detailed in this chapter including its question structure, typology, timing, weighting, and points of data integration. Each decision made in this MMR design is then discussed in consideration of the aims and research questions (RQs) of this thesis. The fit of integrated data and their resulting inference quality are then discussed. This chapter concludes with ethical considerations made throughout this thesis and the researchers' prospective reflections. This chapter is followed by study one of this thesis which investigates factors which influence supplement use and doping among adolescent athletes (SUDAA) in NZ sporting contexts (chapter 3).

2.2 Research paradigms

There exists a tension between paradigm purists and those who believe a compatibility exists between different research methods (Denzin, 2010; Tashakkori & Teddlie, 2003). This thesis ascribed to the "… compatibility thesis at the paradigm level" (Denzin, 2010, p. 419). Underpinned by a pragmatic approach, this thesis therefore used research methods from varied paradigms (Cameron, 2009; Johnson & Onwuegbuzie, 2004; Tashakkori & Teddlie, 2003). This non-purist, pragmatic philosophical position allowed multiple truths to be considered through contextually bound RQs which drove this research methodology. This contingency based approach afforded flexibility to combine the research methods which were anticipated to most effectively answer the RQs, and meet the aims, of this thesis.

The philosophical position of pragmatism contrasts the views of paradigm purists who argue the incompatibility between the epistemological (how we know), and ontological (the nature of reality), traditions of quantitative and qualitative research (Guba & Lincoln, 1988). These isolated research traditions have opposing views of the singular, or multifaceted nature of reality. For example, positivism believes in a single reality whose causal effects can be measured objectively using empirical evidence (Firestone, 1987). Whereas, interpretivism contends there are many realities which are understood through subjective and phenomenological assessments of others' lived experiences (Appleton & King, 2002). In contrast to the isolated perspectives inherent in positivist and interpretivist paradigms,

pragmatism offers a non-purist view which remains open "to all possibilities while tying that search to practical ends" (Maxcy, 2003, p. 86).

2.2.1 Pragmatism

The thesis aims to investigate factors which influence the real-world issue of SUDAA and to identify outcome-oriented solutions to reduce these behaviours. These aims render this thesis contextually bound to adolescent sport and underpinned by a pragmatic perspective to find "what works" (Howe, 1988, p. 16). The contextually driven needs of this thesis meant positivist approaches were a poor fit as they seek unified truths and refute the presence of realities that cannot be scientifically observed (Pawlikowski et al., 2018). Pure interpretivism was also a poor fit in this thesis as it did not reconcile with the construction of an outcome-oriented solution which needed to incorporate several world views. Whereas, a pragmatic approach permitted contextual truths to be seen from a central methodological and philosophical position (Johnson & Onwuegbuzie, 2004). This contextual grounding has importance in the field of doping where challenges to translate the outcomes of previous research to practical sporting contexts have been acknowledged (Gatterer et al., 2019). Pragmatism therefore provided the best fit in this thesis which sought a better understanding of SUDAA, and practical ways to reduce these behaviours, through multiple perspectives.

Pragmatism and MMR

According to Hanson et al. (2005), the philosophical notions which underpin MMR enable quantitative and qualitative research methods to be combined in a single thesis. MMR is therefore well suited to pragmatic approaches through which researchers combine the methods of inquiry they believe will most effectively answer their RQs. A pragmatic position underpinned the MMR design of this thesis which sought to capture the perspectives of current and recent adolescent athletes, support personnel and stakeholders. With a pragmatic world-view, and multiple participant perspectives, a MMR design answered the RQs of this thesis with greater comprehension than what would have been possible using a single research method (Cameron, 2009; Denzin, 2010; Tashakkori & Teddlie, 2003). A pragmatic MMR approach had further suitability to the aims of this thesis due to its ability to render outcome-oriented results (Johnson & Onwuegbuzie, 2004). Based on the aims and RQs of this thesis, MMR from a pragmatic philosophical position was most appropriate in this contextually bound investigation.

While a pragmatic approach appears a parsimonious solution to the aforementioned incompatibility debate, it remains critical that integrity is upheld in the epistemological differences of quantitative and qualitative research components. It is therefore important that

quantitative and qualitative research methods are conducted in accordance with their inherent assumptions to maintain their respective integrity. Efforts made to uphold the assumptions and integrity of each research method in this thesis are detailed in the chapters pertaining to study one (chapters 3-4), study two (chapter 5) and study three (chapter 7). Specific to MMR, it was also necessary for research integrity to be preserved as evidence from respective research methods were integrated. To that end, quantitative and qualitative evidence were presented in their natural forms (i.e., empirical or narrative) in joint displays based on their integration type. Convergent integrations indicated that agreement was interpreted between data sets (Fielding, 2012) and convergence meant that evidence from respective data sets supported each other (Tashakkori & Teddlie, 2003). Divergence would have indicated disagreement between data sets (Tashakkori & Teddlie, 2003) while silence revealed evidence in one set which was absent in another (O'Cathain et al., 2010). As opposed to discarding divergent or silent data, the pragmatic perspective of this thesis meant that similarities and differences were considered important to answer its RQs.

2.2.2 MMR

MMR is a deliberate process of quantitative and qualitative data collection, analysis and integration in a single body of research (Creswell, 2005; Shannon-Baker, 2016; Tashakkori & Teddlie, 2003). MMR therefore opposes the purist argument of paradigm incompatibility (Cameron & Miller, 2007; Tashakkori & Teddlie, 2003). Also known as multimethod, integration and synthesis research, MMR has undergone several phases of development since its inception (Creswell, 2014; Creswell & Plano Clark, 2011; Teddlie & Tashakkori, 2009a). These developments have contributed to the effective use of MMR in various fields including education, health and social sciences (Creswell, 2014). Despite its widespread effectiveness, MMR is scarcely used in the field of doping however has been recommended in the outcomes of previous research (Morente-Sánchez & Zabala, 2013).

Compared to the possible outcomes of single method research, Ivankova et al. (2006) argued that RQs can be answered with greater conviction, comprehension and strength through MMR. These outcomes are permitted by the collective strengths of MMR which contrast the inherent limitations of isolated research methods. For example, positivist approaches use quantitative research methods which believe truth exists without subjective influence and thus consider researchers as separate from their inquiry (Cameron & Miller, 2007). While positivist approaches reduce potential researcher bias, they have limited ability to capture lived experiences from multiple participant perspectives. Comparatively, interpretivist approaches use qualitative research methods which seek to understand reality through participants' lived

experiences, perspectives and backgrounds (Creswell, 2003). While interpretivist approaches can obtain a superior depth of insight to other research methods, their lack of objectivity and inherent bias has been criticised as researchers cannot be separated from their inquiry (Bishop, 2015).

By combining the strengths of isolated research methods in a single thesis, MMR can obtain validity, depth and corroboration in its outcomes and thus generate greater understanding (Johnson et al., 2007; Schoonenboom & Johnson, 2017). MMR is also suggested to increase credibility, integrity and utility in pragmatic investigations which seek outcome-oriented solutions to real-world issues (Bryman, 2006). In this thesis, MMR afforded the flexibility required to derive comprehensive responses to its RQs through a broad range of perspectives. The collective strengths of MMR also maximised the ability to identify outcome-oriented solutions to reduce SUDAA in adolescent sporting contexts.

MMR in the field of doping

Doping has been described as a complex issue which is influenced by several factors (Allen et al., 2015; Elbe & Barkoukis, 2017; Erickson et al., 2015). These complexities have largely been informed by empirical studies which have dominated this field of research (Petróczi & Nepusz, 2011). In the past decade, increased calls have been made for MMR, and theoretically guided inquiry, to better understand the complexities of doping behaviour (Backhouse et al., 2015; Morente-Sánchez & Zabala, 2013). Based on the acknowledged intricacies of SUDAA, and an imbalance of research methods in the field, MMR was a suitable approach in this thesis. The robust outcomes possible through MMR also held promise to derive comprehensive responses to these RQs and to contribute to the field in a meaningful way.

Purposes of MMR

There is widespread agreement in the literature on the purposes of MMR (see Bryman, 2006; Greene et al., 1989). The purposes of MMR most relevant to this thesis are summarised below in the context of this programme of research, as informed by Greene et al. (1989).

- *Triangulation:* enabled enhanced validity in this thesis as it considered multiple perspectives and, through methodological triangulation, drew inferences from their convergence, divergence, complementarity and silence (chapters 6 and 8).
- *Development:* aligned to the explanatory and sequential design of this thesis. As detailed in this chapter, MMR afforded an opportunity for preceding phases of research to inform the development of participant criteria, data collection tools and

procedures of following studies. This MMR design also allowed knowledge to develop sequentially and thus generate a robust understanding of this research issue.

- *Initiation:* was observed as the outcomes of one study informed actions and approaches used in following phases of research. For example, the integration of evidence from studies one and two informed the need to engage stakeholders in a third study which sought outcome-oriented solutions to reduce SUDAA. The actions initiated as a result of previous phases of research were pivotal to meet the aims of this thesis and comprehensively respond to its RQs.
- *Expansion:* was evident in the explanatory nature of this MMR design as the perspectives gained in each phase of research expanded on previous knowledge. Expansion was pivotal to develop a robust understanding of SUDAA, and how to reduce its occurrence, throughout this thesis.

Strengths of MMR

Among the strengths of MMR is the complementarity made possible by integrating quantitative and qualitative inquiry (Greene et al., 1989). In doing so, the limitations of single research methods can be reduced or negated (Creswell, 2014; Gay et al., 2012; Ivankova et al., 2006). MMR also allows multiple perspectives to be obtained from varied sources which are relevant to a research issue. These variances contribute to the comprehensive nature of MMR through which convergent and divergent perspectives can generate holistic knowledge (Bryman, 2006; Creswell, 2014). In this thesis, the strengths of MMR were considered to "provide the best opportunity" (Scott & Morrison, 2006, p. 154) to obtain a comprehensive understanding of factors which influence SUDAA from the perspectives of individuals who these behaviours effected most. The use of MMR in this thesis also aligned to its pragmatic approach and resulted in practical recommendations to reduce SUDAA in adolescent sport (chapter 9).

Challenges of MMR

Despite its strengths, MMR has been considered a complex approach which is "not easy to implement" (Ivankova et al., 2006, p. 4). Methodologically, researchers can be challenged to possess the skills and experience required to design, conduct and analyse quantitative, qualitative and MMR (Creswell, 2014; Creswell et al., 2003; Scott & Morrison, 2006). For example, researchers may have experience in the design, conduct and analysis of either qualitative or quantitative research. Expertise in the use of a single research method may result in imbalanced skills which contrast the multifaceted capabilities required in MMR. Further, a unique and inherent need of those who undertake MMR is the ability to integrate evidence from varied research methods. These requirements may challenge researchers with

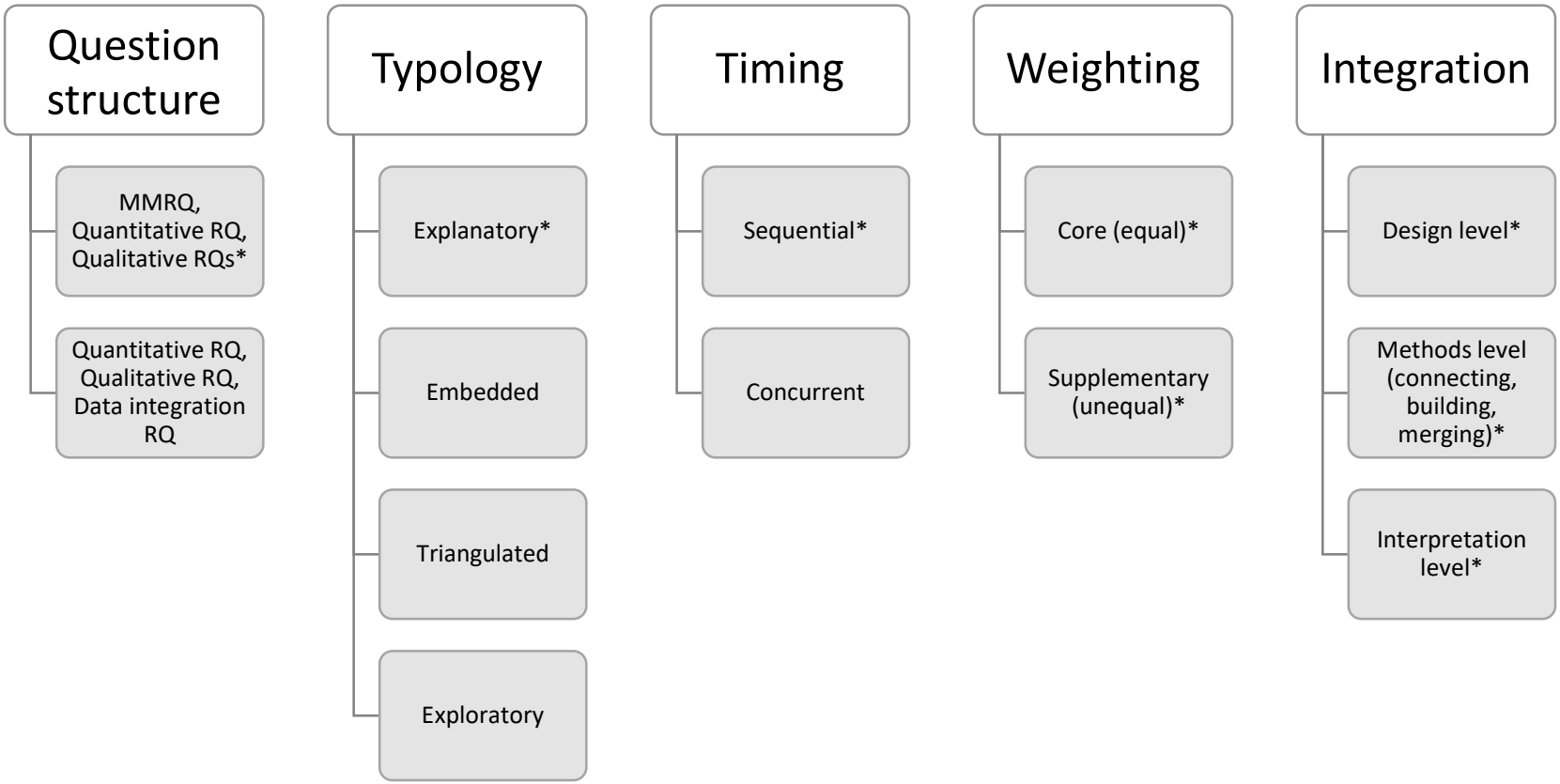
previous experience using isolated research methods where the integration of quantitative and qualitative data is irrelevant. A further limitation of MMR is the need for greater resources than required when using single research methods (Gay et al., 2012). For example, MMR requires significant human and fiscal resources to recruit participants, design and conduct research, and then analyse and integrate evidence. The time required to complete each phase of MMR may also be constrained by the requirements of a study.

2.3 MMR design

Characteristic of the design, conduct and integration of MMR are "key considerations" (p. 63) which are required of researchers who use this approach (Creswell & Plano Clark, 2011). The many decisions a researcher must make in the design of MMR are displayed in Figure 2 including the RQ structure, typology, timing, weighting and integration of evidence (Creswell et al., 2003). In MMR, these decisions are guided by the aims of a thesis which is essential to generate effective outcomes (Plano Clark & Ivankova, 2016). The decisions made in the design of MMR may also be influenced by participant availability, access to resources and time constraints. In this thesis, the researcher paid due diligence to each decision made in the MMR design process with consideration of its pragmatic philosophical position, aims and RQs. The decision-making process for the MMR design of this thesis is shown in Figure 2 and detailed in the section which follows.

Figure 2

Decision-making process in MMR design



Note. MMRQ = Mixed Methods Research Question. RQ = Research Question.

Informed by considerations required in the design of MMR as explained by Creswell and Plano Clark (2007).

* denotes decisions made in the MMR design of this thesis.

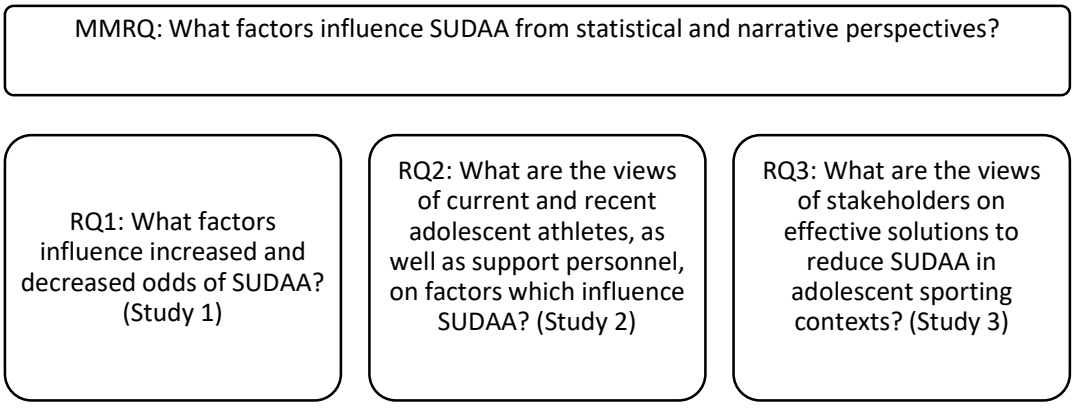
2.3.1 MMR question structure

RQs are an essential aspect of MMR as they influence decisions made in its design and provide direction to explain unknown aspects of a research phenomenon (Bryman, 2006; Subedi, 2016; Teddlie & Tashakkori, 2009a). Despite literary consensus on the importance of MMR questions (MMRQs), debates of their composition have rendered two predominant views (Plano Clark & Ivankova, 2016; Teddlie & Tashakkori, 2009a). As shown in Figure 2, one view on question structures in MMR advocates for an overarching MMRQ to address the core purpose of a thesis and the nature of its data integration (Plano Clark & Ivankova, 2016). This overarching question is followed by quantitative RQ(s) for empirical components and qualitative RQ(s) for phenomenological components (Creswell & Plano Clark, 2011; Onwuegbuzie & Johnsen, 2006; Teddlie & Tashakkori, 2009a). The second view on question structures in MMR is that quantitative and qualitative research components should have separate RQs alongside a final question which focuses on data integration (Creswell & Plano Clark, 2011).

As advocated by Plano Clark and Ivankova (2016), and indicated in Figure 2, this thesis had an overarching MMRQ which outlined its purpose and detailed its data integration. As shown in Figure 3, this thesis' MMRQ was followed by a RQ for its respective quantitative and qualitative research components. This RQ structure was most suited to this programme of research as it ensured the aims of this thesis remained a core component of all phases of research. Further, this question structure allowed the theoretical assumptions and integrity of each research method to be upheld (Bryman, 2006). This MMRQ structure also enabled multiple perspectives to be obtained which was fundamental to the aims, and contextual focus, of this thesis.

Figure 3

MMR questions



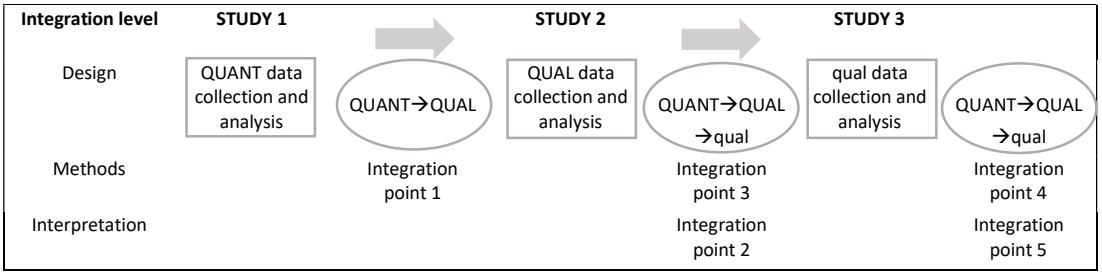
Note. MMRQ = Mixed Methods Research Question. RQ = Research Question. SUDAA = Supplement use and doping among adolescent athletes.

2.3.2 Typologies in MMR

When informed by specific RQs and objectives, typologies have been suggested to add legitimacy to MMR and to provide a useful tool to guide its design and implementation (Ivankova et al., 2006; Tashakkori & Teddlie, 1998; Teddlie & Tashakkori, 2009a). As shown in Figure 2, this MMR design had an explanatory typology which was drawn from the four typologies proposed by Creswell and Plano Clark (2007). An explanatory typology permits knowledge to generate through an initial study and to be explained in greater depth through further phases of research. As recommended of all MMR designs, it was important to provide a visual display of this thesis' typology to articulate its inherent complexities (Creswell, 2005; Ivankova et al., 2006). As such, Figure 4 displays the explanatory typology of this MMR design whose components are discussed throughout this section. This typology shows the process through which knowledge derived from study one (chapters 3 and 4) was explained through the outcomes of study two (chapter 5). This figure also shows how the outcomes of study three (chapter 7) provided further explanations of the knowledge generated in studies one and two. As discussed throughout this chapter, Figure 4 also shows the sequential nature of this MMR design, as well as its levels and points of integration.

Figure 4

Explanatory, sequential MMR design



Note. Explanatory Sequential Mixed Methods Research design. Adapted from *Research Design: Qualitative, Quantitative and Mixed Methods Approaches* (5th ed., p 218), by J. W. Creswell and J. D. Creswell, 2018. Sage. Copyright 2018 by SAGE Publications Inc.

Figure 4 includes a notation system drawn from literature to permit greater comprehension of this MMR design (Morse, 1991). Components of this notion system are detailed in Figure 5 for reference throughout this chapter.

Figure 5

Key of visual display components in MMR design

Item	Description
→	The sequential nature of this MMR design.
QUANT, QUAL	Capital letters indicate core quantitative (QUANT) and qualitative (QUAL) research components.
qual	Lower case letters indicate a supplementary qualitative research component (qual).
	A phase of integration.
	A phase of research.

2.3.3 Timing of MMR components

The timing of research phases have been described as a key component of MMR design (Plano Clark & Ivankova, 2016). As shown in Figure 2, MMR designs can be concurrent, when quantitative and qualitative studies are conducted at the same time. MMR can also occur sequentially as the outcomes of one study inform the development and conduct of the next (Cameron, 2009; Ivankova et al., 2006; Plano Clark & Ivankova, 2016). Also shown in Figure 2 is the sequential nature of this MMR design as informed by literature (Creswell, 2014; Johnson & Christensen, 2017; Morse, 1991). A sequential MMR design was best suited to the outcome-orientation of this thesis which, as opposed to a reductionist approach, allowed research items to be informed by preceding studies. This sequential design meant that knowledge continued to develop throughout the course of this thesis, based on the voices of purposefully recruited participants. Unique in this field of research, and consistent with existing views, this sequential MMR design included a supplementary study of stakeholder views which was informed by preceding phases of research (Creswell, 2014; Schoonenboom & Johnson, 2017). This final study aligned to the pragmatic approach of this thesis as it sought a contextual understanding of practical solutions to effectively reduce SUDAA. The sequential nature of this MMR design is depicted by right facing arrows in Figure 4.

2.3.4 Weighting of MMR components

In MMR, the weighting of research components indicate whether each were considered of equal, or unequal, value to effectively respond to RQs (Plano Clark & Ivankova, 2016). Single research components can be weighted as core or supplementary sources of evidence to respond to a RQ (Plano Clark & Ivankova, 2016; Schoonenboom & Johnson, 2017). Divided opinion exists regarding the weighting of research components in MMR. For example, Creswell and Plano Clark (2007) have advocated for equally valued research components. In contrast, Morse and Niehaus (2009) have placed importance on identifying core and supplementary weighted studies. Decisions of component weighting can be influenced by practical factors including; time restraints, the suitability of research methods to a specific audience, and

researcher preferences for particular research methods (Creswell et al., 2003). The weighting of components in MMR are also determined by the aims of an inquiry which may render specific components fundamental (or 'core') to respond to its RQs.

The aims and RQs of this thesis informed the weighting of studies in its MMR design. These decisions were also made in consideration of the participant audiences of this thesis and their needs for developmentally appropriate research methods. The weighting of each research component in this MMR design also reflected the priority placed on athlete voice in this thesis, as the most critical audience in SUDAA. As displayed in Figure 4, study one (QUANT) and study two (QUAL) were equally weighted, core research components. These core research components recruited a large adolescent cohort (study 1), and multiple perspectives (study 2), which were considered pivotal to effectively respond to this thesis' aims and RQs (Plano Clark & Ivankova, 2016; Schoonenboom & Johnson, 2017). Also shown in Figure 4 is the third study in this thesis which was considered supplementary as it did not include the voices of adolescent athletes. Instead, study three sought stakeholder perspectives on outcome-oriented solutions to reduce SUDAA in adolescent sport. Despite its supplementary weighting, this third study was pivotal to the pragmatic orientation of this thesis whose sole focus was not to understand what influenced SUDAA but also to identify how these behaviours could be reduced effectively.

2.3.5 Integration in MMR

Central to any MMR design are purposeful point(s) of integration (Fielding, 2012). Points of integration occur whenever quantitative and qualitative research methods interact (Creswell, 2003; Greene et al., 1989; Tashakkori & Teddlie, 1998). Integration has been considered key to the development of credible and comprehensive understanding of a research topic (Bryman, 2006; Fetters et al., 2013; McCrudden & McTigue, 2019). Contrasting integration approaches have been proposed in the literature which vary in complexity and rigor (McCrudden & McTigue, 2019). Owing to the critical role of integration in MMR, dutiful consideration was given to the approaches used, and points at which data would interact in this research design. As discussed in this section, data were integrated at design, methods and interpretation levels according to a framework proposed by Fetters et al. (2013). This framework permitted comprehensive inferences to be drawn from the multiple perspectives presented in the integrated evidence. To answer this thesis' RQs, this MMR design had five points of integration at three levels as shown in Table 1 and described in this section.

Table 1

Integration points in this MMR design

Integration point	Integration level	Description
Whole thesis	Design	Determines all integration points of this MMR design.
1	Methods	Quantitative (QUANT) data from study 1 *connected* with the design of participant criteria and *built* the data collection tool and procedures for study 2 (QUAL).
2	Interpretation	Evidence from study 1 (QUANT) and study 2 (QUAL) were interpreted through *joint displays* (see chapter 6).
3	Methods	The outcomes of integration point 2 *connected* with the design of participant criteria and *built* the data collection tool and procedures for study 3 (qual).
4	Methods	QUANT, QUAL and qual data *merged* through *methodological triangulation.*
5	Interpretation	*Merged* QUANT, QUAL and qual data (integration point 4) were interpreted through *joint displays*.

Note. Italicised items are key terms detailed in this chapter.

Integration at the research design level

Integration at the research design level of this thesis had an important role as it determined the points at which data were integrated at methods and interpretation levels. Points of design level integration can occur at any stage that research components mix or interrelate (Creswell & Plano Clark, 2011; Tashakkori & Teddlie, 1998). Design level integration can influence the quality of inferences made and thus the overall rigor of a thesis (Creswell & Plano Clark, 2011). As such, determining the point(s) of design level integration has been considered a key decision in the design of MMR (Cameron, 2009). Decisions made about design level integration can also reflect a researcher's understanding of what is required for respective research components to be conducted effectively (Creswell et al., 2003). Stages of design level integration are therefore unique to respective programmes and can reflect the time, resources and expertise available (Ivankova et al., 2006; O'Cathain et al., 2010). Figure 6 shows the design level integration of this MMR as well as its phases, procedures and outcomes. This figure also indicates the thesis chapter where this content can be located. Further, the procedures presented in this figure detail methods and interpretation level integrations which are discussed in the following section.

Figure 6

MMR design: Phases, procedures and outcomes

PHASE	PROCEDURE	OUTCOME	CHAPTER
QUANT data collection (Study 1)	Cross-sectional survey: adolescent athletes, Qualtrics software.	Numeric data (n, %, M).	3
↓			
QUANT data analysis (Study 1)	Descriptive analysis (n=1298), statistical analysis (n=660), SPSS software.	Univariate, ordinal and binary regressions, OR, CI, Spearman's correlations, model fit calculations.	4
↓			
QUANT → QUAL	Integration point 1: *Connecting*, *building*.	Ethics approval, study 2 question schedule, moderator's guide, pilot tests.	5
↓			
QUAL data collection (Study 2)	Focus groups: current (n=16) and recent adolescent athletes (n=4), support personnel (n=6).	Narrative data.	5
↓			
QUAL data analysis (Study 2)	General inductive approach, themes/codes developed, independent parallel coding, NVivo software.	3 major themes, 9 minor themes, figures, participant excerpts.	5
↓			
QUANT→QUAL →qual	Integration point 2: *Interpreting*. Integration point 3: *Connecting*, *building*, *merging*.	*Joint displays, inferences*. Ethics approval, study 3 question schedule, moderator's guide.	6 7
↓			
qual data collection (Study 3)	Focus groups: stakeholders (n=6).	Narrative data.	7
↓			
qual data analysis (Study 3)	Deductive Thematic Analysis, themes/codes developed, stakeholder checks, NVivo software.	3 major themes, 9 minor themes, visual models, participant excerpts.	7
↓			
QUANT→QUAL→qual	Integration point 4: *Merging*.	Socio-ecological perspective of factors which influence SUDAA.	8
↓			
QUANT→QUAL→qual	Integration point 5: *Interpreting*.	Conclusion, future research, practical recommendations.	8, 9

Note. Detailed MMR design identifying key terms (italicised) that are detailed in this chapter. Adapted from "Using mixed-methods sequential explanatory design: From theory to practice," by N. Ivankova, J. Creswell and S. Stick, 2006, *Field Methods, 18*(1), p 16 (https://doi.org/10.1177/1525822X05282260). Copyright 2006 by Sage Publications.

Integration at the methods level

As previously discussed, the use of varied components of inquiry in MMR permit RQs to be answered with greater depth than would be possible using an isolated method (O'Cathain et al., 2010). It is through methods level integration that the strengths of MMR come to fruition as quantitative and qualitative research methods *connect*, *build* and *merge* (Creswell & Plano Clark, 2011; Fetters et al., 2013). As shown in Figure 2, each of these methods level integrations occurred in this MMR design. These integrations allowed similarities and differences to emerge between data sets from which a more complete understanding of this research problem was generated. Specifically, the pragmatic approach of this thesis meant that quantitative and qualitative evidence were integrated according to their convergence, divergence, complementarity or silence (see chapter 6). In contrast to positivist approaches which may winnow evidence which does not fit a tested hypothesis, this pragmatic integration of data valued differences and similarities between the data and considered each beneficial to increasing knowledge.

Approaches to integrate data at the methods level have been placed on a continuum of complexity (Jick, 1979). As discussed in the following sections, this MMR design used the integration framework proposed by Fetters and colleagues (2013). While their original framework included connecting, building, merging and embedding, the latter technique (embedding) was not used in this thesis as it did not have an interventional MMR design (Fetters et al., 2013). Figure 6 displays each methods level integration, including the use of methodological triangulation to merge data (O'Cathain et al., 2010). Methodological triangulation is discussed in chapter six where quantitative and qualitative data are merged.

Connecting

In this MMR design connecting occurred through "the sampling frame" (Fetters et al., 2013, p. 2139). This process is indicated in Figure 4 as the outcomes of one study informed the participant sample for the next phase of research. Owing to the sequential nature of this MMR design, studies two and three used purposeful sampling as their participant criteria were informed by preceding phase(s) of research. The use of purposeful sampling was also pragmatic as it meant that participant criteria were informed by the perspectives of individuals with a contextual understanding of this research issue. For example, the participant criteria for study three called for stakeholders in adolescent sport. This participant criteria was informed by evidence from preceding studies which indicated a need for stakeholder input to identify solutions to reduce SUDAA which would effectively transfer to adolescent sporting contexts. Connecting occurred in this MMR design as results from study one informed the participant

criteria for study two (integration point 1). Connecting also occurred when the outcomes of integration point 2 informed the participant criteria of study three (integration point 3).

Building

In MMR, building occurs when the outcomes of one study inform the approach and design of a following phase of research (Fetters et al., 2013). Building is relevant in this MMR design as an understanding of factors which influence SUDAA generated sequentially throughout this thesis, as informed by insights from preceding research components. Examples of building are shown in Figure 6 as results from study one informed the data collection items and procedures for study two (integration point 1). Similarly, inferences made through the integration of quantitative and qualitative data (integration point 2) informed the design of study three (integration point 3).

Merging

According to Fetters et al. (2013), merging occurs when data from different studies are combined, allowing a researcher to compare and interpret the evidence. In this MMR design, data was merged at the methods level through methodological triangulation (Denzin, 1978; O'Cathain et al., 2010). Methodological triangulation has been described as "the combination of methodologies in the study of the same phenomenon" (Denzin, 1978, p. 291). In accordance with the aims of this thesis, methodological triangulation has been widely considered an effective approach from which comprehensive knowledge about a research problem can emerge (Honorene, 2017; O'Cathain et al., 2010; Tashakkori & Teddlie, 2003). Methodological triangulation has also been suggested to reduce researcher bias and enhance validity, reliability and credibility in the outcomes of MMR (Honorene, 2017; Sarantakos, 2013). To obtain these outcomes however, it is important that integrity is upheld within respective research methods, prior to the integration of their evidence at the methods level. As shown in Figure 6, merging occurred in this MMR design as data from studies one and two were combined (integration point 3). Merging also occurred when inferences from integrated data from studies one and two connected with results from study three (integration point 4).

Integration at the interpretation level

Interpretation level data integration occurs through the visual presentation of evidence from isolated research components for comparisons to be made and inferences drawn (Fetters et al., 2013; Plano Clark & Sanders, 2015). In this thesis, joint displays were used to integrate quantitative and qualitative data through their side by side presentation (Fetters et al., 2013; Guetterman et al., 2015). Joint displays were the most suitable approach to integrate data at the interpretation level as they permitted inferences to be drawn from the visual presentation

of convergent, complementary, divergent and silent data (Heale & Forbes, 2013; O'Cathain et al., 2010). These interpretation types are detailed in chapter six as inferences are drawn from joint displays of integrated data from studies one and two (integration point 2).

The fit of integrated data

It has been proposed that the "fit" (p. 2143), or coherence, of research outcomes cannot be assumed when integrating data (Fetters et al., 2013). Instead, assessments of the fit and quality of integrated data must be made through a dynamic and detailed process of researcher derived inferences (Plano Clark & Ivankova, 2016). The quality of integrated data must also be evaluated for their practical implications in consideration of specific RQs (Plano Clark & Ivankova, 2016; Teddlie & Tashakkori, 2009a). Due to the intersubjective researcher position and pragmatic approach of this thesis, the fit of integrated data were assessed in consideration of its aims, RQs and research context. Informed by literature, the fit and quality of integrated data underwent robust review in this thesis as inferences were made with an open mind to their convergence, divergence, complementarity and silence (Heale & Forbes, 2013; Schoonenboom & Johnson, 2017).

Recommendations have been made in the literature for researchers to take specific measures to reduce potential threats to inference quality and data fit (Subedi, 2016; Teddlie & Tashakkori, 2009a). These recommendations informed the measures taken in the design and conduct of this thesis and its respective studies. For example, the statistical processes used to analyse and interpret evidence in study one were critically reviewed by an experienced biostatistician, as recommended by Teddlie and Tashakkori (2009a). Further, inference quality has been considered important to establishing trustworthiness in qualitative research (Lincoln & Guba, 1985; Subedi, 2016). Specific measures to enhance the integrity of data fit were therefore taken in the design of studies two and three, including the use of "independent parallel coding" (p. 244) to analyse qualitative evidence in study two (Thomas, 2006). Further measures were taken to reduce threats to inference quality as recommended in the literature (Burton et al., 2009; Deverka et al., 2012). For example, stakeholder perspectives were sought in study three to enhance validity, and reduce threats to the quality, of inferences drawn from integrated evidence from studies one and two. Moreover, "reflective field notes" (Bogdan & Biklen, 2007, p. 123) were recorded throughout this thesis to afford the researcher with on-going opportunities to reflect on her assumptions, interpretations, and inferences, in consideration of relevant RQs. Additional benefits of these reflective notes included the ability to acknowledge potential researcher bias and to highlight where additional inquiry or supervisor input were required.

Ethical considerations

Each study in this thesis received full ethics approval from Auckland University of Technology Ethical Committee (AUTEC) as shown in Appendices A, B and C. In the ethics application process for each study, the researcher consulted with AUTEC advisors to ensure ethical best practices were adhered to. For example, through AUTEC consultation it was decided that the anonymous nature of participation in study one rendered guardian consent unnecessary. In study two, AUTEC guidance clarified the requirements of participant assent, for minors, and guardian consent. AUTEC also provided support in the decision making process regarding how to treat reports of doping if made during data collection (in studies 2 and 3). Further details of ethical considerations are provided as relevant throughout this thesis.

2.3.6 Intersubjective researcher position

Prior to acknowledging prospective reflexivity, it is important to articulate the researcher's position in this thesis. From a professional perspective, the researcher had over five years' experience in the field of research as the Education Manager at DFSNZ.[6] From a contextual view, the researcher had over 25 years' experience in NZ sport as an athlete, coach and support person. Central to the researcher's perceptions of this research issue was therefore her experiential knowledge of the adolescent sporting environment. These experiences were pivotal to the researcher's belief that adolescent sport represented a unique context which was not replicated in adult, or more junior, levels of competition. The researcher acknowledged that her personal experience in adolescent sporting contexts was outdated and thus prioritised the voices of current and recent adolescent athletes in this thesis. As a previous coach of adolescent athletes, the researcher also recognised the importance of obtaining the views of support personnel whose perspectives on SUDAA were anticipated to add to the knowledge obtained from adolescent participants. The researcher also placed importance on obtaining the perspectives of stakeholders from adolescent sport to derive outcome-oriented solutions to reduce SUDAA in their practical environments.

The researcher also had previous academic experience in the design and conduct of MMR in adolescent sport. These experiences afforded the researcher greater knowledge of this research environment however may have influenced her decision to use MMR in this thesis. Similarly, the researcher's previous research experience may have influenced decisions made about the typology, timing and weighting of components in this MMR design. The researcher's previous experience with MMR may also have influenced the time and resource she dedicated

[6] Drug Free Sport New Zealand (DFSNZ) is NZ's National Anti-Doping Organisation. Drug Free Sport New Zealand. (2020e). *Overview*. https://drugfreesport.org.nz/what-we-do/

to conducting such a robust programme of research. Consistent with the views of Plano Clark and Ivankova (2016), these extensive efforts were undertaken as the researcher believed a MMR approach would most comprehensively respond to the RQs and aims of this thesis. These efforts were also made in light of the pragmatic position of this thesis as the researcher believed MMR would render practical solutions with greater transferability to their intended context.

Researcher position on SUDAA and pragmatism

The researcher acknowledged that her position in this thesis was influenced by her view that doping is an unethical and health compromising behaviour. Further, the researcher considered engagement in prohibited behaviours to enhance adolescent performance as a concerning issue in contemporary sport. The researcher's passion to establish real-world solutions to reduce these problematic behaviours should therefore be acknowledged. The researcher's efforts throughout this thesis were motivated by her genuine intent to contribute to positive sporting experiences for young athletes in NZ. Further, the researcher believed sport could offer a context of health promotion and personal development whose positive outcomes were at risk of being thwarted by unnecessary and dangerous actions (i.e., doping). With awareness of the socially mediated nature of adolescent sport, and a pragmatic philosophical position, the researcher was driven to find effective solutions to reduce SUDAA through this thesis.

Reflexivity

Berger (2015) explained reflexivity as the critical appraisal of a researcher on their position in an investigation, and the effect of their involvement on its design, conduct and analysis. Consistent with the views of Herr and Anderson (2015), reflexivity was important in this thesis due to the researcher's intersubjective position and her experiential knowledge in the research setting. While reflexive approaches are characteristic in qualitative research methods (Attia & Edge, 2017), reflexivity was practiced throughout all phases of this thesis due to the inherent bias of the researcher's unique position.

Prospective reflexivity

Reflexivity has been categorised by two interactive and specific elements; prospective and retrospective reflexivity (Edge, 2011). Prospective reflexivity considers the effect of a researcher on their inquiry from a holistic perspective, while retrospective reflexivity considers the effect of a programme of research on the researcher (Attia & Edge, 2017). Due to its very nature, retrospective reflexivity is discussed in this thesis' conclusion (chapter 8).

Through prospective reflexivity, the researcher gained greater awareness of how her personal characteristics and previous experiences may have influenced the design, conduct and inferences made in this MMR (Attia & Edge, 2017). For example, the researcher came to understand the personal importance she placed on conversation as a means to understand others' realities, perspectives and lived experiences. This personal characteristic lead to a preference for narrative data collection and an inherent subjective perspective. Through heightened awareness of these tendencies, the researcher placed importance on the design, conduct and analysis of a robust quantitative research component in this thesis. These efforts were also made to ensure the strengths of quantitative and qualitative research were realised in the inferences drawn throughout. As a result, and as shown in Figure 4, study one is a quantitative study which was designed as an equally weighted, core component of this thesis.

Based on the researcher's acknowledged position in this research, it is important to prospectively reflect on her inherent bias about the research issue of SUDAA (Creswell, 2014). To avoid the potential effects of this bias, several measures were taken throughout this thesis. For example, reflective notes were recorded to recognise potential biases which informed discussions with supervisors regarding required steps to address their influence. In light of the inherent bias of the researcher's intersubjective position, and to enhance validity and trustworthiness in this thesis, a supervisory team of organisational outsiders were also engaged (Herr & Anderson, 2015). Other measures to increase trustworthiness and validity in this thesis included the critical review of relevant outcomes with subject matter experts (i.e., a biostatistician), comprehensive pilot tests (study 1 and 2) and stakeholder participation (study 3). The measures taken to address potential researcher bias are detailed in relevant chapters throughout this thesis.

Due to the researcher's intersubjective position in this thesis, it is also important to acknowledge the considerable time spent in the research setting. Throughout the course of this thesis, the researcher engaged in frequent conversations with athletes, support personnel and those in governance positions. These informal consultations generated greater contextual awareness of SUDAA and, while not analysed as data in this thesis, provided unique insights to this research context. The learning gained through this consultative process was instrumental in the development of appropriate data collection tools and effective approaches to elicit stakeholder participation in this research.

2.4 Chapter summary

This chapter detailed the pragmatic philosophical position which underpins this thesis and its explanatory, sequential MMR design. Perspectives were also provided about the use of MMR

in the field of doping. The characteristics, strengths and challenges of MMR were explained before rationale for the decisions made in this research design were detailed. Visual displays were then used to illustrate this MMR design including its points of integration, research phases, processes, and outcomes. This chapter concluded with ethical considerations made throughout this thesis and the researcher's intersubjective and reflexive position therein. This chapter is followed by the first study of this thesis which is a nationwide investigation of adolescent athletes' views on factors which influence SUDAA (chapter 3).

Chapter 3 Study one, part I

3.1 Chapter introduction

The purpose of this chapter is to present the first study in this thesis which sought to identify factors which influence supplement use and doping among adolescent athletes (SUDAA). This chapter is the first of two to present the initial study in this explanatory, sequential mixed method programme of research. This chapter details the research design, survey development, participant recruitment and data collection procedures for study one. The procedures used to analyse the quantitative data are detailed before its results are presented. These findings are then discussed in light of existing evidence and in response to research question one (RQ1). This chapter concludes with the practical implications of this study. The chapter which follows also pertains to study one of this thesis and analyses a subset of data to investigate factors which increase and decrease the odds of SUDAA (chapter 4). The limitations, contributions to knowledge and directions for future research from this study are summarised in chapter eight.

3.2 Quantitative research

This quantitative study sought to respond to RQ1 of this thesis by gaining a comprehensive understanding of factors which influence SUDAA in NZ sporting contexts. The purpose of study one therefore aligned to previous explanations of quantitative research: "to generate knowledge and create understanding about the social world" (Ahmad et al., 2019, p. 2828). Quantitative research methods are underpinned by positivist and post-positivist paradigms from which truths and realities are considered measurable and objective (Bloomfield & Fisher, 2019). In quantitative research, knowledge and understanding is gained through the collection and analysis of numerical data (Gay et al., 2012; Niglas, 2010). The methods and paradigms which underpin quantitative research therefore contrast those of qualitative inquiry, which consider the world immeasurable and subjective (Bishop, 2015).

The tools employed to collect quantitative data use closed-ended and repeatable measures to minimise bias and derive objective evidence (Bloomfield & Fisher, 2019). The potential for power imbalances and coercion are also minimised through quantitative research as the researcher has limited interaction with participants. Assisted by its ease of access, quantitative research methods allow evidence to be collected from large participant cohorts which result in outcomes which may be generalised across specific populations (Niglas, 2010). Further, quantitative research permits consistent and standardised data collection as participants respond to identical questions at their own pace (Gay et al., 2012). As this study sought to

obtain the perspectives of a large cohort of adolescents about SUDAA, quantitative research offered a consistent, accessible and developmentally appropriate method of inquiry.

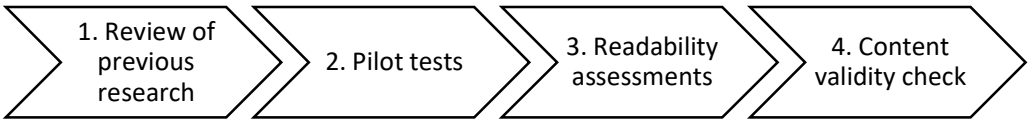
3.3 Data collection

3.3.1 Survey development

To obtain the knowledge required to understand factors that influence SUDAA, a robust and developmentally appropriate survey was developed. As shown in Figure 7, the development process of this survey was comprehensive as described in the section which follows.

Figure 7

Steps of survey development



Step one: Review of previous research

As displayed in Figure 7, the first step of this survey design included a broad review of previous research in the fields of doping, supplement use, adolescent development, and adolescent substance use (e.g., tobacco, alcohol). The selection of items for inclusion in this survey were informed by three rationale.

Rationale 1: To establish a baseline for comparison

Items which measured behaviours (e.g., doping), individual variables (e.g., attitudes toward doping) and normative factors (e.g., social norms) were drawn from previous doping research with adolescent athletes. As this study was the first to investigate SUDAA in NZ, it was important to use existing scales with which baseline comparisons could be made to international evidence. Previous measures were also used so as not to contribute to the recognised challenge of comparing evidence in this field due to the varied scales used (Backhouse et al., 2015). While the intent of this study was not to contrast its outcomes with other evidence, comparisons lent perspective to the nature and extent of SUDAA in NZ.

Rationale 2: To seek greater knowledge

True to the pragmatic nature of this thesis, the second rationale for scale inclusion in this survey was to explore what needed to be understood in order to reduce SUDAA. The literature review conducted in chapter one highlighted areas where greater knowledge was required to generate a robust understanding of factors which influence SUDAA. This contextual knowledge was critical to meet the aims of this thesis and provide practical recommendations to reduce

these behaviours. Four factors whose respective influence on SUDAA was anticipated, yet remained unknown, are introduced below.

- Adolescent autonomy

Despite the developmental importance of autonomy during adolescence (Berger, 2017; Gillet et al., 2010), how the role of perceived autonomy functioned in relation to SUDAA was poorly understood. Further, previous research has proven equivocal to show the influence of aspects of the autonomy construct on supplement use and doping during the developmental period of adolescence. As defined later in this chapter, aspects of autonomy include IPLOC, volition and PBC (Ng et al., 2011). While some have considered doping a volitional and deliberate behaviour (Petróczi & Aidman, 2008), literature reviewed in chapter one revealed developmental characteristics of adolescence which may influence athletes' ability to act with autonomy (Berger, 2017). An example from sporting contexts was observed as adolescent's susceptibility to the influence and control of other people (e.g., coaches) have thwarted their capacity to experience volition (Gillet et al., 2010). Further, this lack of volition has presented particular doping risks in sporting contexts which support doping through characteristic, adolescent vulnerabilities to these normative influences (Dodge & Jaccard, 2008). In this context, developmental vulnerabilities to social norms and others' controlling behaviour have directly influenced adolescent autonomy. It was therefore anticipated that adolescent perceptions of behavioural control, alongside their ability to experience volition and IPLOC, may influence SUDAA.

- Sources of sport confidence

As revealed in chapter one, adolescence involves several cognitive developments, characteristics and priorities which may render adolescents vulnerable to SUDAA. Given the role of social media and the influence of body image during adolescence (Berger, 2017), there exists a logical link to be pursued between confidence sourced through appearance (i.e., self-presentation) and SUDAA. Adolescent egocentrism (Elkind, 1967) was also anticipated to heighten the salience of adolescent sources of confidence whose influence on SUDAA warranted further research.

- Social norms

Literature has established the influence of social norms on adolescent doping and has recognised adolescent vulnerabilities to normative influences which support these behaviours (Dodge & Jaccard, 2008). Conversely, a deterrent effect has been identified in norms which do

not support doping (Overbye et al., 2013). What remains unknown are the orientations of subjective and descriptive norms regarding doping in NZ sporting contexts, and how these norms influence SUDAA. As noted elsewhere (Sport New Zealand, n.d.), sport in NZ is perceived to inhabit a culture of fairness and sportspersonship. To some extent this perception has been unchallenged due to a lack of doping detection at certain levels of NZ sport. It was therefore anticipated that a social norm which accepted doping (subjective), and believed this behaviour was prevalent (descriptive), would influence increased SUDAA. Conversely, it was anticipated that SUDAA would decrease through a social norm which discouraged doping (subjective) and perceptions of a low prevalence of this behaviour (descriptive). With a lack of evidence on the orientation of doping related norms in NZ, yet a reputation as a 'clean' sporting nation, further research was required to understand if these contextual norms had a meaningful difference to the rest of the world with regards to SUDAA.

- Motivational climate

Literature has shown that ego-oriented motivational climates pose a risk to doping among adolescent athletes (Smith et al., 2010). This may be explained by the competitive discourse which is believed to have emerged in adolescent sport, in which ego-oriented performance priorities have resulted in athletes doing what it takes to win (Johnson, 2012; Mudrak et al., 2018). Conversely, mastery-oriented climates have protected adolescents from engaging in these behaviours (Degenhardt et al., 2010). How the discourse of motivational climate operated in NZ, whose reputation is that of a 'clean' sporting nation, remained an area for investigation. The influence of motivational climates was anticipated to have further importance in the unique sporting culture of NZ where a debate about early specialisation continues alongside increased sporting achievements on the world stage. The unique climate in which adolescents experienced sport in NZ, and its influence on SUDAA, therefore required greater understanding.

Rationale 3: Effective research techniques

A final rationale in the development of this survey were the techniques used, as informed by literature and previous doping research with adolescent participants. For example, Yesalis et al. (1993) indicated that anonymous research which used self-reported responses was an accurate approach to survey adolescents about substance use. As this approach required efforts to reduce the potential effects of social desirability and false responding, specific measures were made in this survey design as informed by literature (Elbe & Barkoukis, 2017; Lazuras et al., 2015). For example, this survey used direct and indirect questioning methods to address the possible influence of social desirability and false responding. In addition,

reminders were provided about the anonymous and voluntary nature of participation in this survey. Explanations of relevant key terms were also given to enhance adolescent comprehension of survey items. For example, key terms such as *supplements* and *banned drugs* were explained in the survey introduction and again at the beginning of relevant survey sections. A hypothetical situation was also included due to its proposed ability to reduce socially desirable responding in doping research among adolescents (Elbe & Barkoukis, 2017). The data collection tool developed for use in this study was a 77-item, anonymous survey (Appendix D) which participants accessed by QR code or electronic link using Qualtrics software (as shown in Appendix E).

Step two: Pilot tests

Before this survey was considered complete, a two-stage pilot testing process was conducted as informed by Thabane et al. (2010). Each pilot test provided opportunities for the integrity of the survey and its protocol to be assessed in contexts which replicated all conditions of the final study (Gay et al., 2012). Pilot testing also provided an opportunity to check adolescent's comprehension of survey items as each were tested with individuals who met the participant criteria for study one (Gay et al., 2012). This two-stage pilot testing process was followed by readability assessments of survey items (step 3) and a content validity check (step 4).

Pilot test one

This survey was initially piloted with a large group of adolescent athletes who met the participant criteria of this study (n = 45). In a face to face context, the researcher began this pilot by introducing the purpose of this study and the pilot testing procedure, before sharing the electronic link from which participants could access the survey on individual devices. Participants were asked to use the pens and paper provided to record words or phrases they did not understand while completing the survey. It was also requested that participants note any issues they encountered with the functionality of the survey software. Upon survey completion, an informal discussion was held regarding group members' survey experience. At this time, participants were provided an opportunity to record additional feedback in written form and to ask questions about the study.

The outcomes of pilot test one showed that *performance-enhancing* and *doping* were terms that were not comprehended well by adolescent participants. Following survey completion, suitable alternatives for these items were discussed with participants. As a result, *improving sporting performance* and *banned drug use* were agreed as appropriate wording adaptations to the original items. Participants also suggested that a back button would be a useful function

of the survey to allow respondents to return to a previous item. All edits suggested in pilot test one were made in preparation for pilot test two.

Pilot test two

Following adaptations made as a result of a pilot test one, a second pilot test was conducted with another group of adolescents who met the participant criteria (n = 8). Pilot test two was held under the same conditions as pilot test one and no participants had previously completed the survey. Results of pilot test two revealed no comprehension issues which indicated that adolescent's understanding of survey items had improved as a result of changes made following pilot test one. Several participants also reported their use of the back button which indicated the relevance of this function in the final survey. Further, pilot test two had a reduced survey completion time from a maximum of 22.5 minutes (pilot test 1) to a maximum of 16 minutes (pilot test 2). No further feedback on survey item wording or functionality were received in pilot test two.

Step three: Readability assessment

Each survey item was subjected to a Flesch-Kincaid reading level assessment at the conclusion of pilot test two (Kincaid et al., 1975). This assessment provided a measure of anticipated adolescent comprehension of each survey instruction and item. This measure resulted in a final survey reading ease score of 73.1 which in a NZ context is considered plain English[7] (Jack, 2013). As participants were 13 years of age or more, and all items had been comprehended well in pilot test two, the final survey items were deemed suitable for use with an adolescent population.

Step four: Content validity check

The final step of this survey design included a content validity check by a panel of educators (n = 4). Members of this panel shared more than 15 years' experience educating adolescents in NZ secondary schools. Based on this experience, these educators were deemed well suited to assess anticipated item comprehension and overall suitability of this survey for adolescent participants. Following an assessment of each survey item and data collection protocols, further edits were deemed unnecessary. As a result of pilot tests, readability assessments and content validity checks, the survey and data collection protocols for this study were considered final. As shown in Appendix D, the final survey included 77-items in nine subscales as outlined in Table 2 and described in the following section.

[7] Plain English is considered the use of simple and clear language. Cambridge University Press. (2020). Plain english. In *Cambridge Dictionary*. https://dictionary.cambridge.org/dictionary/english/plain-english

3.3.2 Survey items

Table 2

Survey items and scales analysed in chapter three

Survey scale	Number of scale items (n)	Survey items
Consent and demographic information	5	1-5*
Sources of sport confidence		
Demonstration of ability	6	12-17
Mastery	5	18-20, 22-23
Environmental comfort	4	21, 27-29
Self-presentation	3	24-26
Substance use		
Doping/Banned drugs	3	48-50
Supplements	4	43-46
Motivational climate		
Ego-oriented	6	30, 32, 34, 37, 39, 41
Mastery-oriented	6	31, 33, 35, 36, 38, 40
Outcome expectancy beliefs		
Attitudes	8	55-62
Anticipated regret	5	51-54
Social norms		
Subjective norms	3	63, 67, 69
Descriptive norms	3	64-66
Self-efficacy beliefs		
Situational temptation	5	70-74
IPLOC	3	6-8
Volition	3	9-11
PBC	1	68
Doping consideration	1	75
Doping intentions	2	76-77

Note. IPLOC = Internal perceived locus of causality. PBC = Perceived behavioural control.

*the demographic item 'main sport' was omitted from analysis for ethical reasons, items 42 and 47 were statements only.

Demographic information

Participant age was assessed by year (e.g., 2 = 13 years, 3 = 14 years) and participant gender was reported with three options (1 = male, 2 = female, 3 = gender diverse). Participants recorded their hourly volume of engagement in their main sport, each week, and were requested to answer all survey items in consideration of that sport. Results are reported using frequencies (n), percentages (%), and means (M).

Sources of sport confidence

Derived from the Sources of Sport Confidence Survey (SSCQ; Vealey et al., 1998), four of nine original subscales were measured including: Demonstration of ability, Mastery, Environmental comfort and Self-presentation. A total of 18 items were measured from these subscales including: *I usually gain self-confidence in my sport when I win* (Demonstration of ability), *I usually gain self-confidence in my sport when I improve my performance on a skill* (Mastery), *I usually gain self-confidence in my sport when I feel comfortable in the environment where I am performing* (Environmental comfort) and *I usually gain self-confidence in my sport when I feel I look good* (Self-presentation). The five original subscales omitted from use in this survey were deemed contextually irrelevant to this investigation. SSCQ items were originally measured on a 7-point Likert scale: 1 = not at all important, 7 = of highest importance (Vealey et al., 1998). In this survey, each item was measured on a 5-point Likert scale; 1 = Strongly disagree, 5 = Strongly agree. Results are reported using frequencies (n) and percentages (%).

Substance use

Doping/Supplement use

The reasons that athletes used banned drugs[8] and supplements were measured indirectly: *Why do you think athletes use banned drugs/supplements?* (Hellemans et al., 2009). Participants could select multiple reasons from a list of options which included: *to improve performance, to lose weight* and *because they are told to*. As shown in Appendix D, explanations and examples of banned drugs and supplements were provided at the beginning of respective survey sections to enhance adolescent comprehension (Barkoukis et al., 2015; Lazuras, Barkoukis, Mallia, et al., 2017).

Sources of information about banned drugs and supplements were measured respectively, using items from previous research with adolescent athletes (Hoffman et al., 2008). Participants could select relevant information sources from a list which included: internet sites, teammates and sports coach (Hoffman et al., 2008). Two additional responses were included in this survey to reflect the current environment (social media) and to provide an alternate option (other).

The use of banned drugs and supplements were measured directly; *How frequently do you use banned drugs/supplements to improve your performance?* (Barkoukis et al., 2015). This item was originally measured on a 6-point Likert scale; 1 = never, 6 = systematically (Barkoukis et al.,

[8] *Banned drug use* was the terminology used to reference *doping* to enhance adolescent comprehension of relevant survey items.

2015). In this survey, items were measured on a 5-point Likert scale (1 = never, 5 = very frequently). Another item measured recent supplement use which was not repeated in the context of doping: *In the past six months, which of these supplements have you used?*. A list of supplement types were provided as possible responses including: *Sports Drinks*, *Protein powders*, *Testosterone boosters,* and *Pre-workouts* (Hoffman et al., 2008; Wiens et al., 2014). Results are reported using frequencies (n) and percentages (%).

Motivational climate

The Motivational Climate Scale for Youth Sports (MCSYS) measured athlete perceptions of coach-led MCs in their sporting context (Smith et al., 2008). The MCSYS assessed 12 items across ego- and mastery-oriented motivational climates in this survey. Six items measured ego-oriented motivational climates including: *Winning is the most important thing for the coach*. An additional six items measured mastery-oriented motivational climates including: *The coach makes athletes feel good when they improve at a skill* (Smith et al., 2008). Results are reported using frequencies (n) and percentages (%).

Minor adaptations were made to original MCSYS items based on the outcomes of pilot test one. For example, participants were from team and individual sports therefore *squad members* was included in addition to *team members* to increase the relevance of this item to a wider range of participants. These adaptations were consistent with the approach taken in previous research which measured the MCSYS with adolescent swimmers (Monteiro et al., 2018). Once wording adaptations from pilot test one were made, retention of the initial meaning of each item was assessed and confirmed in pilot test two. The readability of each survey item was measured following pilot test two. The outcomes of this readability assessment found that the Flesch-Kincaid reading level of MCSYS items in this survey had decreased from 3.3 (Smith et al., 2008) to 2.8. This decrease provided greater reading ease for participants with a broader range of reading skills than achieved in previous use of the MCSYS (see Monteiro et al., 2018; Smith et al., 2008). Results are reported using frequencies (n) and percentages (%).

Outcome expectancy beliefs

Attitudes

Attitudes toward doping were measured using a short version of the Performance Enhancement Attitude Scale (PEAS, Petróczi & Aidman, 2009). Originally, the PEAS assessed doping attitudes using 17 unidimensional items on a 7-point Likert scale; 1 = Strongly disagree, 7 = Strongly agree (Backhouse et al., 2013). A short version of the PEAS was included in this survey based on its previous use in research with adolescent athletes (Lazuras, Barkoukis, Mallia, et al., 2017). In this survey, items were measured on a 5-point Likert scale (1 = Strongly

disagree, 5 = Strongly agree) and included: *Using banned drugs is necessary to be competitive.* It should be noted that the wording of original PEAS items referenced *doping.* The term *doping* was adapted to *banned drug use* in this survey due to poor adolescent comprehension of the original item in pilot test one. Greater agreement with items in this scale indicated a more positive attitude toward doping. Results are reported using frequencies (n) and percentages (%).

Anticipated regret

Survey items measured anticipated regret by assessing the negative consequences that adolescents expected from doping (Lazuras, Barkoukis, Mallia, et al., 2017). In this survey, anticipated regret was measured using the following stem proposition; *If I used banned drugs to improve my sporting performance, I would …*. This proposition was followed by four items which included: *…feel disappointed with myself* (Lazuras et al., 2015). In previous research these items were measured using a 7-point Likert scale; 1 = Strongly disagree, 7 = Strongly agree (Lazuras et al., 2015). In this survey, anticipated regret was measured using a 5-point Likert scale; 1 = Strongly disagree, 5 = Strongly agree. Greater agreement with these items indicated that an adolescent anticipated more regret from doping (Lazuras et al., 2015). Results are reported using frequencies (n) and percentages (%).

Social norms

Subjective norms

Subjective norms measured the extent to which participants believed people important to them would approve if they doped (Lazuras et al., 2015; Rivis & Sheeran, 2003). Subjective norms were assessed with three items from previous research including: *Most people I know would think it was OK if I used banned drugs to improve my performance* (Lazuras et al., 2015). These items were originally measured on a 7-point Likert scale (1 = Strongly disagree, 7 = Strongly agree) however were assessed using a 5-point Likert scale in this survey (1 = Strongly disagree, 5 = Strongly agree). More agreement with these items indicated a greater perception of social approval to dope. Results are reported using frequencies (n) and percentages (%).

Descriptive norms

As informed by previous inquiry, descriptive norms measured adolescent perceptions of doping prevalence in their sporting environment (Petróczi et al., 2008; Rivis & Sheeran, 2003). Descriptive norms were measured through three items which included: *At your level of competition in NZ, what percentage of athletes do you think use banned drugs to improve their performance?* (Barkoukis et al., 2014; Lazuras et al., 2015). As detailed in Appendix D, each item which measured descriptive norms had a respective response which responded to the

nature of each question. More agreement with each item represented a greater perception of others' engagement in doping. Results are reported using frequencies (n) and percentages (%).

Self-efficacy beliefs

Self-efficacy beliefs measured adolescent's perceived ability to prepare and implement the actions required to perform a specific task (Bandura, 1997). In this survey, self-efficacy beliefs were measured through situational temptation and aspects of the autonomy construct (IPLOC, volition, and PBC).

Situational temptation

Situational temptation was measured using items from original research on adolescent smoking (Lazuras et al., 2009). The items measured in this study were drawn from research which adapted these original items to assess temptation to dope among adolescent athletes (Lazuras et al., 2015). A stem proposition was used in this survey which began with: *How tempted would you be to use banned drugs to improve your performance this season ….* Participants responded to this proposition through five items including: *…when you have been told to improve your performance?* (Lazuras et al., 2015). These items were originally measured on a 5-point Likert scale; 1 = Not at all tempted, 5 = Very much tempted (Lazuras et al., 2015). A 5-point Likert scale was similarly used in this survey however the labelling of responses were adapted for simplicity (1 = Not tempted, 5 = Very tempted). Further, the wording of one original item was adapted to reflect the outcomes of pilot test one. Specifically, *colleagues* was poorly comprehended by adolescents and was adapted to *peers* in the final survey. Adolescent temptations to dope in specific situations are reported using frequencies (n) and percentages (%).

Internal Perceived Locus of Causality (IPLOC)/Volition

Three items from the autonomy construct of the Basic Needs Satisfaction in Sport Scale (BNSSS) were used to measure IPLOC (Ng et al., 2011). These items assessed adolescent's belief that they could initiate and regulate their actions (Reeve et al., 2003). These items included; *In my sport, I feel I am pursuing goals that are my own* (Ng et al., 2011). Also using items from the autonomy construct of the BNSSS, volition was measured through adolescent's willingness to engage in a specific activity (Reeve et al., 2003). These items included: *I feel I participate in sport willingly* and a reversed scored item: *In my sport, I feel that I am being forced to do things I don't want to do* (Ng et al., 2011). Originally, these IPLOC and volition items were measured using a 7-point Likert scale (1 = Not true at all, 7 = Very true) (Ng et al., 2011). In this survey, IPLOC and volition were measured on a 5-point Likert scale (1 = Strongly disagree, 5 = Strongly agree). Results are reported using frequencies (n) and percentages (%).

Perceived Behavioural Control (PBC)

An isolated item was used to measure adolescent's PBC and thus their confidence to engage in specific actions (Barkoukis et al., 2013). In this survey, PBC was assessed using the following item: *I feel in complete control of whether I will use banned drugs to improve my performance this season* (Lazuras et al., 2015). This item was originally measured on a 7-point Likert scale (1 = Strongly disagree, 7 = Strongly agree) however was measured on a 5-point Likert scale in this survey (1 = Strongly disagree, 5 = Strongly agree). Greater agreement with this item indicated a heightened perception of control over individual behaviour. Results are reported using frequencies (n) and percentages (%).

Doping consideration

Doping consideration was measured using a hypothetical scenario from previous research (Gucciardi et al., 2010). In checks for adolescent comprehension of this item with the original author, it was confirmed that such challenges had not been encountered in previous use (D. Gucciardi, personal communication, 21 August 2017). In response to the outcomes of pilot test one, minor adaptations were made to the original item wording and labelling to enhance adolescent comprehension. The final item read: *If, under medical supervision, a banned drug was offered to you which was free or cheap, was not detectable and could make a useful difference to your performance, how much consideration would you give to taking it?*. Originally this item was measured on a 7-point Likert scale; 1 = None at all, 7 = A lot of consideration (Gucciardi et al., 2010). In this survey, doping consideration was measured on a 5-point Likert scale (1 = None, 5 = A lot). Results are reported using frequencies (n) and percentages (%).

Doping intentions

Items which measured doping intentions were based on previous research on intent to smoke including: *Do you think you will try a cigarette soon?* and *Do you think you will smoke a cigarette in the next year?* (Pierce et al., 1996). These measures were later adapted to assess doping intentions among adolescent athletes using the items included in this survey: *Do you think you will use banned drugs to improve your performance soon?* and *In the next year, how likely are you to use banned drugs to improve your performance?* (Lazuras et al., 2015). In this survey, the first item was measured using a dichotomous scale (1 = No, 2 = Yes) and the second was assessed using a 5-point Likert scale (1 = Not likely, 5 = Very likely). Responses are reported using frequencies (n) and percentages (%).

3.3.3 Statistical analysis

Descriptive statistics are reported in the following section using frequencies (n), percentages (%) and means (M). All data were analysed using SPSS 25 for Windows.

3.3.4 Participant recruitment

Procedure

In 2018, information about this study was sent to personnel at National Sporting Organisations (NSOs) and secondary schools throughout NZ (Appendix E). To ensure a broad understanding of NZ's adolescent sporting environment, the researcher requested that these organisations shared this information with audiences who met the participant criteria outlined below, regardless of their level of competition. Adolescents who were interested in participation could use the QR code or electronic link provided for discretionary access participant information and the survey proper. As no direct contact was made between the researcher and potential participants, this recruitment approach was deemed suitable to maintain athlete anonymity and to avoid perceived pressure to take part in this study. The participant information sheet included reminders of the voluntary and anonymous nature of involvement in this study as well as details about how participant consent would be provided.

Ethical considerations

Three key ethical considerations were made in this study. First, consultation with AUTEC revealed it was unnecessary to obtain parental consent for adolescents to participate due to its anonymous nature. Instead, adolescents who wished to contribute to this study provided their consent in the first survey item. A second consideration regarded participants' demographic information. Originally, participant ethnicity and urban/rural location were considered in this survey. These details were considered to threaten participant anonymity thus were not included in the final survey. Following data collection, the decision was made to omit data regarding adolescent's sport from analysis as it too was considered to risk the anonymity of participants. Finally, consultation with AUTEC ethics advisors informed the decision that all data collected in study one would be included this phase of analysis, regardless of whether the survey had been completed in full. This decision was made to respect the time and contributions that participants had made to this study through any extent of engagement.

Participant criteria

Participants were aged 13 to 18 years and competed in any sport in NZ. Participants reported their gender and hourly volume of engagement in their sport each week. To ensure participant

criteria was met, selection of age *12 or less* (1) or *19 or more* (8) resulted in immediate survey termination.

3.4 Results

In this section, results are presented by survey scale as outlined in Table 2. This section is followed by a discussion of these findings in consideration of existing evidence.

Demographic results

This participant cohort included 1298 adolescent athletes in NZ who ranged in age from 13 to 18 years (M = 15.5 years; SD: 2.05). Participants were female (n = 661, 66.4%), male (n = 332, 33.3%) and gender diverse (n = 3, .3%). Participants engaged in their main sport for an average of 9.01 hours each week (n = 926).

Sources of sport confidence

Most respondents reported obtaining sport confidence through mastery sources including the development of new skills (n = 741, 94.9%) and improved skill performance (n = 723, 92.6%). The results show that adolescents obtained confidence from other sources to varied extents. For example, adolescents sourced confidence when performing in an environment they liked (environmental comfort, n = 645, 82.6%) and when they demonstrated their ability by winning (demonstration of ability, n = 600, 76.8%). Respondents also sourced confidence when they felt good about their weight (self-presentation, n = 445, 57%), and felt they looked good (n = 404, 51.7%).

Substance use

Doping

Participants most commonly thought athletes doped to improve performance (n = 625, 12.9%), to build muscle (n = 493, 10.1%), and to increase energy (n = 484, 10%). The commonly reported reasons for doping are summarised in Table 3 while full results of this item are presented in Appendix F.

Table 3

Common reasons for athletes to use banned drugs

Reasons for banned drug use	Frequency (n)	Percentage (%)
To improve performance	625	12.9
To build muscle	493	10.1
To increase energy	484	10
To recover faster from training or competition	418	8.6
To recover faster from injury	374	7.7
Because other people use them	319	6.6

As summarised in Table 4, participants thought athletes most commonly sourced information about banned drugs from internet sites (n = 508, 15.8%), social media (n = 367, 11.4%) and teammates (n = 352, 10.9%). Full results of this item are available in Appendix G.

Table 4

Common sources of information about banned drugs

Information source (banned drugs)	Frequency (n)	Percentage (%)
Internet sites	508	15.8
Social media	367	11.4
Teammates	352	10.9
Salesperson/dealer	351	10.9
Friends	303	9.4
Sports coach	281	8.7

When asked directly, 17 adolescent athletes reported their use of a banned drug to improve their performance (n = 17, 2.5%). Participants who self-reported banned drug use specified their engagement as very frequent (n = 4, 0.6%), frequent (n = 4, 0.6%), sometimes (n = 3, 0.4%) and rare (n = 6, 0.9%). The vast majority of participants reported that they had not used a banned drug to improve their performance (n = 671, 97.5%).

Supplements

As summarised in Table 5, participants thought that athletes used supplements to improve their performance (n = 616, 11.3%), to build muscle (n = 569, 10.4%) and to increase energy (n = 544, 9.9%). Full results of this item are available in Appendix H.

Table 5

Common reasons for athletes to use supplements

Reasons for supplement use	Frequency (n)	Percentage (%)
To improve performance	616	11.3
To build muscle	569	10.4
To increase energy	544	9.9
To recover faster from training or competition	526	9.6
To recover faster from injury	423	7.7
To treat a medical condition/nutritional deficiency	313	5.7

Participants thought athletes most commonly sourced information about supplements from internet sites (n = 461, 11.1%), sports coaches (n = 446, 10.7%), and teammates (n = 435, 10.5%). The common sources of information about supplements are summarised in Table 6 and full results of this item are available in Appendix I.

Table 6

Common sources of information about supplements

Information source (supplements)	Frequency (n)	Percentage (%)
Internet sites	461	11.1
Sport coach	446	10.7
Teammates	435	10.5
Fitness trainer	383	9.2
Social media	375	9.0
Strength and conditioning coaches	356	8.6

A majority of participants reported their use of one or more supplements in the previous six months (n = 570, 92.6%). As summarised in Table 7, the supplements used most frequently included sports drinks (n = 437, 24.1%), protein bars (n = 263, 14.5%), and multivitamins/minerals (n = 253, 13.9%). Full results of this item are presented in Appendix J.

Table 7

Supplements used to enhance performance in the past six months

Supplement used	Frequency (n)	Percentage (%)
Sports drinks	437	24.1
Protein bars	263	14.5
Multi-vitamins or minerals (e.g., iron, calcium)	253	13.9
Caffeine (including energy drinks, gels, gums, capsules)	196	10.8
Protein powders	180	9.9
Recovery drinks	175	9.6
Had not used a supplement in the past 6 months	134	7.4

To improve performance, participants reported using supplements very frequently (n = 25, 3.6%), often (n = 53, 7.5%), sometimes (n = 108, 15.3%) and rarely (n = 208, 29.5%). In this item, almost half of the sample reported they had never used a supplement (n = 310, 44%). These results are inconsistent with evidence presented in Table 7 where only 134 participants reported they had not used a supplement in the previous six months (7.4%).

Motivational climate

The vast majority of participants perceived their sporting climate as mastery-oriented. Most participants agreed that their coach encouraged athletes to learn new skills (n = 647, 89.6%), made athletes feel good when they improved a skill (n = 634, 87.8%), and told athletes that trying their best was the most important thing (n = 585, 81.1%). Further, most respondents revealed an ego-oriented climate in their sport. Over three quarters of participants agreed winning was the most important thing for their coach (n = 565, 78.2%). Further, almost one quarter of adolescents reported that their coach had told them to be better than their teammates (n = 162, 22.5%).

Outcome expectancy beliefs

Attitude

The majority of participants did not report positive attitudes towards doping and disagreed that doping was not cheating because everyone was doing it (n = 633, 94.7%). Adolescents also disagreed that doping was necessary to be competitive (n = 614, 91.8%) and that athletes should not feel guilty about breaking the rules and doping (n = 613, 91.6%).

Anticipated regret

When participants were asked how they would feel if they doped, most anticipated regret (n = 631, 91.8%), feeling badly (n = 624, 90.8%) and feeling shame (n = 621, 90.4%).

Social norms

Subjective norms

The vast majority of participants did not agree that people important to them would want them to dope (n = 647, 97.3%), or that most people close to them would like them to dope (n = 645, 97%). Moreover, participants did not agree that most people they knew would think it was OK for them to dope (n = 624, 93.8%).

Descriptive norms

Almost one third of participants knew someone who doped or had doped (n = 200, 30%). When asked how many people they knew who doped or had doped; eleven participants reported knowing *a lot* (n = 11, 1.6%), 12 knew *several* (n = 12, 1.8%), 29 knew *some* (n = 29, 4.3%) and 148 knew *a few* (n = 148, 22.2%). Almost one half of participants reported knowing of doping in their sport (n = 300, 45%) which occurred *always* (n = 8, 1.2%), *often* (n = 26, 3.9%), *sometimes* (n = 67, 10%) and *rarely* (n = 199, 29.8%). Participants also believed that 18% of athletes at their level of sport in NZ were doping.

Self-efficacy beliefs

Situational temptation

One third of participants agreed they would be tempted to dope when they believed most of their peers engaged in this behaviour (n = 213, 32.2%) while one quarter of respondents reported doping temptations when they felt disadvantaged (n = 166, 25.1%). Of the situations posed, respondents reported least temptation to dope when preparing for an important competition (n = 110, 16.6%).

IPLOC

A majority of participants reported an IPLOC and wanted to be in their sport (n = 858, 93.5%). Most participants felt they did what they wanted to do in their sport (n = 843, 91.9%), and pursued goals that were their own in that context (n = 801, 87.3%).

Volition

Most respondents agreed that they participated in their sport according to their own free will (n = 847, 93.7%), however many felt forced to do things they did not want to do in their sporting context (n = 760, 84%).

PBC

One quarter of respondents disagreed that they had complete control over whether they would dope this season (n = 163, 24.5%).

Doping consideration

Almost one half of participants considered using a banned drug to enhance their performance in response to the hypothetical situation: *If, under medical supervision, a banned drug was offered to you which was free or cheap, was not detectable and could make a useful difference to your performance, how much consideration would you give to taking it?* (n = 277, 42%).

Doping intentions

When asked directly, thirteen participants reported their intent to dope soon (n = 13, 2%) and twenty-five participants reported their intent to dope in the next year (n = 25, 3.8%).

3.5 Discussion

The results of this study are discussed in the section which follows according to the survey scales presented in Table 2 and in consideration of existing evidence.

Demographic information

The significant number of participants recruited in this voluntary study is important to acknowledge. It was not anticipated that so many individuals would voluntarily participate in research about doping as it was not assumed a widely discussed topic among adolescent athletes. Regardless, the sample size recruited for this study provided insightful outcomes. Further, the age of participants suggested they were unlikely to have received previous anti-doping education. Thus, involvement in this survey may have marked participants' first exposure to the subject of doping. It remains unknown if topical conversations were initiated as a result of participation in this survey however, as talking about doping has been considered essential to its prevention (Patterson & Backhouse, 2018), engagement in this study may have positive implications for anti-doping among its participants.

Sources of sport confidence

These results reveal the sources through which adolescents obtain belief in their ability to be successful in sport (Rintaugu et al., 2018; Vealey et al., 1998). These outcomes show that adolescents source confidence most through controllable sources of mastery and demonstrating ability. To a lesser extent, adolescents acquire confidence through the uncontrollable sources of environmental comfort and self-presentation. These results are consistent with previous evidence which found that adolescents obtained confidence most through controllable sources, i.e., mastery (Vealey, 2001). Similar to these findings, Vealey and colleagues (1998) found that adolescents sourced confidence least through self-presentation. As only four of nine original SSCQ subscales were measured in this survey, further research is required to corroborate these outcomes among adolescents in NZ sporting contexts.

Associations between sources of confidence and SUDAA have not been investigated in previous research which, as identified earlier in this chapter, warrant greater understanding. To contribute to this field of research, and in response to RQ1, potential associations between confidence sources and SUDAA are analysed in chapter four.

Substance use

Doping

These results reveal that 2.5% adolescent athletes in NZ self-reported doping. As past and present behaviour has been suggested to predict future behaviour (Ajzen, 1991), the participants who reported doping appear a subset of the adolescent population at greater risk of future engagement in this behaviour. The extent of doping reported in this study is consistent with an estimated 1-5% international prevalence of this behaviour among adolescent athletes (Backhouse et al., 2015). These findings mirror the prevalence of doping reported by adolescents in the USA (2.5%, Dodge & Jaccard, 2008), the South of France (2.4%, Pillard et al., 2002) and Italy (2.1%, Zelli, Lucidi, et al., 2010). These self-reports also indicate that adolescent doping occurs at a lesser extent in NZ than among adolescents in Italy (4.2%, Lazuras et al., 2015) and Greece (4.2%, Barkoukis et al., 2015). In contrast, this evidence suggests that adolescents dope to a greater extent in NZ than among similar cohorts in Finland (0.5% males, 0.2% females, Mattila et al., 2009).

When interpreting self-reported prevalence data, it is important to acknowledge that their validity may be influenced by social desirability despite efforts made to avoid these effects through survey design (Elbe & Barkoukis, 2017). Further, comparisons between international, self-reported data should be made with caution as variations in cultural norms may be reflected in cohort specific perceptions of social desirability. Consistent with the views of Smith et al. (2018), these findings reveal that for the majority of athletes, adolescence remains a viable period for the primary prevention of doping as this behaviour has not initiated. These outcomes also position adolescent doping as a relevant issue in NZ sport thus greater knowledge of factors which influence this behaviour is necessary (see chapter 4).

Consistent with previous research, most adolescents think that athletes dope to improve sporting performance (Backhouse et al., 2015; Sagoe et al., 2014). Outside of this core reason, divergent outcomes were observed between the reasons that adolescents believed athletes doped, and reasons provided by their international peers. For example, Backhouse and colleagues (2015) suggested that improving self-presentation was a common reason for athletes to dope while these results found that *to look better* was not a common reason for this behaviour (Appendix F). Further, adolescents in Greece thought athletes doped to push

their physical limits, to recover faster from exercise/training or out of curiosity (Lazuras, Barkoukis, Loukovitis, et al., 2017). Comparatively, adolescents in Cyprus thought athletes doped to recover from injury, for competitive advantage or to push their physical limits (Lazuras et al., 2018). The differing reasons that adolescents have reported for doping may be associated with variations in cultural norms and render international conclusions unreliable (Lazuras, Barkoukis, Loukovitis, et al., 2017).

As shown in Table 4, internet sites, social media and teammates are adolescent's most common sources of information about banned drugs. These findings are consistent with evidence which revealed the internet was a primary source of information about doping for 17-18-year-old male athletes in South Africa (Gradidge et al., 2011). These findings indicate that adolescents primarily seek information about doping from sources they do not have a personal relationship with. This evidence is complemented by knowledge that adolescents sourced information from individuals they did not consider authoritative, who they thought would tell them what they wanted to hear and who they anticipated would accept doping queries (Hoffman et al., 2008). Regardless of the source, the importance of quality information about banned drugs was emphasised in previous research which found that doping dispositions increased among adolescents who obtained unreliable information (Fürhapter et al., 2013; Nolte et al., 2014). In light of the consequences of adolescent doping identified in chapter one, additional analysis is required to investigate the influence of several factors on increased and decreased odds of doping among this athlete population (see chapter 4).

Supplements

These results show that the vast majority of adolescent athletes used one or more supplements in the six-months prior to data collection (92.6%). While participants were not defined by competitive level, previous research similarly revealed supplement use among 91.1% of elite level, adolescent athletes in Germany (Diehl et al., 2012). In contrast, these findings suggest that adolescent supplement use is higher in NZ than among international cohorts. For example, a lower prevalence of supplement use was found among adolescent athletes in Germany (80%, Braun et al., 2009), the USA (71.2%, Hoffman et al., 2008), the UK (48.1%, Petróczi et al., 2008), Greece (39.4%, Barkoukis et al., 2015), and Italy (15%, Zelli, Lucidi, et al., 2010). These findings are important in the context of SUDAA as adolescent supplement use has been suggested to influence longer term, habitual consumption of substances to improve sporting performance (Braun et al., 2009; Lieberman et al., 2015). These results also show that adolescent supplement use is a normative discourse in NZ sporting contexts which concurs with existing views (Hoffman et al., 2008; Moston et al., 2015). Within contemporary sporting climates, this evidence indicates that adolescence is too

late to prevent the initiation of supplement use for most athletes. Instead, these results suggest a need for secondary preventative measures to reduce the established behaviour of supplement use (Backhouse et al., 2009) in NZ sporting contexts.

These results show that adolescents primarily source information about supplements from internet sites, sports coaches, and teammates (Table 6). While the quality of information from these sources is unknown, previous research found that adolescent sources of information about supplements displayed insufficient detail of the associated risks (Bergeron et al., 2015; Braun et al., 2009). The importance of adolescent access to accurate and reliable information about supplements has been advocated to afford individuals with adequate opportunities to make informed decisions (Hoffman et al., 2008). These outcomes also reveal that coaches are adolescents' second most common source of information about supplements. These results are similar to previous research which found that adolescent athletes in Germany sourced information about supplements from their coaches (Diehl et al., 2012). Complementary evidence from the UK identified a belief among young athletes that coaches had a role in the provision of information about supplements (Petróczi et al., 2008). These results show the importance of accurate knowledge about the risks associated with adolescent supplement use extending to a wide audience of participants in adolescent sport. In particular, these findings illustrate the influential role of coaches in SUDAA.

These findings also indicate that adolescent athletes in NZ use a range of supplements to improve their performance. For example, Table 7 shows that adolescents most commonly use sports drinks, protein bars and vitamins to improve their performance (based on consumption in the six months preceding data collection). These results are consistent with previous research which found that 35.1% of adolescent athletes used caffeine pills and fat burners, while 17.3% used creatine and amino acids (Hoffman et al., 2008). Further, adolescent athletes in Germany used magnesium, dextrose, and energy drinks (Diehl et al., 2012). While energy drinks, multivitamins, whey protein and creatine were used by adolescents in the UK (Petróczi et al., 2008). These outcomes show that the supplements used by adolescents differ by cohort and context therefore international comparisons should be made with caution. This evidence does however identify the supplements used in respective sporting environments which could usefully inform the development of contextually relevant preventative initiatives.

This evidence reveals that adolescents have mirrored reasons for why an athlete would dope (Table 3) and use supplements (Table 5); to improve performance, to build muscle or to increase energy. Similarly, Sagoe et al. (2014) and Gradidge et al. (2011) identified improving performance as a mirrored reason for adolescent doping and supplement use in their

respective inquiries. The shared reasons for supplement use and doping are unsurprising as a developmental trajectory has been discovered between initial supplement use and sequential progression to doping (Backhouse et al., 2013; Lucidi et al., 2008; Mathews, 2017). While not measured in this cross-sectional survey, previous research found supplement use to be a strong predictor of doping and doping intentions (Lazuras, Barkoukis, Mallia, et al., 2017). As these results show that adolescents' reasons for supplement use may be replicated in their reasons for doping, it is necessary to investigate factors which influence their use of supplements to enhance performance (see chapter 4). This evidence may inform initiatives which seek to reduce adolescent supplement use however, as indicated by these findings, may also contribute to doping prevention.

Motivational climate

As expressed earlier in this chapter, motivational climates in adolescent sport are important to understand due to their known influence on SUDAA (Mazanov & Huybers, 2010). These results reveal mastery- and ego-oriented climates in NZ's adolescent sporting context. This evidence suggests that patterns of influence, interactions, rewards and standards in adolescent sport are oriented toward mastery (e.g., development, improvement) as well as ego (e.g., winning) (Breiger et al., 2015; Smith et al., 2008). Adolescents predominantly believe their sporting climates are mastery-oriented. According to literature, these findings suggest that priority is placed on skill development and team contributions in adolescent sporting contexts (Nicholls, 1989; Vealey et al., 1998). Several initiatives exist in NZ which aim to increase awareness of motivational climates in youth sport and advocate for mastery-orientations in this context (Aktive, 2020; Drug Free Sport New Zealand, 2016). While the influence of these initiatives on motivational climate are unknown, this evidence shows that most adolescents were exposed to mastery-oriented climates in their sport.

These results also reveal that motivational climates are not underpinned by an isolated orientation. Instead, these findings show that the majority of adolescents also perceive ego-orientations in their sport and believe winning is the priority of their coach. While not measured in this survey, literature suggests that adolescents may be exposed to expectations and pressures related to performance outcomes in their sporting climate (Bergeron et al., 2015). The winning priorities and athlete comparisons revealed in this study are noteworthy as they have previously influenced doping among adolescent athletes (Ehrnborg & Rosén, 2009; Mazanov & Huybers, 2010). Another characteristic of ego-oriented motivational climate are coach comparisons of ability between athletes (Nicholls, 1989). These comparisons are influential to one quarter of participants in this study who feel their skills are compared to that of others in their team. The salience of peer comparisons have been acknowledged as a source

of adolescent anxiety in developmental literature (Berger, 2017). These findings suggest that ego-oriented motivational climates expose adolescents to pressure and anxieties which have negative connotations to their sporting experience. Further, previous research has discovered associations between ego-oriented motivational climates and SUDAA. Thus, better understanding of the influence of mastery- and ego-oriented motivational climates on SUDAA in NZ sporting contexts is required (see chapter 4).

Outcome expectancy beliefs

Attitudes

Consistent with literature (Backhouse et al., 2015), these results show that most adolescent athletes do not have positive attitudes towards doping. Similarly, Fürhapter et al. (2013) found that 92% of adolescent athletes in Austria believed doping was unfair, while 85% of adolescents in South Africa thought doping was immoral (Nolte et al., 2014). As non-positive attitudes toward doping have influenced doping avoidance (Cunningham & Johnson, 2007), these results show promise in the context of reducing SUDAA. Conversely, it should be noted that a small cohort of participants reported positive attitudes toward doping. Despite their minority, these findings warrant attention as positive attitudes towards doping have previously predicted doping, doping susceptibility and intent (Gucciardi et al., 2010; Lazuras et al., 2015; Lucidi et al., 2008). While these results are optimistic, on-going efforts are required to prevent positive attitudes toward doping among adolescent athletes.

Anticipated regret

These findings show that the majority of participants anticipate feeling regret, shame and badly if they were to dope. These results are consistent with evidence from the UK where male adolescents anticipated guilt and shame from doping (Bloodworth & McNamee, 2010). This evidence has positive implications for anti-doping as anticipated regret has been identified to deter adolescent athletes from doping (Backhouse et al., 2013; Bloodworth & McNamee, 2010; Lazuras et al., 2015). In contrast, a lack of anticipated regret about doping has been associated with greater doping intentions in this athlete population (Lazuras et al., 2015). In line with extant knowledge, the anticipated regret identified in this study may have a positive, anti-doping influence among adolescent athletes in NZ.

Social norms

Subjective norms

These findings show that most adolescent athletes do not perceive that people close or important to them would approve if they were to dope. As adolescents characteristically place value on social acceptance during this developmental phase (Berger, 2017; Lentillon-Kaestner

& Carstairs, 2010), these findings may have promising implications for anti-doping. Further, this developmental focus on social acceptability renders subjective norms about SUDAA an important consideration among this population. For example, subjective norms oriented away from doping have been identified to influence doping avoidance (Donovan et al., 2002; Overbye et al., 2013; Smith et al., 2010). As adolescents are particularly vulnerable to norms related to doping (Dodge & Jaccard, 2008), these results emphasise the importance of adolescent perceptions of doping as a socially unacceptable behaviour. In light of the known association of subjective norms and adolescent behaviour, further analysis is required to understand the influence of these norms on increased or decreased odds of SUDAA in NZ (see chapter 4).

Descriptive norms

These results reveal a descriptive norm about doping among adolescent athletes in NZ. Participants reported that they knew of doping in their sport and among fellow athletes. This evidence also shows that adolescents believed that 18% of their competitors doped. These findings indicate greater perceptions of doping in NZ sporting contexts than identified in international cohorts. For example, adolescent athletes in Australia believed 11% their competitors were doping (Moston et al., 2015). The descriptive norms revealed in this data are concerning as these norms have previously predicted adolescent doping intentions and have been considered a risk factor for doping among this population (Lazuras et al., 2010; Wiefferink et al., 2008). Due to the descriptive norms identified in this study, and their anticipated influence on SUDAA, further analysis of these results is required (see chapter 4).

Self-efficacy beliefs

Situational temptation

These results indicate several situations in which adolescents reported temptations to dope. While the predictive qualities of situational temptation were not investigated in this cross-sectional study, these findings are noteworthy as situational temptations have previously predicted doping, doping intentions and susceptibility (Blank et al., 2016; Lazuras et al., 2010). These results show that adolescents are most tempted to dope when they believe their peers engage in this behaviour. As descriptive norms were identified in the previous item, it appears that adolescent perceptions of doping among their peers is a factor influential to SUDAA in NZ sporting contexts.

IPLOC

Most respondents reported an IPLOC and thus believe they can initiate and regulate their actions (as defined by Reeve et al., 2003). Specifically, these results show that most

adolescents want to be in their sport and feel they pursue their own goals in that context. IPLOC is important to consider in this research context as it indicates an athletes' belief that they can initiate and regulate the actions required to engage in, or refrain from, doping. Despite an identified IPLOC in these findings, the influence of this aspect of autonomy on SUDAA remain poorly understood. As such, further analysis is required to investigate potential associations between IPLOC and SUDAA in NZ sporting contexts (see chapter 4).

Volition

This evidence shows that most adolescents have a willingness and desire to participate in their sport. Alarmingly, these results also show that many adolescents feel forced to do things they don't want to in their sport. While this evidence was not drawn in regards to SUDAA, literature by Reeve et al. (2003) indicated that these results signify a lack of "action choice" (p. 259) among adolescents. These findings suggest that adolescents may not have a role in determining their behaviour in sporting contexts which may, or may not, include supplement use and doping. This evidence raises questions about the extent of adolescent volition in NZ sporting contexts which has relevance to doping as it has been considered a volitional act (Petróczi & Aidman, 2008). As shown earlier in this chapter, volition is an aspect of the autonomy construct whose influence on SUDAA requires better understanding (see chapter 4).

PBC

These results identify that one quarter of participants do not perceive control of whether they will dope in the current sporting season. This lack of PBC contrasts literature which described doping to occur as a result of an individual's choice to use, or not use, a prohibited substance or method (Lucidi et al., 2008). These findings instead suggest that adolescents believe their engagement in doping is determined by others and indicate a perception of controlling behaviour in adolescent sport. These results are noteworthy as adolescents who feel that others control their doping have been considered more likely to engage in this behaviour (Barkoukis et al., 2011; Hodge & Gucciardi, 2015). Thus, the lack of PBC revealed in this data indicates that a subset of adolescent athletes have a heightened likelihood of doping if immersed in an environment of autonomy control. These findings also highlight the important role of external influences on autonomy and SUDAA in NZ sport. The complex dynamic between PBC, autonomy control and SUDAA requires greater understanding through the voices of individuals who are immersed in this research context (see chapters 5 and 7).

Doping consideration

These findings show that a significant cohort of adolescents considered doping to enhance their sporting performance when posed a hypothetical scenario. These findings are consistent

with the extent of consideration that adolescents have given to doping when posed hypothetical situations in previous research (Backhouse et al., 2015; Bloodworth & McNamee, 2010). These results are concerning in light of previous research however as a three times greater likelihood of doping was identified among athletes who considered the behaviour, than those who did not (Jalleh & Donovan, 2007). Further, the consideration given to doping in this evidence has been suggested to indicate doping susceptibility (Gucciardi et al., 2010; Pierce et al., 1996). Applying this perspective to current evidence indicates that a noteworthy cohort of adolescent athletes in NZ may be susceptible to doping. In light of the known influence of doping consideration on doping susceptibility, greater knowledge is required regarding the factors which influence adolescents to consider this behaviour (see chapter 4).

Doping intentions

These results reveal that a minority of adolescent athletes in NZ intend to dope soon and in the next year. Despite their minority, these findings are noteworthy as previous research found that adolescents with doping intentions are at greater risk of engaging in this behaviour (Barkoukis et al., 2015). As intentions have been considered an antecedent of volitional action (Lazuras et al., 2015), these results suggest that a subset of adolescent athletes in NZ sporting contexts are at risk of doping. These intentions complement existing definitions of doping as a deliberate act (Petróczi & Aidman, 2009). As intentions are considered to precede volitional behaviour (Lazuras et al., 2015), it is critical to understand factors which influence their formation in the context of SUDAA (see chapter 4).

3.6 Chapter summary

This chapter has presented the first investigation of factors which influence SUDAA in NZ sporting contexts. The comprehensive process taken to design and test the data collection tool for this nationwide study was detailed in this chapter, followed by a description of its participant recruitment process. The results of this inquiry were presented using descriptive statistics and discussed in consideration of existing evidence. The views of adolescent athletes revealed several factors whose associations with increased or decreased odds of SUDAA require greater understanding. As such, the outcomes of this initial analysis revealed areas which require additional investigation as presented in chapter four. Due to the sequential nature of this MMR design, the results presented in this chapter contribute to the research design of study two (chapter 5) and the practical recommendations of this thesis (chapter 9).

Practical implications

The evidence presented in this chapter has several implications for varied audiences in adolescent sporting contexts. The practical implications of these findings are summarised in this section as guided by a problem-solving framework by Guyer (1998).

Recognition of SUDAA as a relevant issue

This study revealed a high prevalence of supplement use, and a noteworthy extent of doping consideration, among adolescent athletes. A minority of participants also self-reported doping and doping intent. These findings have implications for stakeholders within NZ's sporting context who should recognise SUDAA as a relevant issue. Further recognition should be given to the need for initiatives to reduce SUDAA at all levels of adolescent sport. As introduced in chapter one, SUDAA has multifaceted consequences among adolescents which may be elevated among those who intend to dope, or who consider doping. Despite the fiscal implications of initiatives to reach this broad audience, the evidence shows a current need for such efforts to reduce SUDAA in NZ.

Coaching practice

The evidence revealed that some adolescents felt forced to do things they didn't want to do in their sport while almost one quarter of athletes perceived a lack of control about whether they would dope. These outcomes indicate that many adolescents perceive their behaviour to be controlled by others in sporting contexts which has implications for athlete support personnel. In consideration of this evidence, coaches and other support personnel should review the extent to which they control adolescent behaviours in sporting contexts. Where discovered, opportunities and best practices should be sought to reduce control on adolescent behaviours, particularly those related to SUDAA.

Motivational climate

These findings show that the majority of adolescents perceive mastery-orientations in their sporting climate, however, many also reported aspects of ego-orientation. Ego-oriented motivational climates have been recognised as a doping risk (Petróczi & Aidman, 2008; Sas-Nowosielski & Swiatkowska, 2008), therefore these results have implications for those who establish climates in adolescent sport. In this context, coaches should aim to reduce ego-oriented practices, particularly those which prioritise winning. These results have further implications for those who develop coach-education initiatives which should include a focus on the development of mastery-orientations, alongside a reduction in ego-orientations.

Education initiatives

Owing to the high prevalence of supplement use revealed in this study, a further implication of this evidence is the need for education which dispels an apparent perception of supplement efficacy to enhance adolescents' sporting performance. Further, coaches were found to be a common source of information about supplements, yet it is unlikely that most coaches have the expertise required to provide advice about adolescent consumption. As such, the provision of information on expert services to which coaches can refer athletes with supplement use queries appears necessary. Sports organisations thus have a role in providing access to education opportunities, and support services (for referral), in their sporting community.

Descriptive norms

This evidence reveals a descriptive norm among adolescent athletes who perceive that doping occurs in their sporting context and among those they know. This study also shows that adolescents are most tempted to dope when they believe their peers engage in this behaviour. These findings have implications for all audiences of adolescent sport who can proactively contribute to challenging this descriptive norm and thus, its potential influence on SUDAA. For example, adolescent perceptions of doping in their environment may be challenged by sharing evidence-based prevalence estimates, in developmentally appropriate ways. These efforts may be reinforced by transparent discouragement of doping in adolescent sporting contexts.

Chapter 4 Study one, part II

4.1 Chapter introduction

This chapter is the second to present outcomes from the initial study in this explanatory, sequential mixed method research (MMR) design. The purpose of this chapter is to expand on the knowledge gained through the descriptive analysis of evidence from study one, presented in chapter three. In response to RQ1, a subset of evidence from study one is analysed in this chapter to identify factors associated with increased and decreased odds of supplement use and doping among adolescent athletes (SUDAA). This chapter provides rationale for this subsequent phase of analysis, the survey items included, and statistical techniques used. The results of this analysis are presented and discussed in this chapter with consideration of existing evidence. This chapter concludes with practical implications derived from these results. The limitations, contributions to knowledge and directions for future research which emerged through this analysis are summarised in chapter eight.

4.2 Rationale for analysis

Literature reviewed in chapter one, and results of the initial analysis of data in chapter three, revealed factors whose influence on SUDAA require greater understanding. In response to RQ1, and to identify factors which influence increased and decreased odds of SUDAA, it is pertinent to explore potential associations between these factors. Specifically, this analysis seeks comprehensive insights into the influence of IPLOC, volition, subjective and descriptive norms, sources of sport confidence (SSC) and motivational climate (MC) on SUDAA. Owing to the pragmatic nature of this thesis, it is also important to understand if age influences these behaviours. For example, if age is associated with SUDAA, this may inform practical implications for the priorities placed on preventative initiatives with specific cohort(s). These constructs are each anticipated to influence SUDAA however the direction and extent of their associations remain unknown. The pragmatic nature of this thesis meant that discovering the direction in which respective factors influence SUDAA (i.e., increased or decreased) is essential to developing solutions to reduce these behaviours in practical sporting contexts. Due to the nature of this analysis, only data from fully completed surveys in study one are assessed in this chapter. While of interest, the examination of gendered difference was outside the scope of this thesis which sought to understand issues that would influence a wider community. Consequently such an analysis was not undertaken here. There does however remain the potential to examine these differences for the benefit of a broader scholarly audience in the

future. Therefore, the evidence analysed in this chapter represent the views of six hundred and sixty adolescent athletes who participated in study one (n = 660).

4.3 Survey items

Data analysed in this chapter are drawn from salient measures in the original 77-item, anonymous survey used to collect data in study one (Appendix D). The comprehensive process undertaken to develop and test this survey was detailed in the previous chapter. Based on the evidence presented in chapter three, and rationale for this analysis, the survey items analysed in this chapter are displayed in Table 8 and summarised in the section which follows.

Table 8

Survey items and scales analysed in chapter four

Survey scale	Amount of scale items (n)	Survey item(s)
Consent and demographic information	2	1, 2
SSC		
Demonstration of ability	6	12-17
Mastery	5	18-20, 22-23
Environmental comfort	4	21, 27-29
Self-presentation	3	24-26
Substance use		
Doping/Banned drugs	3	48-50
Supplements	4	43-46
MC		
Ego-oriented	6	30, 32, 34, 37, 39, 41
Mastery-oriented	6	31, 33, 35, 36, 38, 40
Social norms		
Subjective norms	3	63, 67, 69
Descriptive norms	3	64-66
Self-efficacy beliefs		
IPLOC	3	6-8
Volition	3	9-11
Doping consideration	1	75
Doping intentions	2	76-77

Note. SSC = Sources of sport confidence. MC = Motivational climate. IPLOC = Internal perceived locus of causality. Each survey item is detailed in full in Appendix D.

4.3.1 Demographic information

Participants gave their consent to participate in this survey and self-reported their age by year (e.g., 4 = 15 years, 5 = 16 years).

4.3.2 SSC

Derived from the Sources of Sport Confidence Survey (SSCQ, Vealey et al., 1998), each of the 18 items which measured SSC in study one are analysed in this chapter. These items were drawn from four original subscales including; Demonstration of ability, Mastery, Environmental comfort, and Self-presentation (Vealey et al., 1998). Throughout this chapter, sources of sport confidence are abbreviated to 'SSC' followed by a respective subscale (e.g., SSC: Mastery).

4.3.3 Substance use

Doping and supplement use

The frequency of doping and supplement use were measured through isolated items regarding each behaviour, drawn from previous research (Barkoukis et al., 2015).

4.3.4 MC

Derived from the Motivational Climate Scale for Youth Sport (MCSYS, Smith et al., 2008); six items measured mastery-oriented climates, and six items measured ego-oriented climates in adolescent sport. Throughout this chapter, motivational climate is abbreviated to 'MC' followed by a respective subscale (e.g., MC: Ego, MC: Mastery).

4.3.5 Social norms

Subjective and descriptive norms

Subjective norms and descriptive norms were each assessed using three items from previous research with adolescent athletes (Lazuras et al., 2015).

4.3.6 Self-efficacy beliefs

IPLOC and Volition

Derived from the Basic Needs Satisfaction in Sport Scale (BNSSS, Ng et al., 2011), IPLOC and volition were each measured using three items.

4.3.7 Doping consideration

A hypothetical scenario was used to measure adolescent consideration of doping to enhance sporting performance: *If, under medical supervision, a banned drug was offered to you which was free or cheap, was not detectable and could make a useful difference to your performance, how much consideration would you give to taking it?* (Gucciardi et al., 2010).

4.3.8 Doping intentions

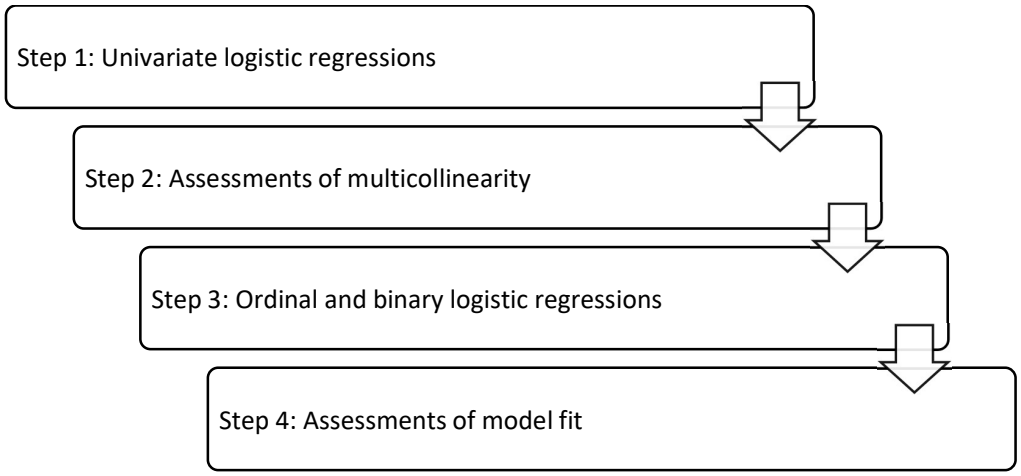
Based on original research on adolescent smoking, intentions to dope soon and in the next year were assessed using two items from previous research (Lazuras et al., 2015).

4.4 Statistical analysis

Descriptive analyses were conducted through the four-step process of standard statistical approaches presented in Figure 8. These analyses were conducted with regard to five dependent variables regarding SUDAA including: supplement use, doping, doping consideration, and doping intent (soon, and in the next year). This four-step process included univariate logistic regressions, assessments of multicollinearity, ordinal and binary logistic regressions and assessments of model fit. All analyses were conducted using SPSS 25 for Windows and are described in the section which follows.

Figure 8

Four-step statistical analysis process



4.4.1 Step 1: Univariate logistic regressions

The first step of this analysis was to determine the effect of respective independent variables on five dependent variables: supplement use, doping, intent to dope soon, intent to dope in the next year and doping consideration. The forty-two independent variables included in these regressions sought greater knowledge in key areas which were articulated in rationale two of this survey design (see chapter 3). The goal of a univariate regression is to explain the effect observed in a dependent variable as an outcome of their exposure to an independent variable (Bland & Altman, 2000; Haase, 2011; Szumilas, 2010). Therefore, univariate regressions evaluated and described the effects of a single independent variable (e.g., MC: Ego 5) on a single dependent variable (e.g., doping). Univariate regressions were an appropriate statistical

approach in the initial phase of this four-step statistical analysis process which sought to identify factors which influence SUDAA. Univariate regression outcomes also specified the odds ratios (OR) and confidence intervals (CI) for covariates which provided a greater understanding of the role of specific factors in these adolescent behaviours.

Odds ratios (OR)

ORs were calculated to measure the strength of association between the independent and dependent variables measured in each univariate regression. With relevance to RQ1, each OR provided important information on the odds that a dependent variable (e.g., supplement use) would occur as the result of exposure to an independent variable (e.g., IPLOC 1) (Bland & Altman, 2000; Szumilas, 2010). In this phase of analysis, an OR > 1 described increased odds of a measured effect while an OR < 1 indicated decreased odds of an assessed outcome (Szumilas, 2010).

Confidence intervals (CI)

CIs were measured to obtain an estimate regarding the precision of the OR. In this analysis, CIs were measured at the 95% to indicate how well the data reflected the mean estimate of this value to the adolescent athlete population. A smaller CI indicated greater OR precision while a larger CI indicated a lesser OR precision among this participant cohort (Trafimow, 2018). Items were selected for inclusion in further analysis due to their effect on the occurrence of a dependent variable among adolescent athletes. Therefore, the outcomes of each univariate regression indicated the independent variables for inclusion in an assessment of multicollinearity (step 2).

Dependent variables were identified by their high,[9] or low,[10] ORs and low CIs (in step 1). The criteria for an OR indicating increased odds was *OR* = >1, while an *OR* = <1 indicated decreased odds. Where all independent variables of a survey scale had high (*OR* = >1), or low (*OR* = <1) ORs, and low CIs, the independent variable with the highest (or lowest) OR, and lowest CI, represented that scale in further analysis. For example, Table 9 shows that all MC: Ego items had a high OR and a low CI. As MC: Ego 6 had the highest OR and lowest CI of its survey scale, this item represented MC: Ego in further stages of analysis (*OR* = 1.34, *CI* = 1.19, 1.51).

[9] A high OR indicated increased odds that a dependent variable would occur given exposure to an independent variable. Szumilas, M. (2010). Explaining odds ratios. *Journal of Canadian Academy of Child and Adolescent Psychiatry, 19*(3), 227-229. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2938757/pdf/ccap19_3p227.pdf

[10] A low OR indicated decreased odds that a dependent variable would occur given exposure to an independent variable. Ibid.

4.4.2 Step 2: Assessments of multicollinearity

As shown in Figure 8, it was essential that multicollinearity between independent variables were identified and reported. Assessing multicollinearity was critical in step two of this analysis as non-collinearity is an assumption which must be met before regressions can be performed (Laerd Statistics, 2018c). Spearman's correlations were therefore conducted as a non-parametric measure of multicollinearity between independent variables which were revealed as influential to respective dependent variables in step one of this analysis (Laerd Statistics, 2018d; Rebekic et al., 2015). Spearman's correlations were the most suitable method to assess multicollinearity in this phase of analysis as ordinal data was used in these appraisals.

A high correlation between independent variables would have indicated a lack of independence and a linear relationship between covariates. This linear relationship would have identified a monotonic association between two variables whereby changes in one covariate would have resulted in changes to another. Due to data interpretation challenges posed by monotonic associations, correlated variables could not be included together in a regression (Vatcheva et al., 2016). Conversely, when weak (i.e., $r <= 0.50$) or very weak ($r <= 0.30$) correlation coefficients were displayed, and multicollinearity was not identified, independent variables could be used together in the regressions conducted in step three (Cohen, 1988, 1992).

4.4.3 Step 3: Ordinal and binary regressions

Results of the multicollinearity assessments conducted in step two showed independence among the covariates. This independence indicated that each covariate could be included in ordinal and binary logistic regressions for each dependent variable. The covariates included in the regressions for each dependent variable were determined by univariate regression results (step 1) and the outcomes of multicollinearity assessments (step 2). Due to their respective assumptions, ordinal and binary logistic regressions were conducted in this phase of analysis (as described below). The regressions for each dependent variable were conducted many times, using a backward elimination method, as the lowest parameter estimates of all variables were removed from each model. Regressions continued using this pattern until the goodness of model fit was satisfied and Akaike Information Criterion (AIC) scores had sufficiently decreased (see step 4).

Ordinal logistic regressions

Ordinal logistic regressions were used to measure the occurrence of a dependent variable (e.g., doping) as a result of exposure to one or more independent variables (e.g., Descriptive

norm 1). In alignment with the assumptions of ordinal regressions, data were only included if they lacked multicollinearity, had proportional odds, and used ordinal dependent and independent variables[11] (Laerd Statistics, 2018c). Based on these assumptions, and informed by previous steps of analysis, ordinal regressions were conducted for the dependent variables of supplement use, doping, doping intent (in the next year), and doping consideration.

Binary logistic regressions

Binary logistic regressions were used to identify the relationship between a dichotomous dependent variable (e.g., intentions to dope soon) and one or more independent variables (e.g., Volition 1) (Fagerland & Hosmer, 2012). Consistent with the assumptions of binary logistic regression, data were only included if they had a dichotomous dependent variable with mutually exclusive, exhaustive categories. Further, covariates were only included in binary regressions if they lacked multicollinearity (as confirmed in step 2) and used one or more independent variables, measured on an ordinal scale (Laerd Statistics, 2018a). Based on these assumptions, and informed by previous steps of this analysis, binary logistic regressions were conducted for a single dependent variable; intent to dope soon.

4.4.4 Step 4: Assessments of model fit

Prior to interpreting or drawing conclusions from data analysed through ordinal and binary regressions, it was critical to assess the fit of each model (generated in step 3). Due to their respective statistical requirements, models within ordinal regressions were measured using Pearson's Goodness-of-Fit tests while binary regression models were assessed through Hosmer and Lemeshow tests (Laerd Statistics, 2018a, 2018c). The Akaike Information Criterion (AIC) was also calculated to assess the quality of each model in ordinal and binary regressions (Fagerland & Hosmer, 2012; Symonds & Moussalli, 2011).

Pearson's Goodness-of-Fit tests

The Pearson's Goodness-of-Fit test is a non-parametric assessment of how well the observed data fits within the empirical distribution which could be expected of independent covariates (confirmed in step 2). The assumptions of Pearson's Goodness-of-Fit tests indicate that there must be no multicollinearity between variables (as confirmed in step 2) which are categorical (or ordinal) and mutually exclusive. A final assumption of this test is that each categorical (or ordinal) variable has at least five frequencies (Laerd Statistics, 2018b). As detailed in step two

[11] Ordinal independent variables must be treated as categorical independent variables in logistic regressions. Laerd Statistics. (2018c). *Ordinal regression using SPSS statistics*. https://statistics.laerd.com/spss-tutorials/ordinal-regression-using-spss-statistics.php

(Figure 8), and observed in the ordinal nature of survey items (Appendix D), these assumptions rendered the Pearson's Goodness-of-Fit test suitable for all data included in ordinal regressions (step 3). The sample size of this data (n = 660) also met the requirements of Pearson's Goodness-of-Fit tests which is considered a more suitable assessment with larger participant cohorts (Mavridis et al., 2007). The aforementioned reasons rendered Pearson's Goodness-of-Fit tests most suitable to assess the model fit of ordinal regression outcomes regarding supplement use, doping, doping intent (in the next year) and doping consideration.

Hosmer and Lemeshow tests

The Hosmer and Lemeshow test (HL test) is a common assessment of Goodness-of-Fit for models within binary regressions. The suitability of fit in such models are considered superior when predicted and observed frequencies are closely matched (Hosmer et al., 2013). As HL tests can only be used among dependent variables with a dichotomous response, it was deemed the most suitable assessment of model fit for binary regression outcomes regarding adolescent intentions to dope soon. These model fit measures were supported by the calculation of Nagelkerke R squared values to explain variances in the dependent variable; intent to dope soon (Laerd Statistics, 2018a).

Akaike Information Criterion (AIC)

The AIC was calculated to assess the quality of models in each ordinal and binary logistic regression by making comparisons between them to identify the "best approximating model" (Symonds & Moussalli, 2011, p. 14). While the AIC score is insufficient when interpreted in isolation, lower AIC values indicate that a model has lost the least amount of data comparative to other models thus providing a best model fit to the observed data (Symonds & Moussalli, 2011). In this step of analysis, AIC scores were calculated using Equation 1 (Vogt, 2014) to identify the model of best fit to the data in each regression (step 3).

Equation 1

Akaike Information Criterion (AIC)

$$AIC = -2(log - likelihood) + 2K \quad (1)$$

4.4.5 Participant recruitment

Procedure

As detailed in chapter three, participants were recruited for study one by way of sports organisations and secondary schools. Upon receiving information about study one (Appendix E) interested individuals could use the included QR code or electronic link to access participant information regarding the investigation and the survey proper.

Participant criteria

As detailed in chapter three, participants were 13 to 18 years of age and competed at any level of any sport in NZ. As previously explained, data analysed in this chapter were drawn from the contributions of study one participants who completed the survey in full.

4.5 Results

4.5.1 Participant information

The present cohort included six hundred and sixty adolescent athletes (n = 660) aged 13 to 18 years (M = 15 years; SD: 1.54).

4.5.2 Supplement use

A univariate regression was conducted to identify associations between the dependent variable of supplement use and the independent covariates displayed in Table 9.

Table 9

Univariate regression results of the effect of covariates on the odds of supplement use

Independent Variable	OR	SEβ	t	*ρ*	95% Confidence Interval	
					Lower Bound	Upper Bound
IPLOC 1	1.30	0.15	3.25	<.001	1.06	1.59
IPLOC 2	1.01	-0.05	-0.92	.354	0.82	1.24
IPLOC 3	1.24	0.06	1.09	.275	1.00	1.54
Volition 1	1.19	-0.01	-0.31	.753	0.95	1.50
Volition 2*	0.89	-0.02	-0.66	.509	0.76	1.05
Volition 3	1.01	-0.05	-1.03	.300	0.82	1.24
Subjective norm 1	1.67	0.10	2.29	.022	1.36	2.04
Subjective norm 2	1.60	0.03	0.65	.510	1.22	2.10
Subjective norm 3	1.65	0.00	0.00	.996	1.28	2.14
Descriptive norm 1	1.00	-0.00	-0.10	.914	1.00	1.01
Descriptive norm 2	1.71	0.13	3.23	<.001	1.46	2.01
Descriptive norm 3	1.65	0.07	1.59	.112	1.38	1.96
SSC: Demonstration ability 1	1.45	0.07	1.49	.135	1.22	1.72
SSC: Demonstration ability 2	1.40	0.06	1.06	.288	1.22	1.60
SSC: Demonstration ability 3	1.36	-0.05	-0.86	.388	1.17	1.59
SSC: Demonstration ability 4	1.47	0.07	1.14	.254	1.29	1.69
SSC: Demonstration ability 5	1.38	0.01	0.28	.777	1.21	1.59
SSC: Demonstration ability 6	1.36	-0.01	-0.20	.837	1.19	1.56
SSC: Mastery 1	0.99	-0.05	-0.93	.352	0.82	1.19
SSC: Mastery 2	1.01	-0.02	-0.38	.699	0.82	1.23
SSC: Mastery 3	1.03	0.03	0.49	.623	0.83	1.29
SSC: Mastery 4	0.98	-0.03	-0.66	.504	0.80	1.20
SSC: Mastery 5	1.07	0.04	0.70	.481	0.85	1.34

SSC: Self-presentation 1	1.20	-0.01	-0.31	.755	1.05	1.37
SSC: Self-presentation 2	1.25	0.11	1.85	.064	1.09	1.42
SSC: Self-presentation 3	1.20	-0.09	-1.51	.130	1.06	1.37
SSC: Environmental comfort 1	0.98	0.00	0.15	.877	0.82	1.18
SSC: Environmental comfort 2	1.28	0.08	2.04	.042	1.11	1.48
SSC: Environmental comfort 3	1.14	0.04	0.87	.383	0.93	1.36
SSC: Environmental comfort 4	0.97	-0.11	-1.94	.053	0.81	1.16
MC: Ego 1	1.28	0.02	0.49	.624	1.08	1.41
MC: Ego 2	1.15	0.00	0.08	.929	1.01	1.33
MC: Ego 3	1.28	0.04	1.01	.308	1.12	1.46
MC: Ego 4	1.27	0.04	0.79	.428	1.11	1.46
MC: Ego 5	1.14	-0.03	-0.74	.458	1.00	1.30
MC: Ego 6	1.34	0.06	1.45	.145	1.19	1.51
MC: Mastery 1	1.04	0.01	0.29	.765	0.86	1.27
MC: Mastery 2	0.99	0.04	0.91	.358	0.81	1.19
MC: Mastery 3	0.92	-0.02	-0.48	.626	0.78	1.08
MC: Mastery 4	0.94	0.05	1.30	.191	0.81	1.10
MC: Mastery 5	0.90	-0.10	-1.87	.061	0.76	1.06
MC: Mastery 6	1.00	0.04	0.93	.350	0.85	1.18
Age	1.35	0.16	4.28	<.001	1.23	1.48

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

*reversed scored item.

Factors which increase the odds of supplement use

Results of the univariate regressions presented in Table 9 show seven covariates which increase the odds of supplement use: IPLOC 1, Subjective norms 1, Descriptive norms 2, SSC: Demonstration ability 2, SSC: Self-presentation 3, MC: Ego 6 and Age. As shown in Table 9, no associations were found between covariates and decreased odds of supplement use. A Spearman's correlation then tested for multicollinearity between the covariates that increased the odds of supplement use, as displayed in Table 10.

Table 10

Spearman's correlation of factors which increase the odds of supplement use

	IPLOC	Subjective norms	Descriptive norms	SSC: Demonstration ability	SSC: Self-presentation	MC: Ego	Age
IPLOC							
Subjective norms	-0.168**						
Descriptive norms	0.105**	0.178**					
SSC: Demonstration ability	0.068	0.052	0.050				
SSC: Self-presentation	0.025	0.053	0.055	0.272**			
MC: Ego	-0.018	0.148**	0.164**	0.306**	0.186**		
Age	0.056	0.048	0.166**	0.116**	0.080*	0.052	

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

* ρ <0.05. ** ρ <0.01.

As shown in Table 10, a weak positive correlation was observed between SSC: Demonstration ability and MC: Ego (r_s = 0.306). These results indicate that confidence obtained through winning is related to participation in sporting climates which prioritise performance. As no statistically significant correlations were present between the covariates assessed in Table 10, all could be included in a multiple regression model. As summarised in Table 11, six ordinal logistic regressions were conducted to determine the influence of IPLOC, Subjective norms, Descriptive norms, SSC: Demonstration ability, SSC: Self-presentation, MC: Ego, and Age on increased odds of supplement use.

Table 11

Ordinal logistic regression results of factors which increase the odds of supplement use

		OR	SEβ	t	ρ	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 6	Subjective norms	1.48	0.10	14.2	<.001	1.21	1.82
	Descriptive norms	1.61	0.08	33.1	<.001	1.37	1.90

Of the models assessed in these ordinal regressions, the Pearson's Goodness-of-Fit test indicated that model six had a good fit to the observed data, $\chi^2(78) = 84.561$, $\rho = 0.286$. Model six also had the lowest AIC score indicating this model was most parsimonious with the observed data, *AIC* = 421.962. As shown in Table 11, two independent variables had a statistically significant effect on increased odds of supplement use among adolescent athletes;

Descriptive norms (*OR* = 1.61, *95% CI* = 1.37, 1.90, *ρ* = <.001) and Subjective norms (*OR* = 1.48, *95% CI* = 1.21, 1.82, *ρ* = <.001). These findings indicate that adolescent athletes have greater odds of supplement use when they perceive doping occurs in their sporting context and that people close, or important, to them would approve of their doping.

4.5.3 Doping

A univariate regression was conducted to identify associations between the odds of doping and associated covariates as presented in Table 12.

Table 12

Univariate regression results of the effect of covariates on the odds of doping

Independent Variable	OR	SEβ	t	*ρ*	95% Confidence Interval	
					Lower Bound	Upper Bound
IPLOC 1	0.47	-0.00	-0.04	.967	0.26	0.86
IPLOC 2	0.46	-0.04	-0.81	.415	0.27	0.76
IPLOC 3	0.72	0.11	2.14	.033	0.38	1.35
Volition 1	0.48	-0.10	-2.14	.032	0.28	0.80
Volition 2*	0.44	-0.07	-1.94	.052	0.29	0.66
Volition 3	0.86	0.09	2.26	.024	0.45	1.65
Subjective norm 1	5.30	0.21	5.09	<.001	3.37	8.34
Subjective norm 2	4.28	0.16	3.88	<.001	2.80	6.55
Subjective norm 3	4.86	0.15	3.13	.002	3.17	7.47
Descriptive norm 1	1.04	0.01	0.38	.698	1.02	1.06
Descriptive norm 2	3.71	0.10	2.60	.009	2.42	5.68
Descriptive norm 3	3.55	0.12	3.08	.002	2.47	5.10
SSC: Demonstration ability 1	0.68	-0.04	-0.93	.351	0.40	1.13
SSC: Demonstration ability 2	1.05	0.00	0.00	.998	0.66	1.67
SSC: Demonstration ability 3	0.88	-0.03	-0.24	.804	0.53	1.45
SSC: Demonstration ability 4	1.21	0.02	0.48	.627	0.76	1.93
SSC: Demonstration ability 5	0.99	0.02	0.51	.608	0.62	1.59
SSC: Demonstration ability 6	0.97	-0.05	-1.06	.289	0.61	1.55
SSC: Mastery 1	0.64	0.01	0.28	.780	0.36	1.13
SSC: Mastery 2	0.62	0.03	0.54	.589	0.34	1.13
SSC: Mastery 3	0.48	-0.07	-1.39	.164	0.27	0.84
SSC: Mastery 4	0.59	0.02	0.39	.695	0.32	1.06
SSC: Mastery 5	0.61	0.10	1.94	.053	0.32	1.17
SSC: Self-presentation 1	1.63	0.06	1.33	.182	0.94	2.81
SSC: Self-presentation 2	1.51	0.01	0.17	.863	0.91	2.51
SSC: Self-presentation 3	1.41	-0.02	-0.37	.710	0.88	2.24

SSC: Environmental comfort 1	0.66	-0.01	-0.40	.688	0.38	1.16
SSC: Environmental comfort 2	1.27	-0.01	-0.45	.648	0.76	2.10
SSC: Environmental comfort 3	0.93	-0.04	-0.79	.424	0.51	1.69
SSC: Environmental comfort 4	0.76	0.02	0.39	.690	0.42	1.37
MC: Ego 1	1.59	-0.04	-1.16	.243	1.01	2.51
MC: Ego 2	1.45	-0.06	-1.42	.154	0.92	2.27
MC: Ego 3	2.26	0.02	0.52	.597	1.45	3.51
MC: Ego 4	1.98	0.03	0.75	.453	1.27	3.10
MC: Ego 5	2.15	0.01	0.39	.695	1.40	3.30
MC: Ego 6	1.68	0.02	0.69	.489	1.11	2.52
MC: Mastery 1	0.66	0.03	0.87	.383	0.36	1.22
MC: Mastery 2	0.59	-0.06	-1.32	.185	0.34	1.00
MC: Mastery 3	0.82	-0.05	-1.17	.240	0.48	1.40
MC: Mastery 4	0.82	-0.00	-0.11	.908	0.50	1.37
MC: Mastery 5	1.09	0.06	1.25	.209	0.60	1.97
MC: Mastery 6	0.96	0.08	2.03	.043	0.54	1.71
Age	1.21	-0.02	-0.83	.404	0.87	1.67

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

*reversed scored item.

Factors which increase the odds of doping

The univariate regression results displayed in Table 12 show that covariates from three scales had high ORs and low CIs (measured at the 95%). From each scale, the item with the largest effect on increased odds of doping underwent further analysis including: MC: Ego 3, Subjective norm 1, and Descriptive norm 3. A Spearman's correlation was then conducted to measure for multicollinearity between these covariates (Table 13).

Table 13

Spearman's correlation of factors which increase the odds of doping

	MC: Ego	Subjective norms	Descriptive norms
MC: Ego			
Subjective norms	0.160**		
Descriptive norms	0.095*	0.178**	

Note. MC = Motivational climate.

* ρ <0.05. ** ρ <0.01.

As shown in Table 13, no statistically significant correlations were identified between covariates which increased the odds of doping and therefore each could be included in a multiple regression model. As summarised in Table 14, two ordinal regressions were conducted to determine the effect of MC: Ego, Subjective norms and Descriptive norms on increased odds of doping.

Table 14

Ordinal logistic regression results of factors which increase the odds of doping

		OR	SEβ	t	*ρ*	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 2	Subjective norms	4.22	0.25	33.1	<.001	2.58	6.90
	Descriptive norms	2.58	0.24	15.5	<.001	1.61	4.14

To assess the fit of each model in these regressions, Pearson's Goodness-of-Fit tests were conducted, and AIC scores were calculated. The results found that model two had a good model fit, $\chi^2(78) = 59.754$, $\rho = 0.938$, and was most parsimonious with the observed data, *AIC* = 131.326. As shown in Table 14, Subjective norms (*OR* = 4.22, *95% CI* = 2.58, 6.90, $\rho = <.001$), and Descriptive norms (*OR* = 2.58, *95% CI* = 1.61, 4.14, $\rho = <.001$), each had a statistically significant effect on increased odds of doping among adolescent athletes. These results show that adolescent athletes are more likely to dope if they believe that people close or important to them would approve of this behaviour. Adolescent athletes also have greater odds of doping if they know others who dope, and if they believe doping occurs in their sport.

Factors which decrease the odds of doping

The univariate regression results summarised in Table 12 displays associations between decreased odds of doping and IPLOC 2, Volition 2 and SSC: Mastery 3. As shown in Table 15, a Spearman's correlation assessed for multicollinearity between these covariates.

Table 15

Spearman's correlation of factors which decrease the odds of doping

	IPLOC	Volition	SSC: Mastery
IPLOC			
Volition	0.373**		
SSC: Mastery	0.313**	0.182**	

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

* ρ <0.05. ** ρ <0.01.

The results of this Spearman's correlation identified weak positive correlations between IPLOC and Volition ($r_s = 0.373$), and between IPLOC and SSC: Mastery ($r_s = 0.313$). These results indicate that IPLOC was related to adolescent volition, and to mastery as a source of confidence. As no statistically significant correlations were identified between covariates, all could be included in a multiple regression model. As summarised in Table 16, three ordinal regressions were conducted to determine the effect of IPLOC, Volition and SSC: Mastery on decreased odds of doping.

Table 16

Ordinal logistic regression results of factors which decrease the odds of doping

		OR	SEβ	t	*ρ*	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 3	Volition	0.43	0.21	15.1	<.001	0.29	0.66

To assess the fit of each model in these regressions, Pearson's Goodness-of-Fit tests were conducted, and AIC scores were calculated. These measures showed that model three had the best fit to the observed data, $\chi^2(15) = 17.046$, $\rho = 0.316$, $AIC = 44.971$. As shown in Table 16, Volition had a statistically significant effect on decreased odds of doping (*OR* = 0.43, *95% CI* = 0.29, 0.66, ρ = <.001). These findings suggest that adolescents have fewer odds of doping when they believe they can make choices willingly, without external influence, and perceive they can implement the actions required to perform a specific task.

4.5.4 Intentions to dope in the next year

Univariate regressions were conducted between adolescent intentions to dope in the next year and the associated covariates presented in Table 17.

Table 17

Univariate regression results of the effect of covariates on the odds of intentions to dope in the next year

Independent Variable	OR	SEβ	t	*ρ*	95% Confidence Interval	
					Lower Bound	Upper Bound
IPLOC 1	0.75	0.01	0.24	.806	0.61	0.93
IPLOC 2	0.70	0.01	0.30	.761	0.56	0.87
IPLOC 3	0.70	-0.11	-2.13	.033	0.56	0.87
Volition 1	0.93	0.15	2.84	.005	0.73	1.18
Volition 2*	0.68	-0.08	-2.12	.034	0.57	0.80
Volition 3	0.72	-0.05	-1.07	.282	0.58	0.89
Subjective norm 1	2.61	0.24	5.30	<.001	2.10	3.23
Subjective norm 2	2.22	0.10	2.27	.023	1.68	2.93
Subjective norm 3	2.49	0.02	0.51	.609	1.90	3.26
Descriptive norm 1	1.00	0.03	0.90	.365	1.00	1.01
Descriptive norm 2	1.37	0.01	0.46	.643	1.17	1.62
Descriptive norm 3	1.58	0.03	0.79	.427	1.32	1.89
SSC: Demonstration ability 1	1.45	0.08	1.77	.077	1.20	1.74
SSC: Demonstration ability 2	1.54	0.15	2.64	.008	1.32	1.78
SSC: Demonstration ability 3	1.34	-0.01	-0.31	.751	1.14	1.58
SSC: Demonstration ability 4	1.49	0.09	1.59	.111	1.29	1.72
SSC: Demonstration ability 5	1.28	-0.12	-2.13	.033	1.11	1.48
SSC: Demonstration ability 6	1.34	0.01	0.20	.837	1.15	1.55

SSC: Mastery 1	0.81	-0.01	-0.22	.819	0.66	0.98
SSC: Mastery 2	0.79	0.05	0.92	.355	0.68	0.97
SSC: Mastery 3	0.69	-0.08	-1.39	.163	0.55	0.86
SSC: Mastery 4	0.69	-0.11	-2.08	.037	0.56	0.86
SSC: Mastery 5	0.75	0.06	1.03	.300	0.59	0.95
SSC: Self-presentation 1	1.14	-0.00	-0.12	.901	0.99	1.32
SSC: Self-presentation 2	1.29	0.09	1.55	.120	1.12	1.49
SSC: Self-presentation 3	1.27	-0.03	-0.64	.517	1.11	1.45
SSC: Environmental comfort 1	0.79	-0.01	-0.38	.700	0.65	0.95
SSC: Environmental comfort 2	1.04	0.01	0.25	.796	0.90	1.20
SSC: Environmental comfort 3	0.94	-0.06	-1.26	.205	0.79	1.13
SSC: Environmental comfort 4	0.94	0.06	1.07	.281	0.78	1.14
MC: Ego 1	1.23	-0.01	-0.33	.736	1.07	1.42
MC: Ego 2	1.24	-0.01	-0.21	.832	1.07	1.43
MC: Ego 3	1.44	0.10	2.13	.033	1.25	1.65
MC: Ego 4	1.32	-0.01	-0.18	.855	1.15	1.52
MC: Ego 5	1.19	-0.07	-1.72	.085	1.04	1.37
MC: Ego 6	1.18	-0.03	-0.70	.479	1.04	1.34
MC: Mastery 1	0.76	-0.02	-0.51	.606	0.62	0.93
MC: Mastery 2	0.74	-0.00	-0.18	.854	0.60	0.90
MC: Mastery 3	0.82	-0.02	-0.37	.711	0.69	0.83
MC: Mastery 4	0.79	-0.02	-0.51	.604	0.67	0.93
MC: Mastery 5	0.85	0.01	0.28	.777	0.71	1.01
MC: Mastery 6	0.82	0.07	1.58	.115	0.69	0.98
Age	1.19	0.09	2.43	.015	1.08	1.32

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

*reversed scored item.

Factors which increase the odds of intentions to dope in the next year

Results of the univariate regressions presented in Table 17 show that covariates from six scales had high OR and low CI (measured at the 95%). These findings indicate that Age, MC: Ego 3, Subjective norm 1, Descriptive norm 3, SSC: Self-presentation 2 and SSC: Demonstration ability 2 were associated with increased odds of intentions to dope in the next year. Each of these covariates were included in a Spearman's correlation to measure for multicollinearity (Table 18).

Table 18

Spearman's correlation of factors which increase the odds of intentions to dope in the next year

	Subjective norms	Descriptive norms	SSC: Demonstration ability	SSC: Self-presentation	MC: Ego	Age
Subjective norms						
Descriptive norms	0.230**					
SSC: Demonstration ability	0.052	0.013				
SSC: Self-presentation	0.065	0.013	0.255**			
MC: Ego	0.160**	0.073	0.246**	0.131**		
Age	0.048	0.013	0.116**	0.012	-0.009	

Note. SSC = Sources of sport confidence. MC = Motivational climate.

* ρ <0.05. ** ρ <0.01.

Results of this Spearman's correlation identified very weak correlations between SSC: Demonstration ability and SSC: Self-presentation (r_s = 0.255) and between MC: Ego and SSC: Demonstration ability (r_s = 0.246). Very weak correlations were also identified between Descriptive norms and Subjective norms (r_s = 0.230). As shown in Table 18, no statistically significant correlations were identified between covariates therefore each could be included in a multiple regression model. As summarised in Table 19, six ordinal regressions were conducted to determine the effect of Age, MC: Ego, Subjective norms, Descriptive norms, SSC: Self-presentation and SSC: Demonstration ability, on increased odds of doping intentions in the next year.

Table 19

Ordinal logistic regression results of factors which increase the odds of intentions to dope in the next year

		OR	SEβ	t	ρ	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 6	Subjective norms	2.61	0.10	77.4	<.001	2.10	3.23

To assess the fit of each model in these regressions, Pearson's Goodness-of-Fit tests were conducted, and AIC scores calculated. These assessments showed that model six had a parsimonious fit to the observed data, χ^2 (15) = 17.207, ρ = 0.307, *AIC* = 77.738. As shown in Table 19, subjective norms had a statistically significant effect on increased odds of adolescent intentions to dope in the next year (*OR* = 2.61, *95% CI* = 2.10, 3.23, ρ = <.001). These findings indicate that adolescent perceptions that those close or important to them would approve of doping are influential to increased intentions to dope in the next year.

Factors which decrease the odds of intentions to dope in the next year

Results of the univariate regressions presented in Table 17 show five covariates which decreased the odds of adolescent intent to dope in the next year including: IPLOC 2, Volition 2, SSC: Mastery 3, SSC: Environmental comfort 1 and MC: Mastery 2. As shown in Table 20, each of these covariates were included in a Spearman's correlation to test for multicollinearity between them.

Table 20

Spearman's correlation of factors which decrease the odds of intentions to dope in the next year

	IPLOC	Volition	SSC: Mastery	SSC: Environmental comfort	MC: Mastery
IPLOC					
Volition	0.373**				
SSC: Mastery	0.313**	0.182**			
SSC: Environmental comfort	0.241**	0.135**	0.379**		
MC: Mastery	0.283**	0.243**	0.366**	0.212**	

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

* ρ <0.05. ** ρ <0.01.

Results of the Spearman's correlation presented in Table 20 show a weak positive correlation between SSC: Mastery and SSC: Environmental comfort (r_s = 0.379), and between Volition and IPLOC (r_s = 0.373). Weak positive correlations were also identified between SSC: Mastery and MC: Mastery (r_s = 0.366), and between IPLOC and SSC: Mastery (r_s = 0.313). As shown in Table 20, no statistically significant correlations were identified between independent variables therefore all could be included together in a multiple regression model. As summarised in Table 21, five ordinal regressions were conducted to determine the effect of covariates on decreased odds of intentions to dope in the next year.

Table 21

Ordinal logistic regression results of factors which decrease the odds of intentions to dope in the next year

		OR	SEβ	t	ρ	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 5	Volition	0.68	0.08	20.1	<.001	0.57	0.80

Pearson's Goodness-of-Fit tests were conducted, and AIC scores calculated, to assess the fit of each model within these regressions. The results of these appraisals indicated that model five had a good model fit to the observed data, $\chi^2(15) = 25.358$, ρ = .045, *AIC* = 95.976. As shown in

Table 21, Volition had a statistically significant effect on decreased odds of intentions to dope in the next year (*OR* = 0.68, *95% CI* = 0.57, 0.80, *ρ* = <.001). These results show that adolescents have fewer odds of intending to dope in the next year when they believe they can make choices willingly and implement the actions required to perform tasks of their own volition.

4.5.5 Doping consideration

Univariate regressions were conducted between doping consideration and the associated covariates displayed in Table 22.

Table 22

Univariate regression results of the effect of covariates on the odds of doping consideration

Independent Variable	OR	SEβ	t	*ρ*	95% Confidence Interval	
					Lower Bound	Upper Bound
IPLOC 1	0.56	-0.03	-0.78	.431	0.34	0.93
IPLOC 2	0.63	-0.03	-0.75	.449	0.39	1.01
IPLOC 3	0.90	0.10	2.17	.030	0.51	1.59
Volition 1	0.71	-0.02	-0.58	.562	0.42	1.20
Volition 2*	0.64	-0.04	-1.23	.219	0.44	0.93
Volition 3	0.89	0.06	1.64	.101	0.52	1.52
Subjective norm 1	4.82	0.23	5.90	<.001	3.30	7.03
Subjective norm 2	4.15	0.14	3.50	<.001	2.81	6.11
Subjective norm 3	5.30	0.26	5.79	<.001	3.56	7.91
Descriptive norm 1	1.04	0.08	2.47	.014	1.02	1.05
Descriptive norm 2	3.21	0.09	2.53	.012	2.27	4.54
Descriptive norm 3	2.92	0.06	1.72	.085	2.16	3.95
SSC: Demonstration ability 1	0.98	0.01	0.41	.680	0.62	1.57
SSC: Demonstration ability 2	1.09	0.06	1.38	.168	0.75	1.59
SSC: Demonstration ability 3	0.82	-0.10	-2.08	.038	0.55	1.22
SSC: Demonstration ability 4	1.05	-0.02	-0.44	.659	0.73	1.51
SSC: Demonstration ability 5	1.05	0.09	1.75	.080	0.72	1.54
SSC: Demonstration ability 6	0.91	-0.07	-1.62	.105	0.63	1.33
SSC: Mastery 1	0.67	-0.05	-1.05	.292	0.42	1.07
SSC: Mastery 2	0.74	0.11	2.24	.025	0.44	1.25
SSC: Mastery 3	0.55	-0.01	-0.25	.802	0.34	0.89
SSC: Mastery 4	0.59	-0.02	-0.58	.556	0.36	0.96
SSC: Mastery 5	0.71	0.09	1.89	.059	0.40	1.25
SSC: Self-presentation 1	1.59	0.08	1.89	.059	1.03	2.46
SSC: Self-presentation 2	1.29	-0.06	-1.28	.201	0.87	1.90
SSC: Self-presentation 3	1.43	0.02	0.40	.688	0.98	2.08

SSC: Environmental comfort 1	0.60	-0.05	-1.42	.154	0.38	0.93
SSC: Environmental comfort 2	1.47	0.04	1.18	.237	0.96	2.25
SSC: Environmental comfort 3	0.82	-0.10	-2.23	.026	0.51	1.31
SSC: Environmental comfort 4	0.76	0.05	1.10	.269	0.47	1.22
MC: Ego 1	1.41	-0.02	-0.66	.509	0.98	2.05
MC: Ego 2	1.07	-0.04	-1.08	.279	0.73	1.57
MC: Ego 3	1.52	0.04	1.11	.265	1.08	2.15
MC: Ego 4	1.21	-0.01	-0.37	.705	0.84	1.74
MC: Ego 5	1.26	0.00	0.07	.941	0.89	1.80
MC: Ego 6	1.40	-0.00	-0.02	.984	1.01	1.95
MC: Mastery 1	0.83	0.01	0.32	.748	0.49	1.41
MC: Mastery 2	0.85	-0.03	-0.72	.467	0.51	1.43
MC: Mastery 3	0.95	-0.08	-1.76	.077	0.60	1.50
MC: Mastery 4	0.86	-0.01	-0.29	.768	0.57	1.31
MC: Mastery 5	1.69	0.10	2.27	.023	0.97	2.92
MC: Mastery 6	0.95	0.08	2.31	.021	0.60	1.52
Age	1.17	-0.04	-1.32	.187	0.90	1.51

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

*reversed scored item.

Factors which increase the odds of doping consideration

Results of these univariate regressions (Table 22) show that covariates from four scales had a high OR and low CI (measured at the 95%). These findings reveal that MC: Ego 3, Subjective norms 3, Descriptive norms 2 and SSC: Self-presentation 1 were associated with increased odds of doping consideration. A Spearman's correlation was then conducted to test for multicollinearity between these covariates as shown in Table 23.

Table 23

Spearman's correlation of factors which increase the odds of doping consideration

	SSC: Self-presentation	MC: Ego	Subjective norms	Descriptive norms
SSC: Self-presentation				
MC: Ego	0.120**			
Subjective norms	-0.036	0.144**		
Descriptive norms	0.026	0.095*	0.213**	

Note. SSC = Sources of sport confidence. MC = Motivational climate.

* ρ <0.05. ** ρ <0.01.

As shown in Table 23, no statistically significant correlations were identified between covariates therefore all could be included in a multiple regression model. As summarised in Table 24, three ordinal regressions were conducted to determine the effect of MC: Ego,

Subjective norms, Descriptive norms, and SSC: Self-presentation on increased odds of doping consideration.

Table 24

Ordinal logistic regression results of factors which increase the odds of doping consideration

		OR	SEβ	t	*ρ*	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 3	SSC: Self-presentation	2.35	0.28	8.78	0.003	1.33	4.14
	Subjective norms	6.20	0.22	64.9	<.001	3.98	9.66

Note. SSC = Sources of sport confidence.

AIC scores and Pearson's Goodness-of-Fit test results indicated that model three had a good model fit to the observed data, $\chi^2(70) = 52.396$, $\rho = .991$, $AIC = 155.294$. As shown in Table 24, two independent variables had a statistically significant effect on increased odds of doping consideration: Subjective norms (*OR* = 6.20, *95% CI* = 3.98, 9.66, ρ = <.001) and SSC: Self-presentation (*OR* = 2.35, *95% CI* = 1.33, 4.14, ρ = 0.003). These results show that adolescents who believe those close or important to them would approve if they were to dope have greater odds of considering doping. This evidence also suggests that adolescents are more likely to consider doping when they obtain confidence through self-presentation (i.e., appearance).

Factors which decrease the odds of doping consideration

The univariate regressions presented in Table 22 identified associations between decreased odds of doping consideration and covariates from four scales with low OR and low CI (measured at 95%). These independent variables included IPLOC 1, Volition 2, SSC: Mastery 3 and SSC: Environmental comfort 1. These variables were each measured for multicollinearity through a Spearman's correlation as shown in Table 25.

Table 25

Spearman's correlation of factors which decrease the odds of doping consideration

	IPLOC	Volition	SSC: Mastery	SSC: Environmental comfort
IPLOC				
Volition	0.352**			
SSC: Mastery	0.281**	0.182**		
SSC: Environmental comfort	0.239**	0.135**	0.379**	

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

* ρ <0.05; ** ρ <0.01.

Outcomes of the Spearman's correlation displayed in Table 25 show a weak positive correlation between SSC: Mastery and SSC: Environmental comfort (r_s = 0.379), and between Volition and IPLOC (r_s = 0.352). A very weak positive correlation was also identified between SSC: Mastery and IPLOC (r_s = 0.281), and between IPLOC and SSC: Environmental comfort (r_s = 0.239). Table 25 shows that no statistically significant correlations were identified between covariates therefore all could be included in a multiple regression model. As summarised in Table 26, four ordinal regressions were conducted to determine the effect of covariates on decreased odds of doping consideration.

Table 26

Ordinal logistic regression results of factors which decrease the odds of doping consideration

		OR	SEβ	t	*ρ*	95% Confidence Interval	
						Lower Bound	Upper Bound
Model 4	SSC: Mastery	0.55	0.24	5.82	0.016	0.34	0.89

Note. SSC = Sources of sport confidence.

AIC scores and results of a Pearson's Goodness-of-Fit test indicated that model four had the best model fit to the observed data, $\chi^2(15) = 8.397$, $\rho = .907$, *AIC* = 35.344. As shown in Table 26, no independent variables had a statistically significant effect on decreased odds of doping consideration. These results do however indicate that SSC: Mastery was influential to decreased odds of doping consideration (*OR* = 0.55, *95% CI* = 0.34, 0.89, ρ = 0.016). These findings suggest that adolescents who obtain confidence through skill development, improvement and mastery have fewer odds of considering doping.

4.5.6 Intentions to dope soon

Univariate regressions were conducted between adolescent's intentions to dope soon and associated covariates as displayed in Table 27.

Table 27

Univariate regression results of the effect of covariates on the odds of intentions to dope soon

Independent Variable	OR	SEβ	t	*ρ*	95% Confidence Interval	
					Lower Bound	Upper Bound
IPLOC 1	0.41	-0.04	-1.13	.258	0.21	0.78
IPLOC 2	0.50	-0.04	-0.90	.364	0.28	0.89
IPLOC 3	0.81	0.11	2.26	.024	0.39	1.71
Volition 1	0.51	-0.04	-0.83	.406	0.28	0.92
Volition 2*	0.42	-0.07	-2.00	.046	0.27	0.67
Volition 3	0.92	0.08	2.02	.043	0.43	1.97
Subjective norm 1	3.65	0.20	4.85	<.001	1.59	8.38
Subjective norm 2	1.90	0.20	4.70	<.001	0.70	5.14
Subjective norm 3	1.43	0.22	4.77	<.001	0.60	3.38
Descriptive norm 1	1.00	0.01	0.46	.640	0.97	1.04
Descriptive norm 2	1.99	0.04	1.25	.209	0.92	4.28
Descriptive norm 3	0.68	0.03	0.78	.432	0.29	1.59
SSC: Demonstration ability 1	1.48	0.04	0.93	.350	0.61	3.54
SSC: Demonstration ability 2	1.78	0.06	1.28	.201	0.75	4.24
SSC: Demonstration ability 3	0.55	-0.03	-0.74	.456	0.21	1.44
SSC: Demonstration ability 4	1.09	-0.04	-0.69	.486	0.46	2.58
SSC: Demonstration ability 5	1.05	0.00	0.09	.928	0.44	2.49
SSC: Demonstration ability 6	0.73	-0.04	-0.88	.379	0.33	1.63
SSC: Mastery 1	0.71	-0.09	-1.81	.070	0.37	1.36
SSC: Mastery 2	1.17	0.15	2.82	.005	0.50	2.72
SSC: Mastery 3	1.27	0.06	1.05	.291	0.38	4.28
SSC: Mastery 4	0.69	0.00	0.05	.956	0.25	1.94
SSC: Mastery 5	0.82	0.01	0.29	.771	0.22	3.06
SSC: Self-presentation 1	1.06	0.04	0.83	.404	0.51	2.22
SSC: Self-presentation 2	0.52	-0.14	-2.48	.013	0.22	1.19
SSC: Self-presentation 3	2.38	0.10	1.96	.050	1.09	5.17
SSC: Environmental comfort 1	0.83	-0.03	-0.76	.448	0.40	1.72
SSC: Environmental comfort 2	1.37	0.01	0.28	.778	0.73	2.57
SSC: Environmental comfort 3	1.13	-0.04	-0.93	.349	0.43	2.95
SSC: Environmental comfort 4	0.51	0.01	0.20	.838	0.18	1.40
MC: Ego 1	1.18	-0.01	-0.34	.731	0.70	1.99
MC: Ego 2	0.86	-0.02	-0.68	.496	0.47	1.56
MC: Ego 3	1.08	-0.00	-0.20	.836	0.57	2.07
MC: Ego 4	1.62	0.07	1.42	.153	0.76	3.47
MC: Ego 5	1.29	-0.00	-0.07	.944	0.74	2.25
MC: Ego 6	1.65	0.03	0.85	.393	0.93	2.93

MC: Mastery 1	1.03	0.03	0.72	.470	0.40	2.67
MC: Mastery 2	0.44	-0.04	-0.93	.348	0.18	1.06
MC: Mastery 3	1.05	-0.01	-0.24	.804	0.40	2.77
MC: Mastery 4	1.07	0.00	0.18	.855	0.52	2.19
MC: Mastery 5	1.76	0.02	0.51	.608	0.66	4.68
MC: Mastery 6	0.98	0.07	1.83	.068	0.43	2.21
Age	1.25	-0.01	-0.41	.679	0.87	1.80

Note. IPLOC = Internal perceived locus of causality. SSC = Sources of sport confidence.

MC = Motivational climate.

*reversed scored item.

Factors which increase the odds of intentions to dope soon

The univariate regressions presented in Table 27 reveal independent variables from two scales which had high ORs and low CI (measured at 95%). These findings identified that Subjective norms 1 and SSC: Self-presentation 3 were influential to increased odds that adolescents would intend to dope soon. A Spearman's correlation was then conducted to measure for multicollinearity between these covariates (see Table 28).

Table 28

Spearman's correlation of factors which increase the odds of intentions to dope soon

	SSC: Self-presentation	Subjective norms
SSC: Self-presentation		
Subjective norms	0.053	

Note. SSC = Sources of sport confidence.

As shown in Table 28, no statistically significant correlations were identified between Subjective norms and SSC: Self-presentation. As such, each of these covariates could be included together in a binary logistic regression model. As summarised in Table 29, two binary logistic regressions were conducted to determine the effect of Subjective norms and SSC: Self-presentation on increased odds of intentions to dope soon.

Table 29

Binary logistic regression results of factors which increase the odds of intentions to dope soon

		β	SEβ	t	*ρ*	OR	95% Confidence Interval	
							Lower Bound	Upper Bound
Model 2	Subjective norms	1.76	0.27	40.9	<.001	5.81	3.39	9.98
	Constant	-7.61	0.86	77.8	<.001	0.00		

AIC scores and HL test results indicate that model two had the best fit to the observed data, $\chi^2(1) = .690$, $\rho = 0.690$, $AIC = 76.199$. Model two also explained 44% (Nagelkerke R^2) of the

variance in adolescent intentions to dope soon. These results show that Subjective norms had a statistically significant effect on increased odds of intent to dope soon (*OR* = 5.81, *95% CI* = 3.39, 9.98, *ρ* = <.001). These findings indicate that adolescents are more likely to intend to dope soon if they perceive those close or important to them would approve of their engagement in this behaviour.

Factors which decrease the odds of intentions to dope soon

The univariate regressions presented in Table 27 reveal covariates from two scales which had low ORs and low CIs (measured at 95%). These results identified that IPLOC 1 and Volition 2 were associated with decreased odds of intentions to dope soon. A Spearman's correlation was then conducted to test for multicollinearity between these covariates (Table 30).

Table 30

Spearman's correlation of factors which decrease the odds of intentions to dope soon

	IPLOC	Volition
IPLOC		
Volition	0.352**	

Note. IPLOC = Internal perceived locus of causality.

* *ρ* <0.05. ** *ρ* <0.01.

Results of the Spearman's correlation shown in Table 30 indicate a weak positive correlation between IPLOC and Volition (r_s = 0.352). As no statistically significant correlations were identified, these covariates could be used together in a binary logistic regression. As summarised in Table 31, a single binary logistic regression measured the effects of IPLOC and Volition on decreased odds of intentions to dope soon.

Table 31

Binary logistic regression results of factors which decrease the odds of intentions to dope soon

		β	SEβ	t	*ρ*	OR	95% Confidence Interval	
							Lower Bound	Upper Bound
Model 1	IPLOC	-0.63	0.35	3.19	0.074	0.53	0.26	1.06
	Volition	-0.76	0.25	9.25	0.002	0.46	0.28	0.76
	Constant	1.58	1.46	1.17	0.278	4.87		

Note. IPLOC = Internal perceived locus of causality.

Results of a HL test, and AIC calculation, indicated that model one had a good fit to the observed data, $\chi^2(5) = 1.206$, *ρ* = .944, *AIC* = 117.101. Further, model one explained 12% (Nagelkerke R^2) of the variance in adolescent's intent to dope soon. As shown in Table 31, Volition had a statistically significant effect on decreased odds of intending to dope soon (*OR* = 0.46, *95% CI* = 0.28, 0.76, *ρ* = 0.002). While not statistically significant, IPLOC was influential to

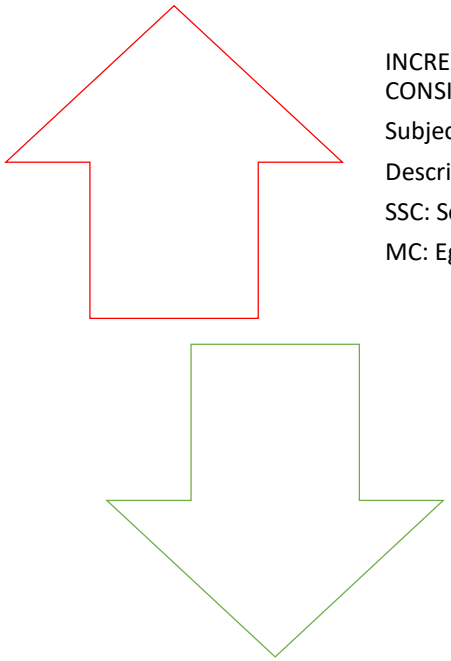
decreased odds of intent to dope soon (*OR* = 0.53, *95% CI* = 0.26, 1.06, *p* = 0.074). These results show that adolescent athletes have fewer odds of intending to dope soon when they perceive they can make choices willingly, initiate and regulate their behaviour in sporting contexts.

4.6 Discussion

In response to RQ1, and an objective of this thesis, these results reveal the covariates which influence SUDAA in NZ sporting contexts. This evidence also identifies the influence of each covariate on increased or decreased odds of adolescent supplement use, doping, doping consideration and intent (soon and in the next year). In this section, factors identified to influence increased odds of SUDAA are discussed in consideration of existing evidence. Following this, factors which influence decreased odds of doping, doping consideration and doping intent among this population are similarly discussed. In response to RQ1, Figure 9 shows the factors identified to influence increased and decreased odds of doping intentions, doping consideration, SUDAA in NZ sporting contexts.

Figure 9

Factors associated with increased and decreased odds of doping intentions, consideration and SUDAA



Note. MC = Motivational climate. SSC = Sources of sport confidence.

*No factor was identified to influence decreased odds of supplement use among adolescent athletes.

4.6.1 Factors which increase SUDAA

Subjective norms

Consistent with previous definitions of subjective norms, these results show that the odds of SUDAA are greater when adolescents believe people close, or important, to them would approve if they were to dope (Lazuras et al., 2015; Rivis & Sheeran, 2003). The associations identified between subjective norms and SUDAA in this evidence are consistent with previous research which found that decisions to dope were related to athlete perceptions of social approval (Donovan et al., 2002; Overbye et al., 2013; Smith et al., 2010). In chapter three, the influence of subjective norms on adolescents were explained from a developmental perspective as gaining social acceptance was considered a priority of this phase (Berger, 2017). Based on available evidence, it appears that the extent to which adolescents believe doping is (or is not) accepted determines whether subjective norms will influence increased (or decreased) odds of SUDAA. For example, these results show that adolescents who perceive SUDAA to be socially acceptable have greater odds of engaging in these behaviours. It is important to note however that previous research identified subjective norms to have an opposing effect on SUDAA when norms were oriented toward anti-doping (i.e., away from doping). For instance, there exists a body of work which revealed that adolescent perceptions of others' doping disapproval was associated with the avoidance of doping (Abelson et al., 2007; Donovan et al., 2002; Overbye et al., 2013; Smith et al., 2010). While not identified in this analysis, existing evidence has shown the importance of subjective norms which transparently refute SUDAA to address the present influence of subjective norms on increased odds of these behaviours.

Descriptive norms

Evidence presented in chapter three shows a descriptive norm of doping among adolescent athletes. Although concerning, these results are not unusual as it has been reported that adolescents commonly perceive doping at a greater prevalence than doping control results indicate (Backhouse et al., 2015). These results however reveal that (regardless of their accuracy), descriptive norms are associated with increased odds of supplement use, doping intent and consideration among adolescent athletes. While the cross-sectional nature of this study does not allow for predictive qualities to be established, previous research identified descriptive norms to predict doping intent among adolescent athletes (Lazuras et al., 2010; Wiefferink et al., 2008). This complementary evidence is important in consideration of results presented in chapter three which revealed that adolescents were most tempted to dope when they believed their peers engaged in this behaviour. The influence of descriptive norms identified in this analysis have complemented previous assertions that adolescent athletes are

vulnerable to norms related to doping (Dodge & Jaccard, 2008; Lentillon-Kaestner & Carstairs, 2010; Rivis & Sheeran, 2003). Specifically, these findings indicate that the odds of SUDAA increase when adolescents believe they know others who dope, and perceive that doping occurs in their sporting context (descriptive norms, Rivis & Sheeran, 2003). These results highlight a need to challenge the perceived prevalence of SUDAA in NZ sport if the influence of descriptive norms on these behaviours are to reduce.

SSC: Self-presentation

These outcomes reveal that confidence sourced through self-presentation is associated with increased odds of SUDAA. From a practical perspective, these results show that when adolescents obtain confidence through feeling good about their weight or appearance, they are more likely to use supplements and to consider or intend to dope. This evidence contributes to the field by identifying a link between self-presentation as a confidence source and increased odds of SUDAA. While unrelated to confidence, these findings complement previous research which identified that SUDAA was influenced, and predicted, by athletes' perceptions of their physical self (Machida et al., 2012; McCabe et al., 2012; Rintaugu et al., 2018). The influential role of self-presentation in these findings are also consistent with developmental literature which stated that adolescents may use substances to alter their self-presentation during this stage in which appearance is characteristically prioritised (Berger, 2017). As self-presentation has been considered an uncontrollable source of confidence (Vealey, 2001), its association with increased odds of SUDAA indicate that adolescents who source confidence through appearance have a heightened, and unstable, risk of doping. Thus, these results show that efforts to reduce adolescents' reference to self-presentation as a confidence source should be considered in anti-doping initiatives among this population.

MC: Ego

These results show that coach-led, ego-oriented MCs are associated with increased odds of SUDAA. As such, these findings reveal that SUDAA is more likely among adolescents whose sporting climates prioritise outperforming others and winning. These findings are consistent with existing evidence which revealed the risks of ego-orientations posed to adolescent doping, particularly when winning was prioritised and athlete abilities were compared (Johnson, 2012; Machida et al., 2012). These outcomes highlight that factors which influence SUDAA are not exclusive to individuals and are instead influenced by others (i.e., coaches) and the MCs in which adolescents' are immersed. These results also reveal a need for support personnel to receive tailored anti-doping education which articulates their influence on SUDAA, through the MCs they establish in adolescent sport.

4.6.2 Factors which decrease SUDAA

Evidence presented in this chapter, and displayed in Figure 9, show that volition and confidence sourced through mastery are associated with reduced odds of adolescent doping, doping intent and consideration. It should be noted that this analysis did not identify associations between any measured factor and reduced odds of adolescent supplement use which requires further investigation.

Volition

These outcomes show that volition has a statistically significant association with decreased odds of doping and doping intent among adolescent athletes. Volition is also influential to decreased odds of doping consideration in this cohort. Aligned to existing definitions of volition, these results indicate that adolescents have fewer odds of doping when they believe they can make decisions willingly, and execute behaviours, without external influence (Bandura, 1997; Ng et al., 2011). These findings provide a new perspective to previous descriptions of doping as a deliberate and volitional behaviour (Petróczi & Aidman, 2008). Instead, these results highlight that opportunities to experience volition are influential to decreased odds of doping, doping intentions and consideration. These findings also reveal the importance of adolescent decision-making skills, and self-efficacy to implement autonomous behaviours, to reduce SUDAA. In efforts to reduce these adolescent behaviours, this evidence also shows the need for coaches to provide athletes with sufficient opportunities to experience volition in their sporting contexts.

SSC: Mastery

As presented in Figure 9, and discussed earlier in this section, this evidence is the first to identify associations between confidence sources and SUDAA. Previously in this chapter, it was established that confidence sourced through self-presentation is influential to increased odds of SUDAA. Conversely, these results show that adolescent athletes have decreased odds of doping intentions and consideration when they SSC through mastery. As explained in literature, confidence is typically sourced through mastery by way of skill development, improvement and recognition of team contributions (Machida et al., 2012; Vealey et al., 1998). Additional to the aforementioned contributions to knowledge, and from a pragmatic perspective, these outcomes may inform the development of future anti-doping initiatives. Specifically, these results highlight the need for adolescents to be exposed to sufficient opportunities to access mastery as a source of confidence to reduce their intentions and consideration of doping.

4.7 Chapter summary

This chapter presented a comprehensive process of data analysis from study one of this thesis. In response to RQ1, this chapter has revealed factors associated with increased and decreased odds of SUDAA based on the views of adolescent athletes. Specifically, these results have shown that subjective norms, descriptive norms, confidence sourced through self-presentation and ego-oriented climates were associated with increased odds of SUDAA. The evidence also revealed that adolescent volition, and confidence sourced through mastery, were associated with decreased odds of doping, doping intent and consideration. These outcomes have informed several practical implications which are outlined in the following section. The limitations of this analysis, its contributions to knowledge and directions for future research are detailed in chapter eight. The outcomes of this chapter are also considered in the practical recommendations of this thesis, presented in chapter nine.

4.7.1 Practical implications

This analysis identified associations between influential factors in adolescent sporting contexts and increased or decreased odds of SUDAA. Practical implications are drawn from these results and presented below in consideration of an existing problem solving framework (Guyer, 1998).

Subjective and descriptive norms

The evidence shows that subjective and descriptive norms regarding doping are associated with increased odds of SUDAA. These results have important implications for people who are close, or important, to adolescent athletes. A transparent lack of approval of SUDAA among these personnel appears influential to reducing these adolescent behaviours. The identified associations between descriptive norms and increased SUDAA also have implications for sports organisations and stakeholders in adolescent sport where community-wide efforts are required to challenge the perceived prevalence of doping.

Volition

These findings revealed that adolescent volition was associated with decreased odds of doping. This evidence has implications for education initiatives which target adolescent athletes, coaches and parents. Specifically, education among adolescents should focus on the development of personal skills to make independent decisions in sporting contexts. These outcomes also have implications for parents and coaches whose practices should provide adolescents with opportunities to make decisions and execute resulting behaviours in sport. These results also have implications for sports organisations who should make education

opportunities available to their members which provide practical solution to increase adolescent volition in sporting contexts.

MC

These results revealed associations between SUDAA and the MCs which underpin adolescent sport. Of most importance, these findings have shown that ego-oriented MCs are associated with increased odds of SUDAA. This evidence has implications for coaches whose emphasis on winning in adolescent sport should be decreased. In contrast, these support personnel should encourage skill development and improvement in this environment. As confidence sourced through mastery is influential to decreased odds of doping, doping intentions and consideration, the broad benefits of a MC which emphasises mastery may also reduce SUDAA.

Chapter 5 Study two

5.1 Chapter introduction

The purpose of this chapter is to obtain the views of current and recent adolescent athletes, as well as support personnel, on factors which influence supplement use and doping among adolescent athletes (SUDAA). To respond to RQ2, and owing to the explanatory, sequential MMR design of this thesis, this study is informed by the outcomes of study one, presented in chapters three and four. The research design, participant recruitment and data collection procedures of study two are presented in this chapter. The processes used to analyse the narrative data are also described in this chapter, alongside measures taken to enhance validity, trustworthiness, and reliability in its outcomes. The results of this study are then presented through major themes, minor themes and narrative examples before being discussed in consideration of literature. This chapter concludes with the practical implications of this study. The limitations, directions for future research and contributions to knowledge drawn from this study are summarised in chapter eight.

5.2 Research design

5.2.1 Qualitative research

Qualitative research is typically underpinned by interpretivist perspectives which consider the world as subjective, detailed and explained through multiple points of view (Gay et al., 2012). Qualitative research is interested in understanding the nuances of specific contexts and the lived experiences of those within them. According to Bogdan and Biklen (2007), key characteristics of qualitative research include its naturalistic approach to gain a detailed understanding of a research phenomenon from participant perspectives. Qualitative research also focuses on the research processes used to generate knowledge in consideration of the inherent relationship between participants and researchers (Bogdan & Biklen, 2007). From a pragmatic perspective, the characteristics of qualitative research allow knowledge to emerge from the perspectives of individuals immersed in practical research contexts.

5.2.2 Research method: Focus groups

Focus groups are discussions held between a small number of participants, facilitated by a researcher and recorded with participant permission (Berg, 2007; Gill et al., 2008). Focus groups have been considered a suitable research method to generate a deep understanding of individual beliefs, experiences and views with adult and adolescent participants (Berg, 2007; Gill et al., 2008). To obtain insightful outcomes, qualitative researchers have an important role

as an instrument in the process of data collection and analysis (Creswell, 2014). Researchers also have a role in building rapport with participants to enable evidence to emerge through interactive discussion. When facilitated well, focus groups are dynamic and have a "synergistic group effect" (Berg, 2007, p. 146). This synergy allows ideas to generate collectively, in ways not possible through individual interviews. Focus groups are most effective when participants interact and feel comfortable to freely contribute their thoughts, opinions and experiences (Berg, 2007; Gill et al., 2008). It is in this interactive context that question responses can be probed deeply and non-verbal communication can be accurately observed (Creswell, 2014; Denzin & Lincoln, 2018; Gay et al., 2012). To obtain such outcomes, the researcher must establish an unimposing atmosphere and prioritise the extension and clarification of key points through participant voice (Berg, 2007; Gill et al., 2008).

Potential disadvantages of focus groups include their reliance on researcher facilitation skills to produce effective outcomes which can only be considered in the context of group discussion (Berg, 2007). Voluntary participation in group discussions also have an inherent risk of smaller group sizes attending data collection than planned (Berg, 2007). Within a group discussion, there is also potential for data to be affected by social desirability as participants respond to RQs with a consensus view. Despite their limitations, focus groups were the most suitable research method to respond to RQ2 of this thesis due to the flexibility, reflexivity and depth of questioning available. Focus groups were also most suited to this study due to the researchers' previous experience with this research method, and it appropriateness for both adolescent and adult participants.

Data collection tool

Due to the explanatory, sequential MMR design of this thesis, the focus group question schedule for study two was informed by the outcomes of study one. Items within this data collection tool also considered the aims of this thesis and RQ2 which sought the views of current and recent adolescent athletes, as well as support personnel, on factors which influence SUDAA. Study two used a semi-structured question schedule with eight pre-determined questions (Appendix K). The length of this schedule adhered to previous recommendations for no more than 12 questions (Gill et al., 2008). The brevity of this question schedule provided ample opportunities for participant and researcher interaction, for responses to be probed and for individual's experiences and perspectives to be discussed. The semi-structured nature of this question schedule provided consistency across all focus groups while permitting flexibility for responses to be probed in ways suitable to respective cohorts (Gill et al., 2008). To outline procedural information throughout the data collection process, the researcher developed a "moderator's guide" (Berg, 2007, p. 155). As shown in Appendix L,

this guide was not intended to be prescriptive or rigid. On the contrary, the moderator's guide outlined an anticipated sequence of actions before, during and following data collection with the flexibility to respond to the direction of each group discussion.

Pilot testing

To obtain a sense of validity, suitability and participant comprehension, the question schedule and moderator's guide underwent several pilot tests prior to final data collection as recommended by Berg (2007). Pilot tests were conducted with individuals who met the criteria of each participant cohort (Figure 10). As such, cohort specific pilot tests were conducted with adolescent athletes (n = 5), recent adolescent athletes (n = 4), and athlete support personnel (n = 5).

Several key outcomes emerged through these pilot tests. Firstly, it was evident that adolescent cohorts should be split by stage due to the developmental variances between early (13 to 14 years of age) and mid to late adolescence (15 to 18 years of age). Particularly with early adolescent cohorts, pilot testing revealed that specific techniques were required to effectively facilitate group discussions. For example, pilot tests with early adolescent participants indicated the need for a speaking prop. As such, a squishy ball was used as a handheld prop to identify who was speaking in final data collection, to avoid multiple speakers at one time. Secondly, it was decided that cohort appropriate music would be played before and after data collection to establish rapport and to provide a comfortable atmosphere. Finally, these pilot tests provided the researcher opportunities to refresh her facilitation skills, and further her ability to moderate the engagement of more and less dominant participants. Through this process, the moderator's guide, question schedule and potential probing questions were refined as suitable to respective participant cohorts.

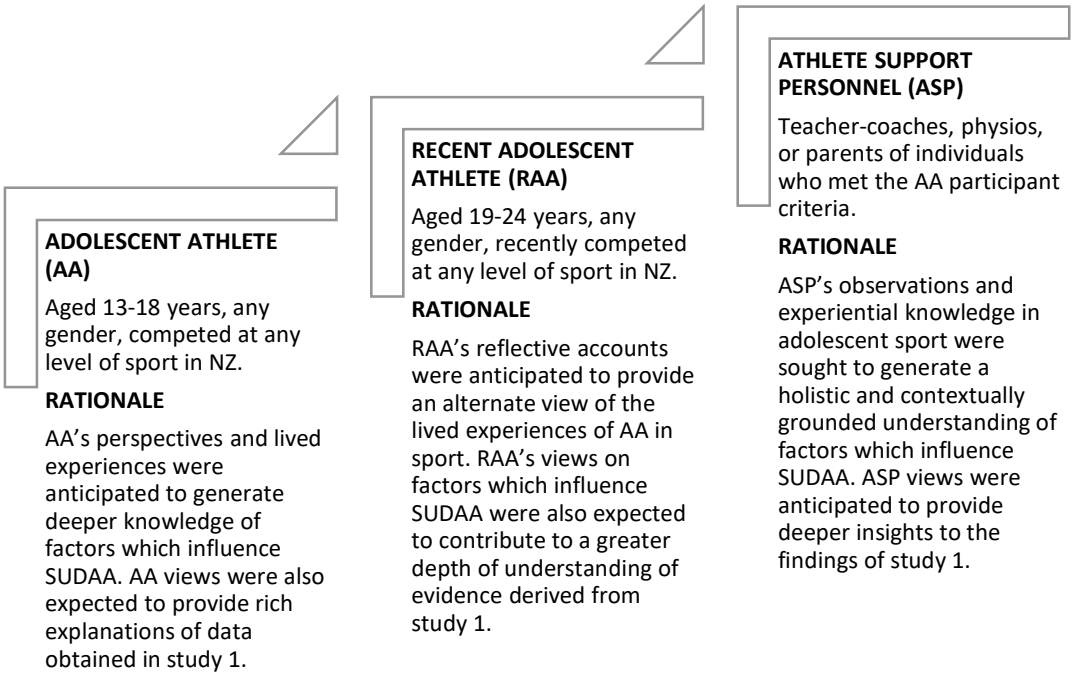
5.3 Data collection procedures

5.3.1 Participant criteria

The sequential nature of this thesis' MMR design meant that the participant criteria for study two (Figure 10) was informed by the outcomes of study one. These criteria also considered RQ2 and the importance of obtaining multiple perspectives to better understand factors which influence SUDAA.

Figure 10

Participant criteria and rationale for study two



Note. AA = Adolescent athlete. RAA = Recent adolescent athlete. ASP = Athlete support personnel. SUDAA = Supplement use and doping among adolescent athletes.

5.3.2 Participant recruitment

The non-probability recruitment method of purposive sampling (DeCarlo, 2018) was most suitable in this study as its participant criteria were informed by the outcomes of study one. Once participant criteria had been established, importance was placed on cohort composition to enable the best possible research outcomes (Gill et al., 2008). In adult focus groups, six to eight participants were considered ideal to provide sufficient opportunities for individuals to contribute to group discussion, in an effectively moderated environment (Gill et al., 2008). In adolescent focus groups, four to five participants were deemed most suitable to maintain individuals' focus and to avoid parallel interviewing (Hennessy & Heary, 2005; Morgan et al., 2002). To account for the variances in sporting experience and comprehension identified in pilot testing, adolescent participant cohorts comprised of early adolescents (13 to 14 years of age), and mid to late adolescents (15 to 18 years of age).

Using the same participant recruitment approach as study one, the researcher sent information about this study to relevant sports organisations and secondary schools by email. The researcher requested that these organisations shared this information (Appendix E) through suitable communication tools, with audiences who met the participant criteria

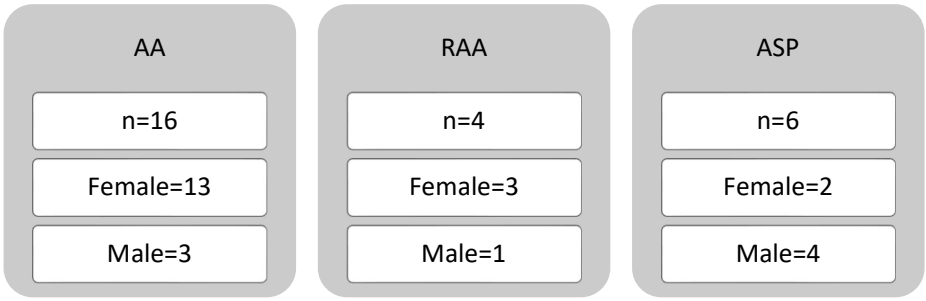
displayed in Figure 10. Interested individuals could contact the researcher at their discretion for more information and to check their suitability to these criteria. Direct communication between the researcher and potential participants (and guardians) provided an initial opportunity for rapport to be built. The development of rapport was an important step in establishing an unimposing atmosphere for data collection (Berg, 2007). It was also through direct communication with participants and their guardians that the researcher could discuss the requirements of consent (if over 16 years of age) and assent (if aged 16 years or less). Prior to data collection, consent and assent was obtained in full for each participant and securely stored.

5.3.3 Participants

Twenty-six (n = 26) individuals participated in study two across the three participant criteria shown in Figure 11. The breadth of perspectives available in this participant cohort were deemed sufficient to generate robust insights in response to RQ2.

Figure 11

Participants of study two



Note. AA = Adolescent athlete. RAA = Recent adolescent athlete. ASP = Athlete support personnel.

5.3.4 Ethical considerations

In consultation with AUTEC advisors, it was deemed important that plans were made should doping have been reported at any stage of this study. Out of respect for participant confidentiality, it was decided that if doping were identified, the researcher would have provided relevant participant(s) with contact information for DFSNZ's confidential service to report doping in sport.[12] Participants, and their guardians, were informed of this process prior to data collection, through the provision of respective information sheets.

[12] DFSNZ provide a service for doping in sport to be reported confidentially. Drug Free Sport New Zealand. (2020c). *Help us stamp out doping in sport*. https://drugfreesport.org.nz/report-doping-in-sport.

5.4 Data collection

In the planning and conduct of focus groups, priority was placed on participant and researcher safety, with consideration given to data collection venues (Gibson, 2007; Gill et al., 2008). Data collection venues were also important to assess for their potential effect on participant behaviour and resulting research outcomes (Gill et al., 2008). For example, if adolescent focus groups were held in school environments, participants may have behaved in ways expected of them in school situations (e.g., raising their hand before speaking) (Green & Hart, 1999). Also, the age of some participants meant personal transport was unlikely, therefore central data collection venues were deemed most practical (Gill et al., 2008). As articulated in the moderator's guide (Appendix L), the researcher conducted pre-visits to data collection venues to assess how potential distractions could be minimised. These visits also provided an opportunity for the researcher to explore ways to make each environment more conducive to group discussion (Gibson, 2007). As focus groups were held in person and included adolescent participants, a police check was also conducted on the researcher.

Qualitative data was collected through a focus group discussion facilitated by the researcher with participants from three respective cohorts. The question schedule (Appendix K) and moderator's guide (Appendix L) were implemented in each focus group to provide consistency and to allow flexibility. Further, each group discussion was audio recorded with participant permission, following an explanation of the intended use of the recorded data. Each audio recording was saved and securely stored as soon as practicable following data collection.

5.4.1 Data saturation

As informed by literature (Charmaz, 2006; Finfgeld-Connett, 2014), data saturation and criterion of fit were important to obtain in the evidence generated in this study. Specifically, data saturation and fit were pertinent to validity in the outcomes of this investigation which sought to build knowledge (Finfgeld-Connett & Johnson, 2013). According to literature, data saturation occurs when greater comprehension of a research problem would not be gained through the collection of additional evidence (Charmaz, 2006; Creswell, 2014). In this study, the researcher shared her perceptions of data saturation with supervisors. Following robust discussion, and with the knowledge that new insights failed to emerge, it was considered that sufficient evidence had been collected.

As data saturation does not indicate understanding, consideration of the intersection of evidence from respective participant cohorts was important to establish its criterion of fit (Finfgeld-Connett, 2014; O'Reilly & Parker, 2013). Establishing a criterion of fit provided a

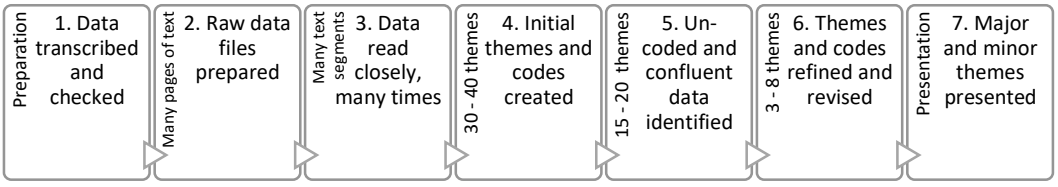
means to identify if comprehensive knowledge had been gained and to highlight areas which needed greater understanding (Morse & Singleton, 2001). As encouraged by Bogdan and Biklen (2007), the reflective field notes maintained during this study assisted to identify where results intersected, and where data were isolated to a specific cohort or individual. Following thorough consideration of evidence from all participant cohorts, a criterion of fit was established, and data analysis began.

5.5 Data analysis: The coding process

A general inductive approach was used to analyse the data collected in study two as outlined by Thomas (2006). The aim of this approach was to identify key themes of relevance to RQ2 and therefore, factors which influence SUDAA. In contrast to processes of deduction, this inductive approach allowed themes to emerge through participant and researcher interactions during data collection, and in subsequent data analysis (Bogdan & Biklen, 2007; Thomas, 2006). The steps taken to analyse data in this study are displayed in Figure 12 and detailed in the following section.

Figure 12

The coding process in inductive analysis



Note. Steps taken to analyse narrative data from study two. Adapted from *Educational research: Planning, conducting and evaluating quantitative and qualitative research* (p 266), by J. W. Creswell, 2002. Pearson. Copyright 2002 by Pearson Education.

5.5.1 Step 1: Data transcribed and checked

All qualitative data were rigorously transcribed verbatim from securely saved audio recordings. Following the completion of a confidentiality agreement, an experienced contractor transcribed each audio recording for greater efficiency. Once transcribed, the researcher checked the accuracy of each transcript against the audio recording. This process assisted the researcher to further familiarise herself with the data, in consideration of reflective field notes (Braun & Clarke, 2006).

5.5.2 Step 2: Raw data files prepared

All identifiable data were removed from the transcribed data to ensure participant confidentiality (e.g., names, sports, schools). Further, each data file was uniformly formatted for more efficient analysis and greater consistency.

5.5.3 Step 3: Data read closely, many times

The researcher read the transcripts many times and included relevant reflective notes in an allocated column of the transcript template. Reflective notes included considerable periods of silence, changes in eye contact and body language observed during data collection (e.g., hand gestures, facial expressions).

5.5.4 Step 4: Initial themes and codes created

Using the general inductive approach and an interpretive lens, data were analysed without preconception and in reflection of the group context in which evidence was generated (Braun & Clarke, 2006; Gibson, 2007; Thomas, 2006). Emerging themes and codes were identified through multiple readings and interpretations of raw data (Thomas, 2006). Themes and codes were then named, refined and checked for congruence with data using NVivo software.

5.5.5 Step 5: Un-coded and confluent data identified

Text which overlapped, or was not coded, were checked for relevancy against theme and code descriptions. According to Thomas (2006), the depth of qualitative data renders a need for researchers to make distinctions between data which is more and less relevant for inclusion in themes and codes. Un-coded data which was deemed less relevant was therefore winnowed through a process of differentiation which allowed a concise set of final themes to emerge (Guest et al., 2012).

5.5.6 Step 6: Themes and codes refined and revised

Based on the rich theme and code descriptions developed in step four, themes and codes were refined in consideration of RQ2 and the evaluation objectives of this study (Appendix M). As shown in Figure 12, three to eight final themes were appropriate to confirm that a comprehensive coding process had been conducted (Thomas, 2006).

5.5.7 Step 7: Major and minor themes presented

Three major themes emerged from this analysis as displayed in Figure 13. In each major theme, three minor themes are also presented in respective visual displays. The results of

these major and minor themes are provided in the section which follows, where they are discussed in consideration of existing evidence.

Validity

In addition to the previously mentioned processes of data saturation and fit (Creswell, 2014; Finfgeld-Connett, 2014), several measures were taken to enhance validity and check for accuracy in the analysis and interpretation of the narrative data. For example, detailed and thick descriptions of each theme and code were generated. These descriptions gave transparent accounts of the context from which data emerged and were the basis of discussion in later phases of analysis. Further, researcher biases were recorded in reflective field notes and acknowledged through prospective reflexivity (Attia & Edge, 2017). These processes informed discussions about potential biases with supervisors for required steps to be identified. These measures also permitted robust comparisons to be made between participants' lived experiences, perspectives, and observations which added validity to the resulting evidence.

Trustworthiness and reliability

An initial thematic analysis was conducted by the primary researcher using checked data transcripts. This analysis resulted in the development of a set of themes and codes which were considered preliminary findings. Coding consistency checks were then conducted through a process of "independent parallel coding" (Thomas, 2006, p. 244). In this process, a second researcher received the evaluation objectives for study two (Appendix M) and copies of final transcripts with identifiable data removed. Without knowledge of the outcomes of the primary researcher's initial analysis, the second researcher independently analysed all data and developed their own themes, codes, and descriptions. The two researchers then met in person to compare and discuss their respective outcomes (Thomas, 2006). Miles and Huberman (1994) believed that, when researchers reached more than 80% agreement on their resulting themes and codes, good reliability of independent parallel coding was established. In this analysis, researchers had more than 90% agreement on resulting themes, codes and descriptions therefore the outcomes of this coding process were considered reliable. Theme and code descriptions were then refined in consideration of the outcomes of independent coding. Following this, final checks were conducted to ensure the content of each code had not drifted from their descriptions (Gibbs, 2007).

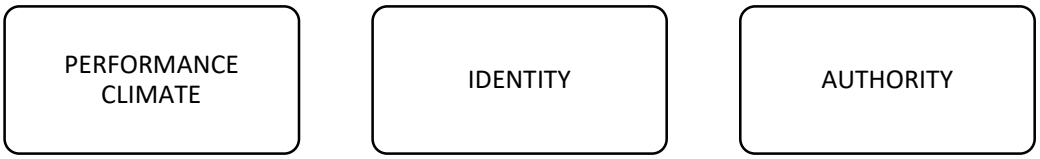
5.6 Results and discussion

This section presents the results of study two through the voices of participants which are identified by cohort; adolescent athletes (AA), recent adolescent athletes (RAA), and athlete

support personnel (ASP). To retain participant anonymity, while providing context to this evidence, participant gender is also indicated; male (M) and female (F). For example, a male athlete support person is identified as MASP, while a female adolescent athlete is labelled as FAA. The age of adolescent participants are also presented to reflect developmental variances (e.g., FAA, 13; MAA, 18). This section is structured by the three major themes presented in Figure 13.

Figure 13

Major themes of study two



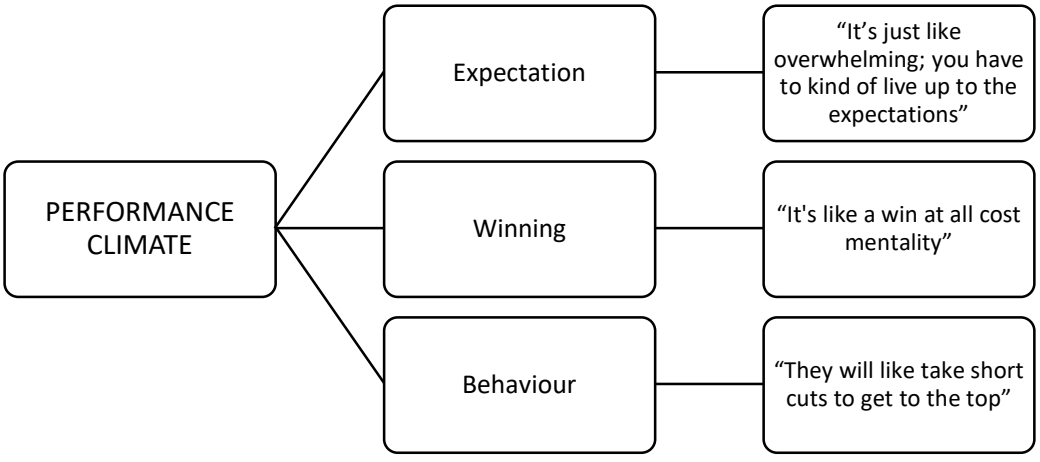
The results for each major theme are presented in this section according to their respective minor themes with the support of narrative examples. These results are followed directly by a discussion of each minor theme, in consideration of extant knowledge. Each major theme is then summarised. This section concludes with participant perspectives on effective education approaches to reduce SUDAA which are considered in the practical recommendations of this thesis (chapter 9).

5.6.1 Major theme 1: Performance climate

The major theme, minor themes and example excerpts of Performance climate are shown in Figure 14, presented and discussed the section that follows.

Figure 14

Major theme, minor themes, and excerpt examples of Performance climate



Minor theme 1.1: Expectation, results

Early adolescent participants perceived performance expectations from others inside and outside of sport. Parents were cited as adolescent's main source of performance expectations: "A lot of people I know … faced so much pressure from their parents or whoever to be good" (FAA, 15). Performance expectations were not isolated to sporting contexts during early adolescence, instead expectations were perceived in several domains: "want their child to be the best at everything … to be perfect and brag about their child to other parents" (FAA, 13). Parent's performance expectations of their adolescents were similarly observed by ASP: "parents … expectation from them around their decision-making … what they should or shouldn't be doing" (MASP).

During early adolescence, participants worried about not meeting their parent's expectations: "if you fall short … it's stressful!" (FAA, 13), which was similarly discussed among ASP: "It's that lack of confidence to worry about upsetting somebody or letting them down" (FASP). Better performing adolescents also felt pressure to maintain what were perceived as high-performance expectations: "if you're the best in the team, there's the pressure to be the best and do everything really well" (FAA, 13). While parents were the main source of performance expectations among early adolescents; these performance pressures came from a wide range of others: "peer pressure, parent pressure, coach pressure" (FAA, 13). Adolescent's fears of not meeting perceived performance expectations were unanimously experienced by athletes and observed by support personnel. While early adolescents perceived performance expectations in several domains, they were prominent in sporting contexts.

Minor theme 1.1: Expectation, discussion

These results show that significant others are the predominant source of performance expectations for adolescents. Further, the direction and intensity of these expectations are determined by age. During early adolescence, athletes experience performance expectations across varied domains which appear to become more concentrated on sport with age. Consistent with these results, performance expectations and priorities have been suggested to increase from junior to senior levels of sport (Kegelaers et al., 2018). Similarly, Pappa and Kennedy (2013), as well as Blank et al. (2016), agreed that the influence of performance expectations on SUDAA increase throughout adolescence.

These findings also show that performance expectations are a source of anxiety for adolescents who fear disappointing their significant others. This evidence has similarities to previous research which revealed a fear of failure as a source of adolescent anxiety (Elendu & Dennis, 2017). Consistent with these findings, previous researchers established that adolescent

concerns about failure exacerbated under parent or coach driven performance pressure (Dorsch et al., 2016; Witt & Dangi, 2018). In the context of SUDAA, these findings are important as previous research identified an association between fears of not meeting performance expectations and adolescent doping (Blank et al., 2016). These results indicate that performance expectations are influential to adolescent anxiety and SUDAA which appears to increase throughout this developmental period. To decrease these negative outcomes of adolescents' involvement in sport, performance expectations in youth sport require attention.

Minor theme 1.2: Winning, results

The majority of participants described a climate of performance in adolescent sport in which winning was prioritised. Comparisons were made between these contexts and professional sport:

> *The pressure to win is probably the biggest one and then like what a winning culture involves … a winning environment so that we win games ... like a professional sporting environment; we are taking as much of that as you can and it's kind of applied to kids at the same time which is a big pressure (MASP).*

ASP unanimously voiced concerns about their perceptions of an inherent, short-term focus in these climates: "They are just prioritising the performance over the development" (MASP). ASP also expressed their unease about the pressure placed on adolescents to win: "a real win at all cost kind of, it's all about winning … I would hate to think what it is like for the kids … the pressure on that age group is pretty significant" (MASP). With convergence to the views of ASP, RAAs shared similar experiences:

> *There was all this expectation; 'next week you have to jump this and the next week you should be able to go to this' … 'you need to be stronger'; 'you need to be faster' … that's quite stressful when you've got this like pressure to keep getting better and better (FRAA).*

Winning priorities in sporting climates extended to adolescents' home environments where financial support for sporting endeavours were based on performance. One RAA reflected on her parents' stance: "you either win or I don't put money in" (FRAA). Participants from all cohorts believed adolescent sport was underpinned by a performance climate which prioritised winning.

Minor theme 1.2: Winning, discussion

These results reveal winning priorities in adolescent sport which literature has suggested are characteristic of ego-oriented motivational climates (Breiger et al., 2015; Smith et al., 2008). This evidence also shows that the intensity of winning priorities in adolescent sport increase

from mid-adolescence alongside competitive level. Consistent with the views of Calfee and Fadale (2006), these findings identify parents and coaches to influence priorities on winning in adolescent sport. These findings diverge from research by Prichard and Deutsch (2015) who found that coaches influenced the nature, goals and climates of adolescent sport. More specifically, the present findings indicate that the influence of parents and coaches on winning priorities are determined by the age and stage of adolescent athletes. In agreement with recent evidence from Madigan et al. (2019), this evidence shows that the priority which parents place on performance is superseded by the influence of coaches' winning priorities throughout this developmental period. These findings also show that adolescent sporting contexts in NZ are predominantly underpinned by ego-oriented motivational climates which increase throughout adolescence.

Regardless of the source of influence, the perceived need to win in adolescent sport raises concern in the context of SUDAA. These concerns stem from previous research which revealed that adolescents considered winning more important than whether substances were permitted in sport (Gradidge et al., 2011). Further, the priority placed on winning by others, as revealed in these results, has been considered a doping risk among adolescents which exacerbates when performance outcomes were desired at any cost (Whitaker et al., 2012). It is in these ego-oriented climates that doping, doping likelihood and vulnerability, have been identified among adolescent athletes (Blank et al., 2016; Donovan et al., 2002; Ehrnborg & Rosén, 2009). Complemented by existing knowledge, these results show that winning priorities in adolescent sport pose a risk to SUDAA and are necessary to reduce in NZ sporting contexts.

Minor theme 1.3: Behaviour, results

While early adolescents expressed their fears about not meeting performance expectations, these concerns did not have a direct effect on behaviour: "I don't think we have enough pressure at the moment to actually take drugs" (FAA, 13). Comparatively, older adolescents believed doping was a relevant response to performance pressures: "pressure from other people or pressure on themselves to be the best, at the top" (MAA, 18). Supplement use, on the other hand, emerged as a common adolescent behaviour in performance climates:

> *Coaches and managers come along, and it is kind of like 'you need to be running this fast' and 'you need to get these scores in this' … That's when I started to see to people, like 15-year-old girls using like protein powder … if you're not going perform or run fast enough then you won't get on the court … it kind of happened overnight … competing harder with the coaches*

pushing them more so they needed to have protein powder or have like BCAAs[13] … I was like, whoa, we're so young (FRAA).

It was in performance climates that adolescents reasoned their use of supplements: "to do things the quickest, get like fit quickest, get big quickest" (FAA, 15). This adolescent's experience was consistent with unanimous reflections among RAAs: "there's just pressure like a time pressure to get the strongest and the quickest the fastest at such a young age" (FRAA). It was in these performance climates that adolescents' suggested doping would be considered: "so desperate to become good they don't know what else to do with themselves apart from take dope" (FAA, 15). A perceived need to perform with urgency was a reality for most adolescent athletes who used supplements, and some who considered doping, to enhance performance.

Minor theme 1.3: Behaviour, discussion

These results show that performance climates are influential to adolescent behaviours to enhance performance. This evidence also reveals that supplement use and doping consideration increase throughout adolescence and alongside perceived urgency to perform. These findings are consistent with previous research in which Sekulic et al. (2019) found that adolescents used supplements and considered doping to enhance performance, and obtain related outcomes, with haste. The outcomes of this study are also supported by links made by Stautz and Cooper (2014) between performance urgency and adolescent substance use.

This evidence also shows that adolescents perceive supplement use, and doping, as behaviours which will enhance their sporting performance. These perceptions were found to be reinforced by adolescents' widespread observation of supplement use, among others. Previous research has similarly identified the influence of descriptive norms regarding peer behaviour on adolescent supplement use and doping intentions (Lazuras et al., 2010; Wiefferink et al., 2008). These findings reveal a predominant perception among adolescents that supplement use will enhance their performance with urgency. This evidence indicates that the behaviours which adolescents consider, or engage in, to enhance their sporting prowess pose a doping risk which is heightened in a performance climate.

Adolescents' identified use of supplements to enhance performance may also pose a doping risk due to a previously established "stepping stone effect" (Kegelaers et al., 2018, p. 124). This effect was recognised in previous research where supplement use to enhance performance increased adolescent's doping susceptibility (Kegelaers et al., 2018). This susceptibility has

[13] BCAAs are a supplement product more formally known as Branch Chain Amino Acids.

been explained by Barkoukis et al. (2015) who revealed that supplement use to enhance performance initiated the cognitive processes associated with doping. In consideration of existing knowledge, there is a risk that adolescents' normative supplement use to enhance performance may contribute to habitual behaviours which progress to doping.

Summary of Major theme 1: Performance climate

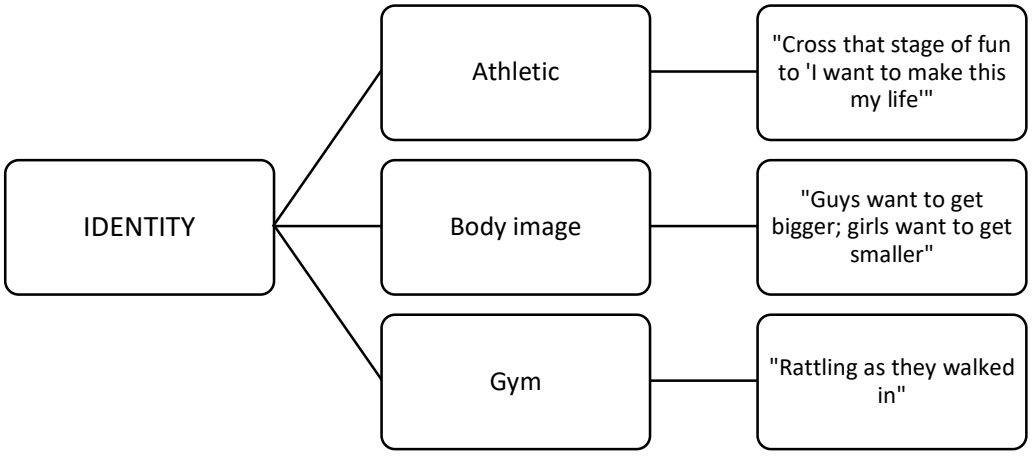
A key outcome of this study was that performance climates were predominant in adolescent sport where they influenced SUDAA. The results have shown that during early adolescence, athletes perceived performance expectations in each domain they participated. During this stage, parents were a significant source of performance expectation which adolescents were anxious to satisfy. From mid-adolescence, the predominant source of performance expectations shifted from parents to coaches who were perceived to prioritise winning. The intensity of performance expectations and winning priorities in sporting contexts increased throughout adolescence, alongside competitive level. Throughout adolescence, participants reported increased engagement in performance enhancing behaviours in response to winning priorities and expectations in their sport. In these performance climates, adolescents consumed supplements and considered doping to perform with urgency. These findings revealed that performance climates were influential to increased SUDAA through performance expectations, winning priorities and performance enhancing behaviours in adolescent sport.

5.6.2 Major theme 2: Identity

The second major theme of study two is Identity. This major theme, its minor themes and example excerpts are displayed in Figure 15. In this section, results pertaining to this major theme are presented and discussed according to each minor theme. This section closes with a summary on the major theme of Identity.

Figure 15

Major theme, minor themes, and excerpt examples of Identity



Minor theme 2.1: Athletic, results

The identity of early adolescent participants was developing through their involvement in a wide range of activities and domains. Once participants had reached mid-adolescence, their motivation for involvement in sport was described to switch from fun and enjoyment to a focus on performance: “cross that stage of fun to ‘I want to make this my life’. I think it's important for people to know once they try to make that decision, what it actually takes to get there” (MAA, 18). Once participants reached mid-adolescence, their focus and commitment to identify as an athlete intensified and determined their behaviour: “… they are so driven and focused” (FASP). ASP also observed changes in adolescents’ determination for performance as they identified as an athlete: “just hit a switch … bang! I'm going give this a crack” (MASP).

It was upon establishing an athletic identity that participants explained the internal and external pressure they experienced to maintain that status: “a lot of pressure to like to be good but not only for yourself like to make everyone else think that you are good as well” (FAA, 15). Once established, participants explained the pressure they experienced to maintain an athletic identity through continued improvement: “pressure to keep like getting better and winning and being selected and like once I've hit under 15s let's get under 17s” (FRAA). RAA reflected on the importance they placed on maintaining an athletic identity during adolescence and the sacrifices made to do so: “dropped out of school because I couldn't keep up … you may have made it once … but you have to do it again” (FRAA). Participants also reflected on social sacrifices they made to maintain an athletic identity:

> *isolating yourself from, you know, friends, sometimes family … it can be quite sort of just a bit saddening in the fact that you are kind of missing out … they are going out and having fun and I'm working my arse off … rewarding and not rewarding at the same time (MAA, 18).*

Early adolescents had not yet established their identity however they expressed clear views on the behaviours they associated with an athletic identity (i.e., supplement use): “he needs these to gain weight … he’s like really good at [sport], he needs muscle” (FAA, 13). Early adolescents also considered doping a normal behaviour among individuals who had committed to being an athlete: “You would normally like take this stuff … if like, that’s the one thing that you really want to be amazing at” (FAA, 13). RAA believed doping became a relevant behaviour for early adolescents to enhance sporting performance: “really get into the like sport and training really hard … into rep teams and stuff, maybe at year 10, year 11” (FRAA). In contrast, early adolescents believed doping became relevant among athletes who sought sporting opportunities: “to be accepted into high schools, like getting sports scholarships, people might start to use them” (FAA, 13).

Adolescents believed doping may occur due to the influence of others who identified as an athlete: “there might be a few people that do it and like that might make you do it” (FAA, 15). This view was shared by a RAA who expressed his concern for a peer he anticipated may be influenced to dope: “close to like people who are involved with it … he probably wouldn't like go and find how to do doping by himself” (MRAA). An alternate perspective was identified among ASP who had concerns about doping at lower levels of competition due to the lack of deterrents in that environment: “they are not really in a position where they have to probably worry because drug testing and stuff like that doesn't take place” (MASP). Despite varied opinions about the stage at which doping would occur, participants from all cohorts associated supplement use and doping with athletic identity.

Minor theme 2.1: Athletic, discussion

These results show an uncertainty among early adolescents about what they want to identify as (e.g., an athlete, a musician, an artist). Thus, early adolescents engage in a process of exploring who they are as an individual through participation in several activities and domains. This exploration process has been described as an aspect of identity formation which is a key developmental undertaking of adolescence (Erikson, 1968). These findings also reveal that early adolescents’ exposure to diverse contexts provides them opportunities to observe a range of identities with which they associate norms, behaviours and appearances. This process has been labelled a stage of psychological moratorium in the Theory of Identity Development (Erikson, 1968). Also known as a phase of identity moratorium, and consistent with these results, this developmental process has been suggested to occur during adolescence and before autonomy is gained (Marcia, 1980; Santrock, 2018). Consistent with acknowledged characteristics of identity moratorium (Marcia, 1980; Santrock, 2018), this evidence shows that athletes considered varied behaviours, roles and contexts in their search for who they wanted to be. These results show that, while identity moratorium continued throughout early adolescence, exposure to sporting contexts during this process informed the behaviours and appearances that early adolescents associated with athletic identity. Importantly, these findings show that early adolescents unanimously perceive supplement use and doping as behaviours synonymous with an athletic identity.

These findings show that from mid-adolescence, individuals make decisions regarding their identity. Consequently, each adolescent and recent adolescent identified themselves as an athlete from mid-adolescence. According to the Theory of Identity Development (Erikson, 1968; Santrock, 2018), these results indicate that athletic identity is achieved, or is being achieved, from mid-adolescence in NZ. Examples of athletic identity were evident as participants defined themselves as athletes and described their challenges and sacrifices to

maintain this identity. These outcomes are consistent with previous descriptions of the complex nature of identity development in which adolescents can struggle to dedicate time to study, socialise with friends and interact with peers (Santrock, 2018; Witt & Dangi, 2018). With consistencies to this evidence, Rodríguez-Serrano et al. (2018) discovered that adolescents prioritised sport over non-athletic activities to maintain an athletic identity. Despite challenges faced, from mid-adolescence, participants in this study were determined to make the sacrifices they deemed necessary to achieve, and maintain, an athletic identity.

The outcomes of this study were echoed in the Theory of Identity Development which indicated that adolescent decisions (when volitional) reflect their desire for an identity of personal significance, rather than one of consensus (Erikson, 1968; Santrock, 2018). These results show that adolescent athletes accept supplement use and doping as normative behaviours for individuals who identify as an athlete. These results also reveal that the formation of athletic identity is associated with adolescent supplement use to obtain the body image and performance they consider to be pre-requisites of 'being an athlete'. The associations which adolescents made between athletic identity and SUDAA show that athletic identity is influential to these behaviours which poses a risk to adolescent engagement.

Minor theme 2.2: Body image, results

Participants from all cohorts detailed adolescent perceptions of athletic body image and their direct influence on adolescent behaviour: "I've seen a bit of it, like because I hear conversations. It's not, I don't think it's anything illegal … they try and think of ways that they can get a bit bigger" (MASP). A gendered difference emerged between the athlete body image which adolescents perceived ideal for males: "it's always been a thing, all the boys wanted to be big" (FRAA) and females: "girls more talk about going the other way with their weight … thinning down not the bulking up" (FASP). Supplement use was discussed as a normative and accepted adolescent behaviour to achieve an athletic body image. ASP, and some RAA, considered supplement use related to body image as more common among males: "supplements I tend to think of it being more a male thing, growing the muscle" (FASP). These behaviours were believed to increase from mid-adolescence: "15, 16 when you are like building muscle and stuff for boys" (MRAA). One RAA suggested that body image was influential to supplement use among females from mid-adolescence: "every skinny little girl is like I take this protein … when you're like 15, 16 isn't that all you want to be?" (FRAA). Ultimately, participants described supplement use as a normative adolescent behaviour to enhance body image.

In group discussions about factors which influence SUDAA, ASP described the broad influence of social media: “social media influencers … would be more of an influence than parents” (FASP). Similarly, RAA discussed the influence of social media on adolescent supplement use: “Everyone you're following is promoting these fat burning pills … it's pretty bad” (FRAA). RAA unanimously explained the overwhelming extent of supplement marketing to which they, and current adolescents, were exposed:

> *every third post is someone promoting something; … proteins, pre-workouts and you know obviously those like skinny teas … every third article on my Facebook page right now is like take this pre-workout and I'm like oh my god, leave me alone! (FRAA).*

This exposure to supplement marketing had a direct effect on adolescent supplement use: “You see it everywhere … on social media just supplements, supplements, supplements and people take it” (MAA, 18). This exposure was also influential to a descriptive norm of supplement use and a perceived need to engage in this behaviour to achieve an athletic body image: “every athlete you see on social media these days is, look how strong and muscly I am … if I have that, I will get to that level” (FRAA). Participants unanimously experienced exposure to a high volume of athletic body imagery via social media and identified its direct influence on adolescent consumption.

Minor theme 2.2: Body image, discussion

The evidence shows that body image is a specific aspect of athletic identity which influences SUDAA, particularly from mid-adolescence. These findings also reveal that adolescents’ priorities and behaviours related to their appearance are influenced by frequent exposure to athletic body imagery through social media. Specifically, adolescents consider the body imagery to which they are exposed as exemplary and thus prioritise attaining the exhibited appearance. These findings are consistent with previous suggestions that body imagery which is portrayed as ideal can be inherently valued and admired in athletic contexts (Helfert & Warschburger, 2011; Yilmaz et al., 2019). Consistent with research by Adamidou et al. (2013), a gendered contrast is evident between the athletic body images which participants believe ideal for female and male athletes. As identified in previous research, adolescents perceived thinness and leanness as an ideal body image for female athletes (Botta, 2003; Eisenberg et al., 2012; Smolak, 2004). Whereas, muscularity and increased size were perceived ideal body images for male athletes (Eisenberg et al., 2012; Hoffman et al., 2008; Saraiva et al., 2017). These findings are important in this research context as adolescent endeavours to achieve an athletic body image have been associated with doping (Hoffman et al., 2008; Zelli, Mallia, et al., 2010). While doping for these means was not evident in this study, supplement use is a

normative practice among adolescent athletes to obtain the body image they associate with athletic identity.

The evidence shows that adolescents' focus on body image is influenced by exposure to supplement marketing through social media, which frequently includes athletic body imagery. Exposure to this content influenced supplement use with increased salience from mid-adolescence. Similarly, previous research identified adolescent's exposure to appearance focused media to increase their desire, likelihood and engagement in supplement use (Field et al., 2005; Frison et al., 2013; Ricciardelli & McCabe, 2003). The identified volume of supplement marketing to which adolescents are exposed is perhaps unsurprising as Desbrow et al. (2014) have suggested this population is a target audience for such efforts. These findings show that adolescent perceptions of body image are influenced, and reinforced, via frequent exposure to supplement marketing through social media. As this exposure is influential to increased SUDAA, the salience of body image on adolescent behaviour is evident.

Minor theme 2.3: Gym, results

While participants did not identify as 'gym users', their observations of others' behaviour in gym environments were influential to the actions that were associated with this identity. Participants from all cohorts agreed that adolescents exposure to this influence began early, as athlete began training in public gyms: "girls are in the gym are Year 9 and 10, 13 years old, 14 years old" (MASP). It was during early adolescence that athlete observations of others' supplement use had a direct effect on their consumption:

> *I just know of heaps of guys that started going to the gym. I don't know why at our age, but he started going with his friend and like they were taking like protein shakes ... he started it because the other guy was doing it (MAA, 14).*

The direct influence of others' behaviour on adolescent supplement use was accepted: "People take like protein powders when they go to the gym … So, you just do it" (FAA, 16). The frequency of adolescents exposure to gym environments, and thus others' supplement use, increased with age and competitive level: "a bit of protein powder myself just for gym workouts ... the top guys all have protein powder for gym workouts" (MAA, 18). ASP similarly observed the influence of gym user's behaviour on adolescents: "the older crowd at the gym were doing whatever, that's what they would do" (MASP).

Adolescent's frequent exposure to supplement use in gym contexts was also influential to a descriptive norm of this behaviour which made non-users question their abstinence: "it is just so spread around that it is kind of like if everyone else is, maybe I should too" (FRAA). While

supplement use was accepted in gym environments, ASP shared their concerns about the effect of this exposure on adolescent behaviour:

> *rattling as they walked in because their bags were so full of whatever it was. I don't think they were any banned substances or anything like that but geez it was all about the latest protein powder or the latest pre-workout … oh how good is this? and 'try this' and 'you should try that' (MASP).*

Additional to these descriptive norms was the influence of peers on adolescent behaviours. One RAA compared peer influence to use supplements with that experienced to consume alcohol:

> *everyone like was trying this new like supplement, I don't like, like pre workout or something, and like they all went to the gym together and there was this one person that didn't want pre workout, it is kind of like alcohol in a way … you're just that one that's not going to feel like you know that buzz … It's the same with like, I don't know, someone that's sober … You kind of feel outcast (FRAA).*

Further, some participants shared their knowledge of banned drug use[14] in gym environments. One RAA explained the accepted and normative nature of this behaviour among gym users: "They don't get tested for it … they are okay with it, they don't care, you know, it's accepted ... like, yeah, I do it" (FRAA). ASP expressed their apprehension about the influence that adolescents exposure to these behaviours may have on their own:

> *they wear kind of a badge of honour …Testosterone... Clenbuterol … they're not sports people so to speak but that's the environment that some of the sports people are in … people that are following those guys are in that adolescent age group (MASP).*

Participants from all cohorts agreed that the behaviours and norms that athletes associated with gym users may influence SUDAA who engage in public gym environments.

Minor theme 2.3, Gym: discussion

This evidence shows that the behaviours which adolescents observe, accept, and consider normative of gym users are influential to SUDAA. This evidence has similarities to the SLT which posits that individuals learn by observing others' behaviour in particular environments (Bandura, 1977; Halliburton & Fritz, 2018). With further convergence to the outcomes of this study, Halliburton and Fritz (2018) claimed that exposure to others' behaviour, and perceived

[14] The Sports Anti-Doping Rules only apply to registered members of a sports organisation, therefore the *banned* or *prohibited* status of substances referenced in this thesis do not apply to gym users who are not also members of a sport. (H. Tapper, personal communication, 06 July 2020).

efficacy in these actions, increased the likelihood of mirrored engagement. These claims are supported in these results as adolescent exposure to supplement use in gym contexts had a direct influence on their consumption.

While these results did not show that adolescents doped as a result of exposure to gym user behaviour, observations of supplement use in gym environments was influential to subjective and descriptive norms related to doping. These findings are consistent with literature which suggested that adolescents are vulnerable to norms which support doping (Backhouse et al., 2015; Dodge & Jaccard, 2008). These findings have also reveal that SUDAA is influenced by exposure to doping norms which participants associate with a gym user identity. These results raise concern for adolescent doping as previous research identified greater doping prevalence among comparable cohorts who trained in gym contexts (Kindlundh et al., 1999; Pedersen & Wichstrom, 2001). Based on the available evidence, adolescents' exposure to the behaviour of individuals with a gym user identity appears to influence SUDAA.

Summary of Major theme 2: Identity

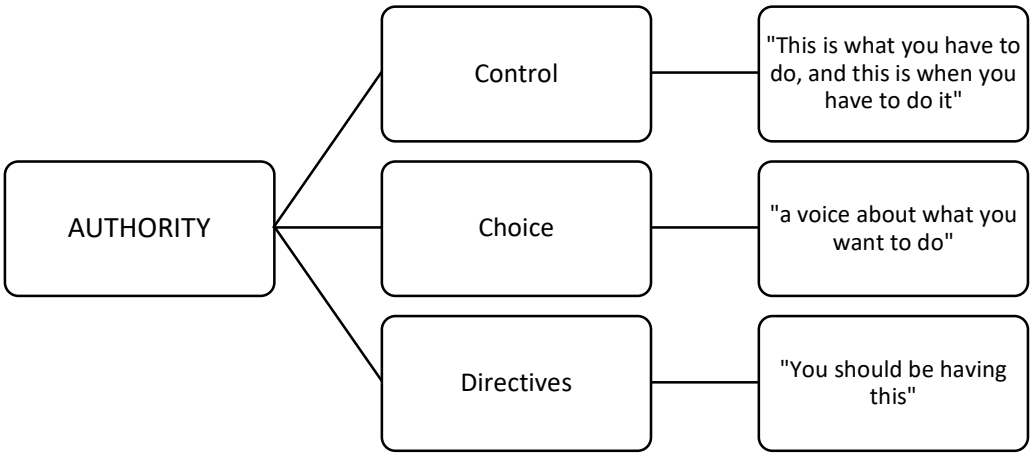
This evidence has revealed aspects of identity which are influential to SUDAA. Specifically, athletic identity, body image and exposure to the behaviours of 'gym users' were influential to SUDAA. These findings have shown that early adolescents engage in a wide range of activities across domains where they are exposed to different roles, experiences, and perspectives. This exposure appears an important aspect of identity formation and adolescents' decisions about who they want to be. From mid-adolescence, individuals made conscious decisions, and sacrifices, to establish an athletic identity. Once established, athletic identity was influential to adolescents engagement in behaviours they deemed normative to this identity. Adolescent perceptions of athletic identity were also influenced through exposure to social media content which normalised supplement use to achieve an athletic body image. These results have also shown that adolescent's observations of gym user behaviour(s) were influential to their supplement consumption, and a perceived norm of doping in gym environments. This evidence shows that identity is influential to SUDAA in NZ sporting contexts through athletic identity, body image (via social media) and exposure to others' behaviour in gym environments.

5.6.3 Major theme 3: Authority

Authority is the third major theme to emerge in this study of factors which influence SUDAA. In this section, the results of this major theme are presented and discussed through the three minor themes displayed in Figure 16. This section closes with a summary of the major theme of Authority.

Figure 16

Major theme, minor themes, and excerpt examples of Authority



Minor theme 3.1: Control, results

Participants from all cohorts agreed that during early adolescence, athletes did not control their decision-making or behaviour. Instead, parental control was dominant, and accepted: “when you are younger it is just like; mum wants me to do this, so I'll do it” (FAA, 15). ASP recognised this parental control on early adolescents in several domains: “this is the sport you are going to do, or this is the school you are going to go to” (MASP). While accepted, RAA reflected on their negative experiences as a result of parental control: “she [mother] was the one that was like forcing me to go … I didn’t want to be there; I didn't want to compete” (FRAA).

Due to the prevalence of parental control, adolescents’ rare access to decision-making opportunities were met with anxiety: “when parents say that I get all worried, because should I? Should I not?” (FAA, 13). One adolescent also expressed her scepticism about the authenticity of opportunities to make decisions: “It’s like a test. They say you can but don’t do it!” (FAA, 13). RAA specifically reflected on their experiences of parental control in sporting contexts: “everybody was taking drugs, and everybody was drinking, and I couldn't do that … It was kind of like ‘no, you get drug tested, you want to do this with your life, you want to do that with your life’” (FRAA). Older adolescent participants acknowledged that parental control during early adolescence had a negative effect on decisions made later in life: “more or less forced to do or, you know, this is what you have to do and this is when you have to do it … bad decisions they can make can come from that” (MAA, 18). Participants unanimously identified the dominance of parental control during early adolescence, and its negative influence on the development of decision-making skills.

Minor theme 3.1: Control, discussion

These results show that the extent to which adolescent decisions and behaviours are controlled is determined by age. As consistent with the views of Fleming (2005), these findings indicate that until mid-adolescence, athletes receive rare opportunities to make decisions about their behaviour. This evidence is similar to previous descriptions of autonomy control where the behaviours of others meant athletes did not perceive a role in decision-making about their actions (Hodge et al., 2013). Autonomy control appears important in the context of this research as it has previously had a negative effect on athletes' attitudes toward doping and their susceptibility to engagement (Hodge et al., 2013). These results also show that parental control thwarted adolescents' needs for autonomy. These controlling behaviours had a negative influence on adolescent's preparedness and ability to make independent decisions. This evidence is noteworthy as parental control has been associated with increased doping likelihood when athletes began making autonomous decisions (Rodríguez-Serrano et al., 2018). These results indicate that a lack of adolescent autonomy, owing to controlling behaviours among support personnel, may have a negative influence on SUDAA.

Minor theme 3.2: Choice, results

In contrast to the previous minor theme, participants began making choices about their behaviour from mid-adolescence, outside of sporting contexts. RAA discussed the age-dependent nature of opportunities to make choices during adolescence: "early stages of teens obviously, you are still a kid … 16, 17, 18, you start to make your own decisions" (FRAA). Some RAAs believed adolescents began making their own choices earlier in contemporary climates than they experienced: "younger now eh, 16 [years]" (FRAA) and "like 14/15 [years]" (FRAA). One ASP similarly observed age-dependent increases in adolescent choice: "year 11 is kind of that ... turning point … boys start to think a bit more for themselves" (MASP). ASP also discussed adolescent choice and agreed this was determined by an individuals' maturity and comprehension: "they start to be mature enough to understand … make their own decisions" (FASP). Similarly, athletes believed their access to choice increased from mid-adolescence due to the development of communication skills: "15 and 16 and yeah, I feel like you get more of a voice about what you want to do at this stage because it is easier to explain to your parents" (FAA, 16).

By late adolescence, participants felt in control of their choices: "athletes our age have more or less total control over their behaviour ... it's a conscious decision to do something" (MAA, 18). One participant believed his ability to make his own choices was enabled by decreased concerns about others' opinions: "16 to 18 eh? Like sort of final years of school and you just … do what you want, and you don't care what anyone thinks" (MAA, 18). While ASP agreed with

adolescents' views, one participant believed female AA experienced less choice than their male peers, due to specific vulnerabilities:

> *They [males] are just a little bit stronger in terms of being able to say or speak up and say what they want. Girls I think tend to get … influenced quite easily just by someone telling them what to do ... parents, coaches (MASP).*

Despite divergent views on the reasons that adolescents' obtained choice, an evident contrast emerged between parental control during early adolescence and increased opportunities for choice from mid-adolescence (outside of sporting contexts).

Minor theme 3.2: Choice, discussion

These findings show that from mid-adolescence, individuals gain choice about their behaviours outside of sporting contexts. These results suggest that from mid-adolescence, athletes experience an increased extent of self-determined extrinsic motivation (Mageau & Vallerand, 2003). This evidence contrasts the parental control identified during early adolescence (minor theme 3.1) and, with similarities to literature, show that greater autonomy support is perceived from mid-adolescence (Mageau & Vallerand, 2003). These findings are consistent with previous research which identified that choice is gained as parental control decreases throughout adolescence (Farrey, 2008; Wuerth et al., 2004). It is noteworthy that this evidence shows adolescent choice in general contexts which contrasted a lack of choice in the sporting domain (see minor theme 3.3). As adolescent choice did not relate to sporting contexts in this evidence, it was not associated with SUDAA. These findings are however valuable in this study as they articulate the lived experience of adolescent athletes and by contrast, provide insights to the nuanced context of adolescent sport in NZ.

Minor theme 3.3: Directives, results

In contrast to the choice experienced from mid-adolescence in general contexts, participants revealed that adolescent's behaviour continued to be directed by others in sporting contexts. From mid-adolescence, coach-direction was dominant in sporting contexts: "A coach is, mostly will make most of the decisions … everyone would go along with it" (FRAA). It was in this environment that coach influence on adolescents' behaviour increased, alongside decreased parental control: "more likely to listen to our coaches rather than our parents" (FAA, 15). The influence of coaches was similarly acknowledged by ASP: "A coach I guess has a huge influence on the athlete or young person" (MASP). The effect of coach influence on adolescent behaviour was also noteworthy. One RAA explained how a coach had directed his supplement use to enhance performance:

> *The coach was pretty into beetroot … boys will be like forced to drink these beetroot concentrate and stuff. Like at midnight, before the race so they can like have good results, which they often did, but yeah, not a great experience (MRAA).*

Another RAA similarly explained how a coach had directed her to purchase a supplement in preparation for a sporting event: "One of my coaches was like before a nationals … I want everyone to buy BCAAs, this one, take a photo of it before you go" (FRAA). These experiences were consistent with directives from other support personnel who had provided adolescents with supplements:

> *He bought it for us, like and it was like in bulk and there was some other little things … I was like okay, like I will just take it because, you know, you kind of, you trust him … I guess it was just what you do … I don't know what those other ones were... Whoops! (FRAA).*

Most participants accepted that adolescent supplement use was directed by ASP: "it is just a coaching thing … you should be having this, you should be getting stronger, you should be after your workouts doing this and this" (FRAA). These results have shown the normative and accepted practice of adolescent supplement use which is directed by others in sporting contexts.

Minor theme 3.3: Directives, discussion

These results reveal an accepted and prevalent norm of adolescent supplement use in response to directions from support personnel in sporting contexts. This evidence contrasts the choice which adolescents experienced outside of their sporting context at the same stage (minor theme 3.2). Consistent with previous research, these results reveal that coach-directed behaviours increase from mid-adolescence as parental control decreases (Madigan et al., 2019). Aligned to existing descriptions (Mageau & Vallerand, 2003), these results provide examples of non-self-determined extrinsic motivation among adolescents whose behaviour is determined by their coaches. According to Gaudreau et al. (2016) and Mageau and Vallerand (2003), these directive behaviours may negatively affect the development of autonomy and intrinsic, or self-determined extrinsic, motivation among adolescent athletes. From a pragmatic perspective, these results contrast calls for adolescents' exposure to opportunities where autonomy can be experienced in sporting contexts (Sport New Zealand, 2015).

These findings also show that some coaches direct adolescent supplement use to enhance performance in NZ sporting contexts. Ominously, the evidence shows that these directives had a powerful influence on SUDAA and were considered normative in adolescent sport. The widespread acceptance of directed behaviour in this context is concerning as previous

research found that a lack of behavioural control increased adolescents' odds of doping (Barkoukis et al., 2011; Hodge & Gucciardi, 2015). Adolescents' obedience to coach directed behaviours is however unsurprising due to the inherent influence of coaches in the coach-athlete dynamic (Woolf et al., 2014). Further, these results indicate that supplements are perceived a legitimate means to enhance adolescent performance. In contrast to the perceived intent of these directed behaviours, supplement use has been considered inappropriate and unnecessary among healthy adolescents (Desbrow et al., 2014; Maughan et al., 2007). Further, these results suggest that directive coaching practices thwart adolescent's ability to make choices about their behaviour. In particular, coach directed supplement use had a direct influence on adolescent consumption which appears a doping risk among this athlete population.

Summary of Major theme 3: Authority

This evidence has revealed that the authority exerted on adolescents in sporting contexts was influential to SUDAA, particularly from mid-adolescence. These results have also shown that the extent of control, choice and directives experienced by athletes was specific to their stage of adolescence and the domain in question (e.g., sport, general). These outcomes found that the behaviours of early adolescents were controlled by their parents across multiple domains. During early adolescence, the dominance of parental control, and athlete's resultant lack of choice, were widely accepted. It was evident that in this controlled environment, adolescents had little exposure to decision-making opportunities which rendered them unprepared to make independent choices. Outside of the sporting domain, parental control decreased from mid-adolescence, which afforded athletes greater choice in an autonomy supportive environment. These findings contrasted the lack of choice, and directed behaviours, which adolescents experienced in their sporting context. This evidence has shown that coaches, and other support personnel, had directed adolescent supplement use to enhance performance. This evidence reveals the salience of athlete support persons' authority over adolescent autonomy in sporting contexts and its influence on SUDAA.

5.6.4 Education approaches

In consideration of topics raised in group discussions, participants identified adolescent athletes and support personnel (i.e., coaches, parents) as important audiences for anti-doping education.[15] Participants from all cohorts unanimously agreed that attempts to reduce SUDAA

[15] Anti-doping education is one of four interrelated strategies to prevent doping. World Anti-Doping Agency. (2020b). *2021 International standard for education.* https://www.wada-ama.org/en/resources/the-code/2021-international-standard-for-education

should focus on: “educating them really young ... before they are like really serious in sport” (FRAA). Participants also emphasised that anti-doping education should target a broad range of “… young people coming up” (MAA, 18) as opposed to an isolated focus on: “… the sporty guys” (MAA, 18).

Due to their direct influence on adolescent behaviour, participants from all cohorts agreed that support personnel should receive anti-doping education. One RAA explained the inclusion of parents in the prevention of SUDAA as: “they are huge driving force behind young athletes” (FRAA). Another RAA identified coaches as a priority audience for anti-doping education due to their direction of SUDAA: “with them being like, ‘have this’, ‘have this’” (FRAA).

Participants also shared their thoughts on the most effective ways to educate adolescent athletes about the topics raised in group discussions. Across all cohorts, participants emphasised the effectiveness of face to face education with adolescents. One adolescent believed in-person approaches would be most effective when: “creative, out there, to get our attention” (FAA, 13). Participants agreed that face to face content was most impactful when communicated through: “real life experiences” (FAA, 13). Early adolescents also emphasised the need to respect individuals’ knowledge and to avoid: “treating us like we don’t really understand what’s going on” (FAA, 13). A common thread in these discussions was the need for anti-doping efforts to be genuine and to: “relate to you [adolescent athletes] as much as they can” (FAA, 14). As such, adolescents felt targeted initiatives were required which were: “aimed at teenagers” (FAA, 13). Participants also thought adolescents exposure to videos via social media would be an effective education approach if they were: “real quick” (FRAA) owing a shared perception that adolescents easily: “get bored” (FRAA). Participants raised that potential challenges to the effectiveness of anti-doping education may occur as adolescents had become “desensitised” (FRAA) to warnings about risk behaviours. Further challenges were anticipated due to adolescents’ perceived invincibility: “it hasn't happened to me” (FRAA). Despite these anticipated issues, participants from all cohorts emphasised the effectiveness of interaction and authentic education approaches among adolescent athletes.

Summary of Education approaches

Through reflection of topics raised in group discussions, participants identified audiences and methods they believed necessary in efforts to reduce SUDAA. Participants unanimously prioritised anti-doping education for athletes from early adolescence. Participants thought that engaging, face to face education methods would most effectively reduce SUDAA with adolescent audiences, particularly when real-life stories were used. Participants also suggested that short, engaging videos may have a beneficial impact on reducing SUDAA through social

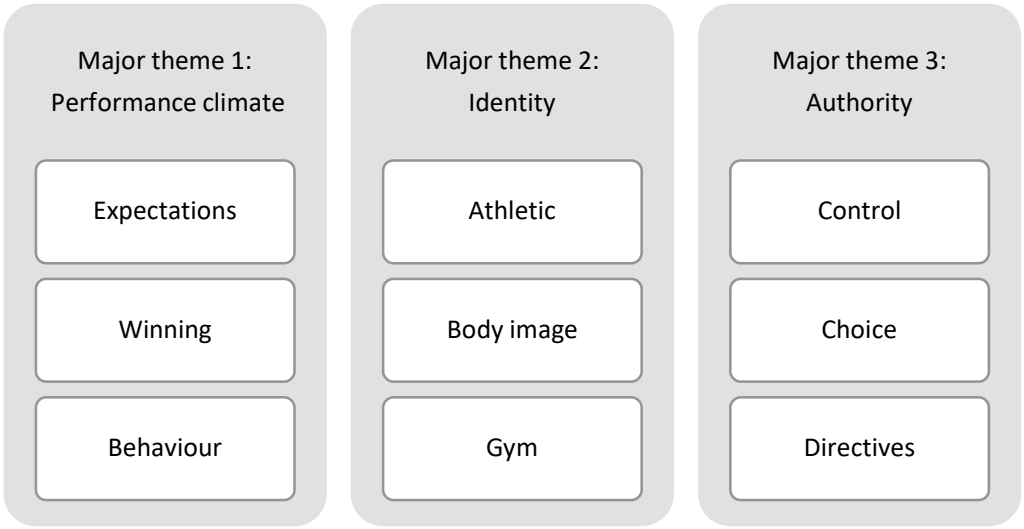
media. Participants also agreed that coaches and parents should receive anti-doping education to address their authority over adolescent behaviours (i.e., supplement use), and their identified influence on SUDAA. These results are considered in this thesis' practical recommendations, presented in chapter nine.

5.7 Chapter summary

This chapter has presented the second study in this thesis' explanatory, sequential MMR design. Through the voices of current and recent adolescent athletes, and support personnel, factors which influence SUDAA were revealed in this chapter. As summarised in Figure 17, these influential factors were detailed through three major themes, and nine minor themes, which emerged from the narrative data.

Figure 17

Major and minor themes of study two



Major theme one identified a predominant performance climate in adolescent sport. Within performance climates, performance expectations (from coaches and parents) resulted in winning priorities and performance enhancing behaviours which were influential to SUDAA. In major theme two, identity was found to influence SUDAA. Through a developmental process of identity formation, participants considered themselves as athletes from mid-adolescence and thus focused on obtaining the athletic body image they associated with this identity. Observed behaviours among 'gym users' were influential to supplement use, and doping susceptibility, among adolescents who trained in gym environments. Social media was also influential to adolescent's engagement in the behaviours they associated with an athletic identity (i.e., supplement use). In major theme three, authority had a nuanced influence on adolescent behaviour in sporting contexts (i.e., SUDAA). These results have shown that adolescent's ability

to make decisions about their behaviour were thwarted by the control of support personnel. These findings raise concern as it was revealed that coaches had directed adolescents to use supplements to enhance their performance. Owing to the MMR design of this thesis, these findings are integrated with quantitative evidence from study one in the following chapter (chapter 6). The limitations, contributions to the field and directions for future research from this study are presented in chapter eight. The outcomes of this study are also inform the practical recommendations of this thesis (chapter 9).

5.7.1 Practical implications

The previously unheard voices of current and recent adolescent athletes, and support personnel, provide a rich understanding of factors which influence SUDAA in this chapter. In consideration of literature, insights drawn from this evidence inform the following practical implications.

Reducing coach involvement in adolescent supplement use

This evidence shows that coaches, and other support personnel, have an influential role in SUDAA. In particular, these results show that coaches and parents directly influence adolescent supplement use. These findings have implications for governing bodies of adolescent sport who require a considered and transparent position on the role of coaches, and other support personnel, in adolescent supplement use. Further, education initiatives for coaches and parents should provide evidence which questions the perceived legitimacy of supplements to enhance adolescent performance. Increased knowledge about SUDAA, and discouraged involvement in these behaviours, are anticipated to reduce the influence of support personnel which was observed in this data.

Education initiatives for adolescent athletes

Outcomes of this study have implications for education initiatives to reduce SUDAA with adolescent audiences. These initiatives should provide adolescents with the skills required to evaluate the body imagery and supplement marketing they are exposed to through social media. Efforts are also required to reinforce healthy body imagery among this population. Reduced SUDAA may occur by increasing adolescent's awareness of the influence of others' behaviour on their perceptions and actions. These implications have particular salience from mid-adolescence and among athletes who train in gyms where supplement use is observed, and doping is perceived.

Education initiatives for coaches and other support personnel

As similarly identified in chapter four, this evidence has implications for athlete support personnel who establish motivational climates in adolescent sport. These results show that ego-orientations (performance climates) should be avoided in adolescent sport, thus emphasis on winning should be reduced. To support this change in climate, education initiatives for coaches and parents should focus on the establishment of mastery-orientations. For example, coaches and parents should receive practical ideas to enhance choice, skill development and improvement among adolescent athletes through mastery-oriented practices and priorities.

Chapter 6 Integration

6.1 Chapter introduction

The purpose of this chapter is to integrate quantitative evidence from study one (chapters 3 and 4) with qualitative evidence from study two (chapter 5) on factors which influence supplement use and doping among adolescent athletes (SUDAA). Data integration takes place at the interpretive level in this chapter, as described in chapter two. The rationale and process used to integrate data is explained in this chapter before joint displays present the merged evidence. Inferences made from the integrated evidence then inform major and minor themes which are discussed with relevant literature. This chapter concludes with a summary of each major theme which was identified to influence SUDAA. Inferences made from the data integrated in this chapter inform the design of study three (chapter 7). The contributions that these integrated data make to this field of research, and areas warranting further inquiry, are presented in chapter eight.

6.2 Data integration

6.2.1 Methods level data integration through methodological triangulation

As introduced in chapter two, methodological triangulation was used to merge quantitative and qualitative data at the methods level due to its fit in mixed methods research (MMR) (Denzin, 1978; O'Cathain et al., 2010). The fit of methodological triangulation to MMR was evident in this chapter where it permitted a better understanding of the research problem than would have been possible using an isolated research method (McCrudden & McTigue, 2019; Tashakkori & Teddlie, 2003). Methodological triangulation was also suitable to the pragmatic philosophical approach of this thesis as it allowed multiple perspectives and contextually bound inferences to be drawn through varied research methods. The combined strengths of quantitative and qualitative research methods meant that the inferences made through methodological triangulation had greater trustworthiness, validity and reliability (Gay et al., 2012; Sarantakos, 2013). Informed by the pragmatic position of this thesis, its aims and RQs, methodological triangulation integrated multiple perspectives to generate a better understanding of factors which influence SUDAA.

6.2.2 Interpretation level integration

Evidence from previous studies in this thesis have thus far been presented using a “contiguous approach” (McCrudden & McTigue, 2019, p. 386). That is, the quantitative results of study one were presented in chapters three and four, followed by qualitative data from study two in

chapter five. In this chapter, evidence from these respective studies were presented in parallel through joint displays (Fetters et al., 2013; McCrudden & McTigue, 2019). As introduced in chapter two, joint displays offered an effective means to present, and draw credible inferences from, the findings of different studies on the same research issue (Fetters et al., 2013; Guetterman et al., 2015). Joint displays were also a suitable technique to generate a robust response to the MMRQ of this thesis and to identify areas warranting further research. Echoed by Tashakkori and Teddlie (2008), joint displays afforded a more complete understanding of this research issue owing to the inherent strengths of quantitative and qualitative research. Completeness was obtained in these interpretations as convergence,[16] complementarity,[17] divergence[18] and silence[19] were explored through the joint display of quantitative and qualitative evidence (Heale & Forbes, 2013; O'Cathain et al., 2010). A strength of data integration by joint display in this chapter was the ability to take a holistic view of evidence from multiple perspectives and research methods. From this viewpoint, meaningful inferences were drawn from multiple perspectives on factors which influence SUDAA.

6.2.3 Inferences

Tashakkori and Teddlie (2008) described inferences as explanations or conclusions drawn from quantitative and qualitative data from respective studies on an isolated topic. In this chapter, conclusions were inferred from the joint display of quantitative and qualitative data about factors which influence SUDAA. Generating inferences has been described as an inherent complexity of MMR which is "an art and a science" (Teddlie & Tashakkori, 2009b, p. 289). Owing to these complexities, diligent processes were followed to ensure quality inferences were drawn in this chapter.

Inference quality

Generating quality inferences has been an argued controversy in the practice of MMR (Tashakkori & Teddlie, 2003). Questions have been raised about the credibility of inferences generated between quantitative and qualitative data due to the inherent differences of these research methods (Onwuegbuzie & Johnsen, 2006). In light of these criticisms, "inference quality" (p. 102) has been considered a pivotal component of generating valid and credible

[16] Convergence revealed agreement between data sets. Fielding, N. (2012). Triangulation and mixed methods designs: Data integration with new research technologies. *Journal of Mixed Methods Research, 6*(2), 124-136. https://doi.org/10.1177/1558689812437101

[17] Complementarity showed that data in respective data sets supplemented each other. Tashakkori, A., & Teddlie, C. (2003). *Handbook on mixed methods in the behavioral and social sciences*. Sage.

[18] Divergence indicated disagreement between data sets. Ibid.

[19] Silence identified evidence on a topic in one data set which was absent in another. O'Cathain, A., Murphy, E., & Nicholl, J. (2010). Three techniques for integrating data in mixed methods studies. *British Medical Journal, 341* (7783), 1147. https://doi.org/10.1136/bmj.c4587

outcomes in MMR (Tashakkori & Teddlie, 2008). Not to be confused with data quality (the quality of the evidence integrated), inference quality is determined by MMR designs and attributed to making meaning of interpreted data (Tashakkori & Teddlie, 2008).

Given the outcome-oriented nature of this thesis, inference quality was fundamental to ensuring contextually bound solutions could be identified to reduce SUDAA. Efforts were therefore made to increase credibility and transparency as inferences were drawn. As informed by Mertens (2005), credibility was attained in these inferences through reference to, and consideration of, participants' views and lived experiences. Credibility was also gained through reference to the researcher's reflective field notes as inferences were generated, as advocated by Tashakkori and Teddlie (2008). For example, reflective field notes taken in studies one and two were reflected on throughout data integration to observe the context in which data were drawn. These notes provided useful reference points as inferences were critically reviewed by supervisors and informed peers. Transparency was achieved in these inferences through descriptive explanations of this MMR design in chapter two. Transparency was also obtained through the detail provided of respective research components from which the integrated data were obtained (i.e., chapters 3-5) (Bryman, 2016). Each inference generated in this chapter was grounded in the evidence obtained in studies one and two and in consideration of the research setting, aims and RQs of this thesis. The measures taken to enhance inference quality in this chapter were of particular importance due to the inherent bias of the researcher's intersubjective position.

6.3 Results

The data integrated in this section include the perspectives of adolescent athletes (AA), recent adolescent athletes (RAA) and athlete support personnel (ASP) on factors which influence SUDAA. The statistical evidence considered in these integrations were drawn from study one (chapters 3 and 4), while the narrative evidence was sourced from study two (chapter 5). In this chapter, data are presented using joint displays which follow best practice recommendations of this technique (Guetterman et al., 2015). As such, each joint display has a consistent design which labels quantitative and qualitative evidence, identifies respective integration types (e.g., convergent) and presents the inference(s) drawn. As divergence was not identified in the integrated data, joint displays are presented in this section according to their convergence (Table 32), complementarity (Table 33), and silence (Table 34).

Table 32

Joint display of convergent evidence on factors which influence SUDAA

Area of convergence	Study one (QUANT)	Study two (QUAL)	Inference
Ego-oriented motivational climate	78% (n=565) AA believed their coaches prioritised winning. Participation in ego-oriented climates increased AA odds of doping*.	"it's all about winning … I would hate to think what it is like for the kids".	Ego-oriented climates, which prioritise winning, are common in adolescent sport and influential to increased odds of SUDAA.
Volition (low)	84% (n=760) AA felt forced to do things they did not want to do in their sport.	"This is what you have to do, and this is when you have to do it".	ASP engage in autonomy controlling behaviours in adolescent sport which renders AA with a lack of PBC and choice.
Descriptive norms	30% (n=200) AA knew others who doped, 18% believed athletes at their level doped, 45% (n=300) knew of doping in their sport. Descriptive norms increased AA odds of doping**, doping consideration**, and supplement use**.	"it is just so spread around that it is kind of like if everyone else is, maybe I should too".	AA, RAA and ASP consider SUDAA as normative behaviours. These descriptive norms are influential to increased odds of supplement use, doping and doping consideration among AAs.
Supplement use	92% (n=570) AA had used one or more supplements in the previous six months.	"just supplements, supplements, supplements and people take it".	AA, RAA and ASP believe supplement use is a normative AA behaviour which is influenced by external factors (e.g., other people, supplement marketing).
Doping consideration	42% (n=277) AA considered doping to enhance their performance.	"so desperate to become good they don't know what else to do with themselves apart from take dope".	A notable cohort of AA considered doping to enhance performance and thus are susceptible to this behaviour, particularly when facing performance pressure.

Note. AA = Adolescent athlete. ASP = Athlete support personnel. PBC = Perceived behavioural control. SUDAA = Supplement use and doping among adolescent athletes. Adapted from "Implementing integration in an explanatory sequential mixed methods study of belief about climate change with high school students," by M. McCrudden and E. McTigue, 2019, *Journal of Mixed Methods Research*, *13*(3), p 395 (https://doi.org/10.1177/1558689818762576). Copyright 2018 by The Author(s).

**statistically significant effect. *influential.

Table 33

Joint display of complementary evidence on factors which influence SUDAA

Area of complementarity	Study one (QUANT)	Study two (QUAL)	Inference
Autonomy control	24% (n=163) AA did not feel in control over whether they would dope this season.	"it is just a coaching thing … you should be having this''.	ASP's control of adolescent supplement use is accepted in sporting contexts and influential to AA's perceived lack of choice and control about supplement use and doping.
Subjective norms (contextual)	Subjective norms increased AA odds of doping**, doping intent**, doping consideration** and supplement use**.	"You would normally like take this stuff … if like, that's the one thing that you really want to be amazing at".	AAs perceive a subjective norm about SUDAA and accept that athletes dope to enhance performance. Subjective norms pose a risk to increased odds of SUDAA, doping intent and consideration.
Body image	AA sourced confidence from feeling good about their weight (57%, n=445) and that they looked good (51%, n=404). Confidence sourced through self-presentation increased AA odds of doping consideration** and intent*.	"every skinny little girl is like 'I take this protein' … when you're like 15, 16 isn't that all you want to be?".	Body image is important to AA and a source of sport confidence for many. Supplement use is considered a normative and effective means to obtain an ideal appearance as influenced by imagery and others' behaviour. The importance placed on body image is influential to AA's use of supplements, their doping consideration and intent.
Social media	Social media was a common source of information for AA about banned drugs (n=367, ranked 2nd) and supplements (n=375, ranked 5th).	"every athlete you see on social media these days is, look how strong and muscly I am … If I have that, I will get to that level".	Preceded by the internet, social media is a common source of information about SUDAA. Exposure to social media content regarding supplements influenced AAs perceptions of their efficacy to enhance performance and their prevalence in sporting contexts.
Sources of confidence: winning	76% (n=600) AA sourced confidence through winning which increased their odds of supplement use* and doping intent*.	"pressure from other people or pressure on themselves to be the best, at the top".	Most AA source sport confidence through winning which is influential to supplement use and doping intent. Confidence sourced through winning also appears a doping risk among AA who experience performance pressure.

Note. AA = Adolescent athlete. ASP = Athlete support personnel. SUDAA = Supplement use and doping among adolescent athletes. Adapted from "Implementing integration in an explanatory sequential mixed methods study of belief about climate change with high school students," by M. McCrudden and E. McTigue, 2019, *Journal of Mixed Methods Research*, *13*(3), p 395 (https://doi.org/10.1177/1558689818762576). Copyright 2018 by The Author(s).

**statistically significant effect. *influential.

Table 34

Joint display of silent evidence on factors which influence SUDAA

Area of silence	Study one (QUANT)	Study two (QUAL)	Inference
Influence of others' behaviour	Not measured in study one.	"he started it because the other guy was doing it".	Supplement use among AAs initiates as a result of observing others engage in this behaviour.
Doping and doping intent	2.5% (n=17) AA doped, 2% (n=13) intended to dope soon and 3.8% (n=25) intended to dope in the next year.	Narrative data did not indicate that participants had doped or intended to dope.	A minority of AA dope or intend to dope in NZ sporting contexts. The silence of narrative data suggest these factors are not common or that individuals are reluctant to discuss doping in a personal context.
Volition (high)	Opportunities for volition decreased AA odds of doping**, doping intent (soon**, in the next year**) and consideration*.	Narrative data did not indicate that AA had opportunities to experience volition in sporting contexts.	Opportunities for AA to experience volition are important to reduce doping, doping intent and consideration. The lack of qualitative evidence shows that adolescent volition is rare in sporting contexts.
Mastery-oriented motivational climate	AA perceived a mastery-oriented motivational climate when their coach encouraged skill learning (89%, n=647) and recognised skill improvement (87%, n=634).	Narrative data did not identify mastery-oriented motivational climates in adolescent sport.	AA perceive mastery-oriented motivational climates when coaches encourage skill learning and improvement. A lack of narrative evidence indicates that mastery-orientations are not widely experienced in adolescent sport.
Sources of confidence: Mastery	Most AA source confidence when their skills develop and improve (94%, n=741). Confidence sourced through mastery decreases AA odds of doping*, doping intent (in the next year)* and consideration*.	Narrative data did not indicate that AA sourced confidence through mastery.	Opportunities for AA to source confidence through mastery are important to decrease their odds of doping, doping intent and consideration. A lack of narrative data suggests mastery is not a predominant source of confidence in adolescent sport.
Subjective norms (significant others)	AA do not believe their closest significant others would want (97%, n=647), or like (97%, n=645), them to dope.	Narrative data did not include perceptions of doping among AA's support networks.	AA perceive those closest to them would not want them to dope. These results may have been affected by social desirability as immediate others' support of doping may not have been accurately discussed (QUAL) or reported (QUANT).

Note. AA = Adolescent athlete. ASP = Athlete support personnel. SUDAA = Supplement use and doping among adolescent athletes. Adapted from "Implementing integration in an explanatory sequential mixed methods study of belief about climate change with high school students," by M. McCrudden and E. McTigue, 2019, *Journal of Mixed Methods Research*, *13*(3), p 395 (https://doi.org/10.1177/1558689818762576). Copyright 2018 by The Author(s).

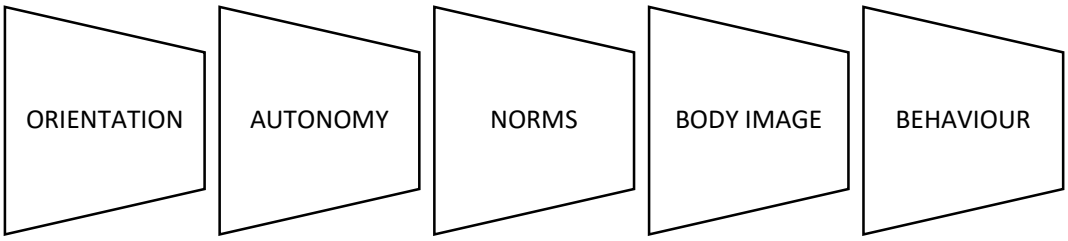
**statistically significant effect. *influential.

6.4 Discussion

The inferences drawn from the joint displays of convergent, complementary, and silent evidence informed five major themes which influence SUDAA (Figure 18). Each major theme had several minor themes which are presented in this section. Outcomes with similarities to existing knowledge are summarised with relevant literature while new insights are discussed in greater depth. As divergence was not identified in these results, the integrated data are discussed according to their convergence (Table 32), complementarity (Table 33) and silence (Table 34). In this section, the discussion of each minor theme is followed by a summary of its respective major theme.

Figure 18

Major themes from integrated quantitative and qualitative data

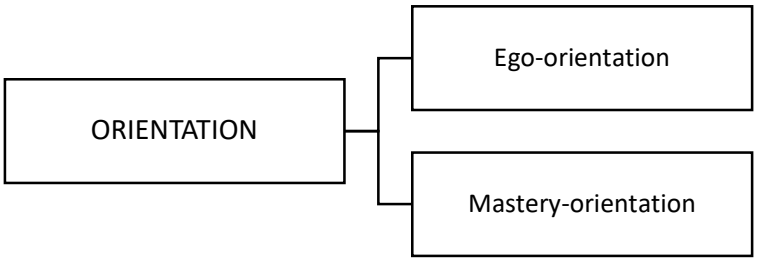


6.4.1 Major theme 1: Orientation

As shown in Figure 18, the orientation of adolescent sporting contexts emerged as a major theme in the integrated evidence. As displayed in Figure 19, two minor themes were apparent in this major theme: ego-orientation and mastery-orientation.

Figure 19

Major and minor themes of Orientation



Minor theme 1.1: Ego-orientation

As shown in Table 32, convergence was identified between quantitative and qualitative evidence regarding the influence of ego-oriented motivational climates on SUDAA. Specifically, the integrated data reveal that ego-oriented motivational climates are influential to increased odds of adolescent doping. These results are consistent with previous research which revealed

adolescent doping and doping consideration in ego-oriented motivational climates which prioritised winning and measured success through performance (Allen et al., 2015; Johnson, 2012; Mudrak et al., 2018). Consistent with existing evidence (Machida et al., 2012; Mudrak et al., 2018; Ntoumanis et al., 2017), the integrated data show that ego-oriented motivational climates present a doping risk to adolescent athletes.

Complementary data displayed in Table 33 reveal that most adolescents source confidence through winning (study 1) however perceive performance pressure to obtain this outcome (study 2). These findings have implications for SUDAA as confidence sourced through ego-oriented outcomes (i.e., winning) increased the odds of these behaviours (study 1). The identified association between ego-oriented sources of confidence, supplement use and doping intent provides new insights to this field of research. Specifically, these results indicate that adolescents have greater odds of doping when they participate in a climate which measures success through winning, and when winning is perceived as a viable confidence source. While further research is required, it appears that an increased focus on mastery in adolescent sport may contribute to addressing the doping risks identified within ego-orientations.

Minor theme 1.2: Mastery-orientation

Quantitative data presented in Table 34 show that adolescent athletes perceive a mastery-oriented motivational climate when their coach encourages skill learning and improvement (study 1). The silence of narrative evidence indicates that mastery-oriented climates are not widely established in adolescent sport and thus, are not experienced by all who engage in this context. While unsubstantiated in the integrated data, mastery-oriented climates have previously had a protective and deterrent influence on adolescent doping (Degenhardt et al., 2010; Elliot et al., 2004). Until mastery-oriented climates are more widely established in adolescent sport, it appears that their suggested anti-doping influence will not be experienced. Efforts are therefore required to understand the limiting and delimiting factors of mastery-oriented motivational climates in NZ's adolescent sporting context.

The quantitative data displayed in Table 34 show that adolescents source confidence through mastery when they develop and improve their skills. The lack of narrative evidence to suggest that adolescents obtain confidence through mastery may be due to the predominant ego-orientation identified in this context (see Table 32). That is, in ego-oriented climates it appears unlikely that adolescents have access to mastery sources of confidence. However, mastery confidence sources are important as they influence decreased odds of adolescent doping, doping intent and consideration (Table 34).

The associations identified between confidence sourced through mastery and decreased odds of doping in this chapter contribute new knowledge to the field. These findings are however complementary to evidence which revealed the protective influence of mastery orientations in adolescent sport on decreased doping, doping intent and attitudes towards this behaviour (Barkoukis et al., 2013; Mudrak et al., 2018). These results show the importance of a focus on mastery in adolescent sport to provide athletes with access to mastery as a confidence source. While a mastery-orientation is anticipated to have broader benefits for adolescent's experiences in sport, these findings suggest that confidence through skill development and improvement may also decrease SUDAA.

Summary of Major theme 1: Orientation

The integrated evidence has revealed the important influence of motivational climate orientations on SUDAA. These findings have also shown that these orientations are inconsistent throughout adolescent sport in NZ. That is, both mastery- and ego-oriented motivational climates are experienced by adolescent athletes and perceived by support personnel. These inconsistencies are important as these data have established that ego-oriented motivational climates influence increased doping consideration and supplement use among adolescent athletes. Moreover, the odds of these outcomes increased when adolescents believed their coach prioritised winning and in the face of performance pressure.

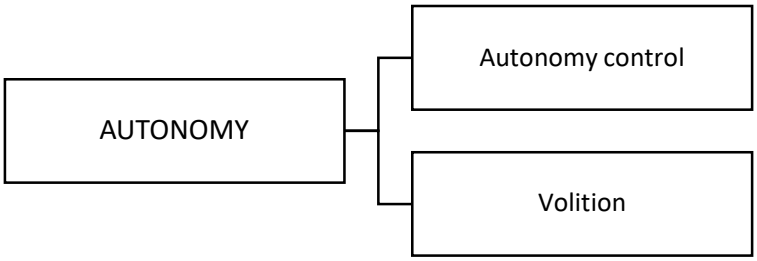
These integrated data contribute to the field by revealing that the orientation of adolescent sources of confidence is associated with increased or decreased odds of SUDAA. By way of example, confidence sourced through winning increased the odds of adolescent supplement use, doping and doping consideration. When combined with the negative influence of ego-oriented motivational climates on these behaviours, there also appears a link between motivational climate, sources of confidence and SUDAA. This association was similarly identified in an opposing direction as confidence sourced through mastery was influential to reduced SUDAA. Based on the identified associations between motivational climate, confidence sources and SUDAA, it is anticipated that a mastery-oriented sporting climate will offer adolescents the best opportunity to access mastery sources of confidence, thus reducing SUDAA. What is yet unknown, and warrants further research, are factors which influence coaches to establish ego- or mastery-oriented climates in adolescent sport. A better understanding of these factors would assist to develop practical solutions which address the prevalence of ego-oriented climates and thus reduce their negative influence on SUDAA. Simultaneously, greater knowledge of factors which influence mastery-oriented climates would inform actions to maximise their presence within which greater access to mastery as a source of confidence may decrease SUDAA.

6.4.2 Major theme 2: Autonomy

As shown in Figure 20, the major theme of Autonomy included two minor themes: Autonomy control[20] and Volition.

Figure 20

Major and minor themes of Autonomy



Minor theme 2.1: Autonomy control

Complementary evidence displayed in Table 33 reveals autonomy controlling behaviours among athlete support personnel in adolescent sport. The quantitative results show that adolescents perceive a lack of control over whether they will dope in their current season. Complementary narrative data indicates that adolescents feel obliged to use supplements when instructed to by their coaches (study 2). These results show that some adolescents experience a lack of choice in their sporting context where they feel their behaviour is controlled by others. These findings appear to have contributed to a lack of PBC among adolescents about doping. Consistent with literature, these results suggest that the controlling behaviours of others thwart adolescent needs for autonomy and, in turn, their ability to make decisions which reflect their own values (Bartholomew et al., 2011; Mageau & Vallerand, 2003). This complementary evidence has further similarities to previous research which linked a lack of autonomy with increased risks of adolescent doping and doping intentions (Chan, Dimmock, et al., 2015; Mudrak et al., 2018). These findings highlight the influential role of autonomy control on SUDAA through its negative effect on adolescent choice and PBC.

Minor theme 2.2: Volition

The convergent evidence displayed in Table 32, show that adolescent athletes lack volition in their sporting context. In chapter one, autonomy was introduced as one of three psychological needs in the Self-Determination Theory (SDT, Deci & Ryan, 2002). According to Steinberg

[20] Autonomy control is the actions of another person, or socio-contextual factors, which thwart adolescents' ability to experience self-determination. Ntoumanis, N., & Standage, M. (2009). Morality in sport: A self-determination theory perspective. *Journal of Applied Sport Psychology, 21*(4), 365-380. https://doi.org/10.1080/10413200903036040

(1999), adolescent autonomy is characterised by moral decisions, thoughts and feelings which are an individuals' own, as opposed to those influenced by others. Volition is one aspect of the autonomy construct which literature explained to be experienced when adolescents perceive they make willing choices about their behaviour (Bandura, 1977; Ng et al., 2011). Evidence from study one shows that some adolescents lack choice in their sporting context where they feel forced to do things they wish not to (study 1). The unanimous view of participants in study two converged with quantitative data to indicate that adolescents rarely have opportunities to develop the skills they require to experience volition in sporting contexts.

In contrast, the quantitative results in Table 34 contribute to existing knowledge by indicating that when adolescents experience volition, they have fewer odds of doping, doping intent or consideration. The silence of qualitative data on volition is indicative of adolescents' lack of opportunity to make choices in their sport. The results presented in Table 32 and Table 34 indicate that autonomy controlling behaviours exhibited by significant others must reduce to improve adolescent volition. Doing so may allow adolescents to make willing choices about their behaviours in sporting contexts. With greater choice, it appears that adolescent supplement use will reduce, particularly in situations where athletes feel obliged to engage in this behaviour. These findings suggest that volition is influential to reducing doping, doping intent and consideration among adolescent athletes. The integrated evidence show the importance of obtaining a greater understanding of best practices (i.e., coaching) to provide athletes with opportunities to experience choice and to develop volition in sporting contexts. These results also indicate a need for adolescents to possess the skills act with volitional when such opportunities arise.

Summary of Major theme 2: Autonomy

While accepted, autonomy controlling behaviours among athlete support personnel had a direct effect on supplement use, particularly when athletes anticipated their consumption was expected. It also appeared that autonomy controlling behaviours resulted in a lack of volition among adolescents in sporting contexts which contributed to a perceived lack of behavioural control about doping. Specifically, in the presence of autonomy control, adolescents did not receive opportunities to develop the skills required to experience volition. As a result, athletes lacked self-efficacy to act according to their values if conflicted with an undesirable behaviour (i.e., doping). While these results contribute new knowledge to the field, further research is required to understand what influences support personnel to exhibit autonomy controlling behaviours in adolescent sport. A greater understanding of these factors would inform outcome-oriented solutions to reduce controlling behaviours among support personnel and to

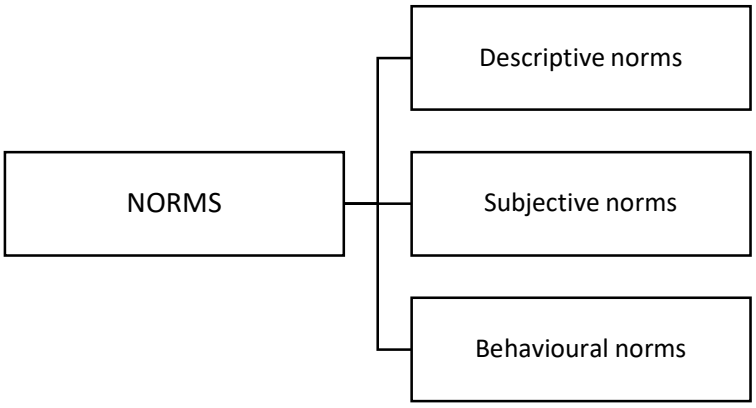
enhance practices which develop adolescent volition. Data presented in this chapter shows that practical solutions which meet these ends are needed to reduce SUDAA.

6.4.3 Major theme 3: Norms

The results presented in this chapter show that several norms are influential to SUDAA. The identified salience of norms on these behaviours is consistent with previous claims that adolescents are vulnerable to normative influences regarding doping (Backhouse et al., 2015; Dodge & Jaccard, 2008). Three minor themes emerged in the major theme of Norms as displayed in Figure 21 and discussed in the section which follows.

Figure 21

Major and minor themes of Norms



Minor theme 3.1: Descriptive norms

Convergent evidence displayed in Table 32 show that a descriptive norm of SUDAA exists in adolescent sport. As defined by Rivis and Sheeran (2003), descriptive norms reflect adolescents' perception that others in their environment use supplements and dope. The narrative data has revealed that these descriptive norms are not only perceived by adolescent athletes but also recent adolescent athletes and support personnel. The qualitative evidence also reveals that participants from all cohorts are frequently exposed to supplement use in their sporting context. This exposure influenced a descriptive norm about doping and adolescents' initial consideration of supplement use. These outcomes are consistent with previous research which asserted that descriptive norms were influential to adolescent doping intentions and related decision-making (Lazuras et al., 2010). These convergent data show that descriptive norms are influential to adolescent athletes for whom they increase the odds of doping, doping consideration and supplement use.

The narrative evidence presented in Table 32 is consistent with the developmental characteristic of "false consensus" (Berkowitz, 2005, p. 194). The effect of this consensus was

evident as adolescents justified their use of supplements through their perception that consumption was prevalent among their peers. These findings are consistent with previous research which found that descriptive norms influenced increased alcohol use among adolescents who perceived a high prevalence of the behaviour among their peers (Perkins et al., 1999). These findings are also consistent with literature which suggested that descriptive norms contributed to adolescents' doping likelihood, even if engaging in this behaviour opposed individual values (Miller & McFarland, 1991). The integrated evidence shows that descriptive norms exist in adolescent sport where they influence supplement use, doping and doping consideration among young athletes.

Minor theme 3.2: Subjective norms

Complementary evidence displayed in Table 33 show that subjective norms relating to SUDAA are a doping risk among adolescent athletes. When considering the broad context of adolescent sport, narrative data shows that SUDAA to enhance performance are accepted behaviours (chapter 5). These norms are important as complementary statistical evidence show that acceptance of these behaviours is influential to SUDAA, doping intent and consideration (chapter 4). These results are also consistent with previous research which found that subjective norms about doping were influential to adolescent engagement (Lucidi et al., 2008; Zelli, Lucidi, et al., 2010).

In contrast to adolescent perceptions of subjective norms in their broader sporting context (Table 33), are quantitative results which show that adolescents do not perceive subjective norms among those they share a close relationship with (Table 34). These results may accurately reflect the views of adolescents' significant others (e.g., that adolescents' parents and coaches do not support doping). It is also possible that this evidence was affected by social desirability. That is, adolescents may have deemed it undesirable to report their significant others' acceptance of SUDAA. The silence of narrative evidence on subjective norms among adolescents' significant others may too have been affected by social desirability and a reluctance to share such information in a group discussion. In contrast, participants in study two openly discussed a subjective norm regarding SUDAA in their wider sporting context. Thus, while adolescents did not report support for doping among their significant others, complementary data reveals a subjective norm in wider sporting contexts which influenced increased SUDAA, doping consideration and intent.

Minor theme 3.3: Behavioural norms

Narrative evidence displayed in Table 34 shows that observations of others' supplement use is influential to mirrored adolescent behaviour. These findings are consistent with aspects of the

SLT as adolescent supplement use occurred through the imitation of behaviours which were modelled by others (Bandura, 1977; Kabiri et al., 2018). These findings are consistent with previous research which identified observation and imitation as processes which influenced adolescent substance use (Kelly et al., 2017). The narrative evidence displayed in Table 34 also shows that adolescent observations of supplement use in gym environments has a direct influence on SUDAA. These results are noteworthy as previous research identified a heightened prevalence of doping among adolescents who trained in gym contexts (Kindlundh et al., 1999; Pedersen & Wichstrom, 2001). Additional to its effect on adolescent supplement use, these results show that exposure to supplement use among others in gym contexts reinforced adolescents' perceptions of the prevalence (descriptive norms, Table 32), and acceptability (subjective norms, Table 33), of SUDAA. These results may be explained by further evidence from study two which revealed a common perception that doping was common in gym contexts (see chapter 5). These outcomes show that perceived norms and observed behaviours in gym environments are not only influential to adolescent supplement use but also present a doping risk to those who train in this context. The silence of quantitative data regarding behavioural norms in Table 34 is explained by the lack of relevant survey items in study one (Appendix D). A lack of open-ended response items in this survey further negated adolescents' ability to record the influence of others' behaviour.

Summary of Major theme 3: Norms

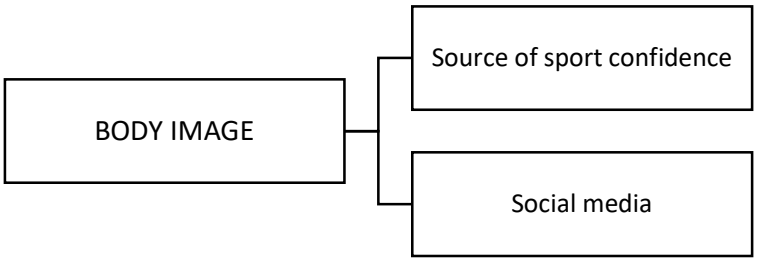
The integrated data has shown that descriptive, subjective and behavioural norms related to SUDAA exist in adolescent sport. This evidence revealed that these norms were each influential to increased odds of SUDAA as informed by the unanimous perspectives of current and recent adolescent athletes as well as support personnel. It is noteworthy that behavioural norms observed in gym environments had a direct influence on adolescent supplement use in sporting contexts. These findings have shown that adolescent vulnerabilities to norms in varied domains translated to behaviours in their sporting context. With greater knowledge of the norms which influence SUDAA, it is now necessary to investigate how they are established and to identify practical ways to challenge and reduce their impact on adolescent athletes. It is also important to generate a deeper understanding of audiences involved in the formation of these norms. With a robust comprehension of these norms, outcome-oriented solutions can be identified to reduce their salience on SUDAA.

6.4.4 Major theme 4: Body image

As shown in Figure 22, the major theme of Body image included two minor themes: Source of sport confidence and Social media.

Figure 22

Major and minor themes of Body image



Minor theme 4.1: Source of sport confidence

Complementary results displayed in Table 33 show that body image is important to adolescent athletes who seek to obtain the appearance they perceive as ideal. The quantitative evidence also shows that more than half of the surveyed adolescents source confidence through self-presentation (i.e., feelings about their appearance). Complementary narrative evidence shows the importance of body image to adolescents who also consider supplement use an effective means to achieve their ideal appearance. Further, when appearance was a confidence source, quantitative evidence shows that adolescents have greater odds of doping consideration and intent. These findings contribute new knowledge to the field by identifying associations between adolescent body image, confidence sourced through self-presentation and SUDAA. In this association, SUDAA was considered a means to achieve a desired appearance, as opposed to enhancing performance as cited elsewhere in this thesis. Thus, these results show that adolescents consider supplement use a legitimate means to obtain a body image from which they can source confidence. Interestingly, confidence sourced through self-presentation is also associated with doping consideration and intent (Table 33). These associations raise concern about adolescent doping, as previous research identified links between this behaviour and adolescent pursuits to obtain a specific appearance (Hoffman et al., 2008; Zelli, Mallia, et al., 2010). This evidence reveals associations between adolescent body image, self-presentation as a confidence source and SUDAA. These findings posit adolescents' appearance related priorities and confidence sources as a doping risk which should be considered in efforts to prevent these behaviours.

Minor theme 4.2: Social media

Complementary evidence shows that social media is influential to SUDAA (Table 33). The quantitative data reveals that social media is the second most common source of adolescent information about doping following the internet, and the fifth most common regarding supplements. Complementary narrative evidence indicates that exposure to body imagery and supplement marketing through social media is influential to adolescent supplement use (Table

33). The identified influence of body image via social media is consistent with literature which acknowledged the perceived importance of the imagery portrayed as exemplary in a given context (i.e., athletic body imagery) (Yilmaz et al., 2019). These results show that adolescents' exposure to supplement marketing, particularly that which portrays athletic body imagery via social media, is influential to their behaviour. Specifically, this exposure has a direct influence on adolescent perceptions that supplement use is required to obtain the modelled appearance. As shown in these results, these perceptions are influential to increased SUDAA. The outcomes of these integrated data are consistent with previous research which identified that adolescent exposure to media content influenced their use of supplements to achieve body image ideals (Frison et al., 2013). Further evidence reveals additional risks of adolescent exposure to body imagery within media content as the endeavour to obtain aesthetic ideals has influenced doping in this athlete population (Backhouse et al., 2015; Hoffman et al., 2008; Zelli, Lucidi, et al., 2010). These doping risks appear most influential to adolescents who perceive supplement use as a legitimate means to obtain aesthetic ideals and thus, source greater confidence.

Summary of Major theme 4: Body image

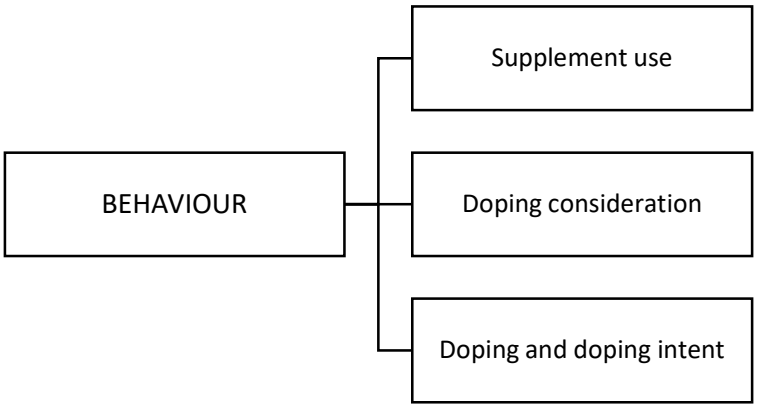
The integrated evidence has shown that adolescent vulnerabilities to body image were influenced by developmental and contextual factors. As a developmental characteristic, it was unsurprising that adolescents prioritised their appearance. However, it is now evident that athletic body image was also a source of confidence. These developmental priorities converged with contextual factors as observations of athletic body imagery, and others' behaviour, were influential to the perceived legitimacy of supplement use to enhance appearance. The developmental and contextual factors related to body image were influential to SUDAA, doping intent and consideration and thus present a risk to these behaviours among adolescents. What remains unknown are factors which lead to adolescents emphasis on substance use, as opposed to evidence-based practices such as training and sound nutrition, to address appearance related concerns in sporting contexts. The integrated evidence also shows that adolescents' developmental priorities on appearance are heightened through exposure to body imagery in social media. As this social media content was commonly associated with supplement marketing, its direct influence on adolescent's consumption to enhance body image is perhaps unsurprising. While reducing adolescent exposure to supplement marketing, and associated body imagery, appears an obvious conclusion, contextual knowledge of this phenomena indicates more pragmatic initiatives are required. Thus, further investigation is necessary to identify outcome-oriented solutions for adolescents to gain greater literacy of the content they are exposed to via social media to reduce its influence on SUDAA.

6.4.5 Major theme 5: Behaviour

As displayed in Figure 23, the major theme of Behaviour included minor themes of Supplement use, Doping consideration, Doping and doping intent.

Figure 23

Major and minor themes of Behaviour



Minor theme 5.1: Supplement use

Convergent narrative and statistical evidence displayed in Table 32 shows that the majority of adolescent athletes in NZ use supplements to enhance performance. Only one other international study has indicated a similar extent of supplement use among a comparable population (Diehl et al., 2012). For the most part, this evidence shows that adolescent supplement use is higher in NZ than identified among their international peers (Braun et al., 2009; Hoffman et al., 2008; Petróczi et al., 2008). Narrative evidence shown in Table 32 and Table 34 show that adolescent supplement use is influenced by others' behaviour. Further data presented in Table 33 show that performance expectations, the directives of others as well as exposure to body imagery via social media, also influence these behaviours. These influences have resulted in prevalent and widespread supplement use among adolescent athletes. These findings echo previous claims that supplement use has become a normative discourse in adolescent sport (Hoffman et al., 2008; Moston et al., 2015). As supplement use to enhance performance has been considered an initial step in a progression toward doping (Kegelaers et al., 2018), and an inappropriate behaviour for healthy adolescents (Desbrow et al., 2014), efforts are required to challenge, and reduce, their consumption. With knowledge gained through these integrated data, it is now important that practical solutions are identified to reduce supplement use in adolescent sport. As no measured variable was found to influence reduced odds of this behaviour (chapter 4), additional research on factors that decrease adolescent supplement use is necessary.

Minor theme 5.2: Doping consideration

Convergent evidence presented in Table 32 reveals doping consideration among almost half of the surveyed adolescents, in order to enhance performance (study 1). Convergent, narrative evidence showed adolescents' consideration of doping in response to performance pressure in their sport (study 2). These findings show that adolescent doping consideration is driven by a perceived need to enhance performance. These findings are consistent with previous research in which adolescents self-reported their consideration of doping to improve performance (Backhouse et al., 2015; Bloodworth & McNamee, 2010). These results are noteworthy as adolescents who consider doping have been identified as more susceptible to engage in this behaviour (Gucciardi et al., 2010; Jalleh & Donovan, 2007). Additional to revealing adolescents' consideration of doping under performance pressure, these outcomes speak to an apparent belief among this population that doping will enhance performance. This knowledge indicates a need to identify practical solutions to reduce performance pressures in adolescent sport and thus address the factors which influence doping consideration. These findings also speak to the importance of reducing ego-orientations in adolescent sport which inherently possess the pressures and expectations which the data reveal are influential to doping consideration (see minor theme 1.1: Ego-orientations).

Minor theme 5.3: Doping and doping intent

As shown in Table 34, quantitative evidence reveals that a minority of adolescent athletes in NZ have doped. These self-reports are consistent with international estimates of a 1-5% adolescent doping prevalence (Backhouse et al., 2015; Dodge & Jaccard, 2008). The quantitative data also shows that a minority of adolescents intended to dope soon or in the next year (Table 34). As consistent with previous research (Barkoukis et al., 2015; Lazuras et al., 2015), these findings suggest that a subset of adolescent athletes have a greater likelihood of doping, which may be influenced by volition. While unknown, the silence of narrative evidence regarding adolescent doping and doping intent may reflect the absence of these factors among the participants of study two. These outcomes may also indicate respondents' comfort to admit doping and doping intent through anonymous research methods (study 1), and their contrasting reluctance to provide such information in a group context (study 2). Regardless, these results show that doping and doping intent are relevant issues in adolescent sport which require prevention owing to their many negative consequences.

Summary of Major theme 5: Behaviour

The integrated evidence has shown that adolescent athletes use supplements at a higher prevalence in NZ than among comparable international cohorts. The prevalence and

acceptance of this behaviour has established that adolescent supplement use to enhance performance is a norm in NZ sport. These findings also revealed that adolescent athletes considered doping to enhance their performance, predominantly in response to performance pressure. These data also indicated that a minority of adolescent athletes had doped, or intended to do so, to enhance performance. Specifically, this evidence has revealed the relevancy of SUDAA as performance enhancing behaviours in contemporary sport. While a minority of adolescents reported doping, a noteworthy cohort had considered doping to enhance their performance. With knowledge of this intent, consideration and engagement in SUDAA, alongside awareness of factors which influence these outcomes, it is now important to identify developmentally appropriate ways to reduce these behaviours.

6.5 Chapter summary

This chapter has presented the integration of quantitative and qualitative data from the core research components of this thesis. The integrated evidence has revealed convergence, complementarity, and silence between the voices of current and recent adolescent athletes, as well as support personnel. The process of generating quality inferences through data integration were described before inferences revealed that orientation, autonomy, norms, body image and behaviours influenced SUDAA. Results within each of these major themes were presented and discussed in consideration of existing evidence. This chapter included summaries of each major theme which, in accordance with the explanatory and sequential nature of this thesis, inform the design of study three (chapter 7). Contributions that these integrated data make to knowledge, and areas warranting further research, are presented in chapter eight. These outcomes are also considered in this thesis' practical recommendations which are presented in chapter nine.

Chapter 7 Study three

7.1 Chapter introduction

This chapter outlines the third study of this thesis which investigates stakeholder perspectives about factors which influence supplement use and doping among adolescent athletes (SUDAA). This study explores stakeholder views on outcome-oriented solutions to reduce SUDAA in adolescent sporting contexts. Owing to the explanatory, sequential MMR nature of this thesis, the design of study three is informed by inferences made from integrated evidence from study one and two. In this chapter, a focus group is used to collect narrative data which is analysed deductively and presented using stakeholder excerpts. Results of this study are discussed in consideration of existing evidence before this chapter concludes with its practical implications. The limitations of this investigation, its contributions to knowledge and directions for future research are presented in chapter eight. The outcomes of this study also contribute to the practical recommendations of this thesis which are presented in chapter nine.

7.2 Research design

7.2.1 Stakeholder participation

This study sought an increased understanding of factors which influence SUDAA through the perspectives of stakeholders with extensive experiential knowledge in adolescent sport. In consideration of the pragmatic perspective of this thesis, stakeholder views on outcome-oriented solutions to reduce SUDAA in adolescent sporting contexts were also explored. As defined by Burton et al. (2009), stakeholders were individuals with experiential knowledge in adolescent sporting contexts whose role and influence had practical relevance to the outcomes of this thesis. As stated in chapter one, stakeholder perspectives are rarely represented in this field of research and warrant greater understanding. Despite its infrequent use, stakeholder participation has been acknowledged as an effective approach to increase sustainability, support and implementation of anti-doping initiatives (Dwyer et al., 2003; Patterson et al., 2016). Further, Patterson and colleagues (2016) found that stakeholder involvement in anti-doping research enhanced the feasibility and appropriateness of its results to its intended context. As such, stakeholder participation has relevance in the field of doping where challenges to translate theory to practice have been acknowledged (Gatterer et al., 2019). Stakeholder participation is therefore suitable to the aims of this pragmatic research, and specifically RQ3, which sought outcome-oriented solutions to reduce SUDAA.

Outside of this field, stakeholder involvement is an emerging research trend with reported practical and ethical benefits (Deverka et al., 2012). From a practical perspective, stakeholder participation has enhanced utility in the translation of theory to practice in varied settings (Deverka et al., 2012; O'Brien et al., 2013; Sloan, 2009). From an ethical lens, literature has emphasised the right of stakeholders to contribute to research about issues which affect them and their environment (Boote et al., 2002; Elwyn et al., 2010). In the context of this study, the ethical rationale for stakeholder participation was twofold; SUDAA was an issue that affected the roles and practical environments that stakeholders occupied, but also the adolescents for whom stakeholders had a duty of care.

Literature has provided several descriptions of stakeholder engagement which are determined by the nature and extent of involvement required (Boote et al., 2002; Rowe & Frewer, 2005). In this study, stakeholder's involvement is considered participatory as it affords opportunities for reciprocal learning through the exchange of information between the researcher and stakeholders (Deverka et al., 2012; Rowe & Frewer, 2005). Stakeholder participation in this study is anticipated to have mutual benefit for all involved. These mutual benefits are experienced as stakeholders learn through their engagement in this study, while the researcher gains understanding of the research issue through stakeholder contributions (Sloan, 2009; van Kerkhoff & Lebel, 2006). This study is therefore anticipated to increase stakeholder's awareness of SUDAA and to empower their involvement in its reduction, through their collaboration in the development of outcome-oriented solutions.

In this study, stakeholder participation affords an opportunity for non-linear perspectives to be obtained about the complex issue of SUDAA from which knowledge is generated. These perspectives are important in the context of SUDAA as it is a research issue which lacks real-world solutions (O'Brien et al., 2013; Sloan, 2009). Stakeholder perspectives were important in this pragmatic inquiry to identify ways to reduce these behaviours whose complexity has been widely acknowledged (Allen et al., 2015; Elbe & Barkoukis, 2017; Overbye et al., 2013). Based on literature, stakeholder participation was also considered pivotal to enhancing transparency, quality and confidence in the outcomes of this thesis (Burton et al., 2009; Deverka et al., 2012). The integrated outcomes of previous research (chapter 6) revealed a need to better understand the contextual, normative and developmental factors that influence SUDAA. To that end, stakeholder perspectives were deemed valuable to obtain varied insights and broader explanations of knowledge generated in preceding phases of research. In this thesis, stakeholder perspectives were critical to the development of practical recommendations which were contextually grounded in the sporting environment for which they were intended (chapter 9).

7.3 Research method: Focus group

A focus group discussion was the most suitable data collection method to respond to the aims of this thesis and RQ3. The qualities of focus group research were introduced in chapter five and have been extended here, through stakeholder participation. For example, group discussion afforded stakeholders opportunities to express their views with likeminded peers who shared an interest in adolescent sport. The collaborative nature of focus group research also permitted the researcher to engage in the group discussion where stakeholders' genuine accounts added value to existing knowledge (Berg, 2007; Gill et al., 2008). The flexibility of focus group research afforded opportunities for interaction between the perspectives, biases and experiences of participants in a dynamic group context (Berg, 2007; Boaz et al., 2018; Gay et al., 2012). This "synergistic group effect" (Berg, 2007, p. 146) permitted ideas to generate among stakeholders which would not have been possible through alternate research methods. A focus group provided the most suitable research method for this study as it allowed contextual understanding to emerge about how to reduce SUDAA, from the collective insights of knowledgeable practitioners.

7.3.1 Data collection tool

Data were collected using a semi-structured question schedule which included six open-ended questions (Appendix N). The length of this schedule was consistent with recommendations for data collection tools to include no more than 12 items (Gill et al., 2008). This question schedule allowed stakeholders ample opportunities to contribute their knowledge, experiences and views to an effectively moderated group discussion. Consistent with literature (Morse & Mitcham, 2002), and this thesis' MMR design, this question schedule was informed by a framework of knowledge which generated sequentially. As suggested by Ritchie and Lewis (2013), it was in this framework that each focus group item sought to extend existing knowledge about factors which influence SUDAA and to elicit stakeholder views on practical ways to reduce these behaviours.

In this study, the researcher drew on recent experience in the facilitation of focus groups (see chapter 5). Due to similarities between the adult cohorts and data collection methods used in this study and in study two, comprehensive pilot testing was not conducted prior to data collection. Instead, the moderator's guide (Appendix L), focus group question schedule (Appendix N) and participant pre-reading (Appendix O) for study three were reviewed by research supervisors and critical peers with relevant experience in adolescent sport. These reviews informed refinements to potential probing questions and developments to the use of pre-reading material.

7.4 Data collection procedures

7.4.1 Participant criteria

According to existing classifications, participants recruited for this study were primary stakeholders as each could affect, or be affected by, SUDAA (Burton et al., 2009; World Wildlife Fund for Nature, 2000). As characteristic of primary stakeholders, individuals who met this participant criteria provided perspectives from positions of responsibility, power and influence in adolescent sport (World Wildlife Fund for Nature, 2000). The outcomes of integrated data from studies one and two (see chapter 6) informed the participant criteria of this study. This criteria resulted in participants with extensive experience in adolescent sport in NZ as a coach, parent, or other support person (i.e., physiotherapist). Participants who met these criteria were anticipated to have robust perspectives on SUDAA, adolescents and their sporting contexts. Based on their contextual experience, stakeholders were considered best placed to identify practical solutions to reduce SUDAA which could be reliably translated to adolescent sport.

7.4.2 Participant recruitment

As the findings of previous research determined the participant criteria of this study, the non-probability participant recruitment method of purposive sampling was used (DeCarlo, 2018; Patterson & Backhouse, 2018). Consistent with approaches used to recruit participants in chapters three and five, the researcher sent information about this study (Appendix E) to National Sports Organisations and secondary schools. The researcher requested that this information was shared with individuals who met the participant criteria for this study. This approach was taken to avoid perceived pressure to participate which may have occurred through direct researcher contact. Stakeholders with an interest to be involved in data collection were invited to contact the researcher directly to obtain more information and a consent form for consideration. It was hoped that six to eight stakeholders would be recruited as this was considered an ideal cohort size for adult participants to contribute to an effectively moderated group discussion (Gill et al., 2008).

During the participant recruitment process, the researcher made specific efforts to establish rapport with stakeholders. These efforts were maintained throughout data collection to increase participant comfort to contribute to group discussion, and to allow the researcher to probe question responses (Creswell, 2014; Denzin & Lincoln, 2018). Prior to data collection, the researcher built rapport with participants through phone and email communication. This rapport was consolidated in a personal context as interaction was encouraged during data

collection. Efforts were also made to maintain rapport with stakeholders after data collection as each were invited to assess the accuracy of the researcher's initial interpretations of data.

Pre-reading

Once the researcher had received stakeholder's consent to participate in this study, each were sent pre-reading materials. This participant pre-reading included four case studies of fictitious athletes in the context of adolescent sport, as based on integrated data from chapter six (Appendix O). The intent of this deductive approach was to generate thinking among stakeholders about SUDAA in reflection of their experiential knowledge in adolescent sport. At this time, participants were also provided the initial focus group item (Appendix N) which afforded stakeholders an opportunity to consider their perspectives on SUDAA at their own pace. This approach was anticipated to provide greater depth and efficiency to group discussion.

7.4.3 Participants

Eight stakeholders provided their consent and confirmed their availability to participate in this study. On the day of data collection, two individuals were unavailable due to illness and an unforeseen work priority. This outcome was consistent with suggestions that smaller participant cohorts than expected were an inherent risk of voluntary focus group research (Berg, 2007). The final cohort in this study included six participants (n = 6) with an average of 14 years' experience in adolescent sporting contexts (5 to 30 years). Stakeholders held various roles in adolescent sport including coaching, physiotherapy, and management. Additionally, three stakeholders were parents of adolescent athletes. This breadth of experience was considered sufficient to contribute to the aims of this study and in response to RQ3.

7.4.4 Data collection

Data collection occurred at a time and date suitable to all stakeholders which was confirmed following receipt of completed participant consent. The data collection venue had been used in study two therefore its suitability for focus group conduct was known. The focus group was conducted in consideration of all adult specific components of the moderator's guide, initially developed for study two (Appendix L). As stakeholders had volunteered time from their working day to participate in this study, the researcher was diligent to limit data collection to a one-hour time period, with refreshments available to all participants. Prior to data collection, and following a description of their purpose, all stakeholders consented to the discussion being audio-recorded and for notes to be taken throughout. To align with the deductive approach of this study, the focus group opened with a brief researcher-led presentation of integrated

evidence from chapter six. This technique was also anticipated to increase individual's awareness of SUDAA as a mutual benefit of stakeholder participation.

7.4.5 Data verification and saturation

Owing to the sequential nature of this thesis, evidence obtained in previous studies informed a framework which gave scope to this inquiry (Morse & Richards, 2002). It was through this framework that assessments of data verification and saturation were made in consideration of existing knowledge (Morse & Mitcham, 2002). For example, the evidence obtained in studies one and two provided a scaffold within which stakeholder perspectives could be explored to verify existing understanding of SUDAA. The extent to which verification was obtained then indicated if data had been saturated (Finfgeld-Connett & Johnson, 2013). If stakeholder perspectives had diverged from current understanding (lack of verification), or if new insights continued to emerge (lack of saturation), further data collection would have been necessary until the principles of data saturation and verification were satisfied.

Data verification and saturation were also assessed in consideration of RQ3 and the broader aims of this thesis. These considerations showed that evidence from an initial focus group converged with, and was complementary to, existing evidence, and that data saturation and verification were established. Divergence to extant knowledge was not recorded and comparatively, a depth of explanation was established through stakeholder views. These insights advanced previous knowledge of factors, and audiences, influential to SUDAA and revealed practical solutions to reduce these behaviours.

7.5 Data analysis: The coding process

Due to the sequential development of knowledge in this thesis, the researcher approached this final study with an established understanding of factors which influence SUDAA in adolescent sport (Stake, 1994). A deductive approach was therefore most suitable to analyse stakeholder contributions to this study in light of a priori knowledge (Hyde, 2000; Morse & Mitcham, 2002; Pope et al., 2002). This deductive process thus took a "top-down approach" (Ritchie & Lewis, 2013, p. 7) and analysed the evidence based on an established understanding of SUDAA and adolescent sporting environments.

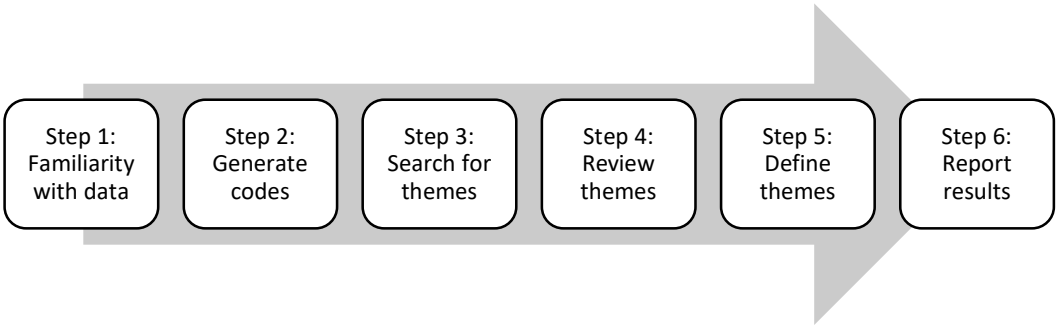
7.5.1 Thematic analysis

Thematic analysis (TA) provided an effective approach to generate a deeper understanding of SUDAA through multiple stakeholder perspectives (Braun & Clarke, 2012). Flexibility was also afforded by TA through which perspectives were explored in a deductive framework informed

by preceding phases of research. As presented in Figure 24, and outlined in this section, data were analysed through six steps of deductive TA (Braun & Clarke, 2006, 2012).

Figure 24

The six steps of Thematic analysis



Note. Steps taken to deductively analyse narrative data from study three. Adapted from "Using Thematic Analysis in Psychology," by V. Braun and V. Clarke, 2006, *Qualitative Research in Psychology, 3*(2), p 87 (https://doi.org/10.1191/1478088706qp063oa). Copyright 2006 by Edward Arnold (Publishers) Ltd.

Step 1: Familiarity with data

To gain familiarity with the data, the researcher facilitated the focus group and transcribed its audio-recording verbatim. Familiarity with this data was then enhanced as the researcher checked the transcript for accuracy against the audio-recording. Reflective field notes recorded throughout, and following, data collection were then included in this transcript. This process increased the researcher's familiarity with the data by reflecting on the context in which evidence was generated. Data were then critically analysed to investigate their meaning from which initial insights were drawn in relation to RQ3.

Step 2: Generate codes

The transcribed data and initial codes were entered into NVivo software. Data were then analysed in consideration of the deductive framework which informed their collection. Participant excerpts were then coded by section according to initial interpretations made at descriptive, semantic and conceptual levels. Each code was generated with the intent to capture the varied perspectives of multiple stakeholders.

Step 3: Search for themes

The researcher actively reviewed the coded data for emergent patterns of relevance to RQ3. These patterns contributed to the development of themes and the overall story which they told of the data. In this process, thematic overlap was also identified and subsequently addressed in step four.

Step 4: Review themes

Themes were reviewed for their quality and relevance to RQ3. Themes were also reviewed for duplicity, conciseness and narrative interest (Braun et al., 2016). Where duplicity was found, themes were collapsed and further reviewed. To assess thematic quality and relevance to the research context, each theme was reviewed by critical peers in consideration of RQ3 and the aims of this thesis.

Step 5: Define themes

Concise descriptions were developed for each theme to identify and articulate its contribution to this study. This process provided a final opportunity to check for duplicity between, and coherence within, each theme. Through this process, minor themes were identified as patterns of relevance to each major theme. Major and minor themes were given informative, concise titles and were supported by narrative excerpts to reflect stakeholder perspectives.

Step 6: Report results

Results are reported in this chapter through major themes, minor themes and stakeholder voice (via participant excerpts). In the reporting process, the narrative of each theme, and excerpts which represented stakeholder perspectives, were critically reviewed by research supervisors.

7.5.2 Validity

The principle of validity was important to establish in this study to ensure its outcomes did not reflect the researcher's subjective view of the data. A critical aspect of obtaining validity was to recognise if the outcomes of this analysis accurately reflected stakeholder perspectives (Pope et al., 2002). Where stakeholder views converged with existing evidence, validity was enhanced in the knowledge which sequentially developed in this thesis (Hyde, 2000). As aligned to the pragmatic view of this thesis, stakeholder perspectives were critical to the relevance of its outcomes to the practical context of adolescent sport.

As introduced in chapter two, researcher reflexivity was vital to validity in this thesis (Attia & Edge, 2017). To remain attentive to the researcher's influence on the design, conduct and analysis of this study, reflective notes were maintained throughout. This reflexive process enabled the researcher to challenge initial interpretations of the data by identifying perspectives which deviated from, or extended, existing knowledge (Pope et al., 2002). Reflective notes also assisted the researcher to identify how knowledge about the research issue had emerged throughout the course of this thesis and where initial assumptions were incongruent with the evidence. For example, stakeholders identified that administrators in

sports organisations were influential to SUDAA. Reflective notes showed that this audience had not been anticipated to influence SUDAA in earlier stages of inquiry. These insights contributed to a broader understanding of this research issue and was a fundamental outcome of study three as it indicated an otherwise unknown audience for the prevention of SUDAA.

7.5.3 Trustworthiness

According to Lincoln and Guba (1985), trustworthiness includes credibility, dependability, confirmability and transferability. Purposeful efforts were made to enhance all aspects of trustworthiness in this study. For example, the researcher sent her initial interpretations of evidence to participants and invited them to confirm or clarify their accuracy (Thomas, 2006). Using a dichotomous scale, and Qualtrics software, stakeholders indicated if the researcher's interpretation(s) accurately reflected the evidence generated in the group discussion; 1 = *yes, the researcher has accurately interpreted the group discussion*, or 2 = *no, the researcher has not accurately interpreted the group discussion*. Stakeholders also had an opportunity to clarify or correct these interpretations in open text fields. High participant engagement in this process was obtained as five of six participants completed each item in full (n = 5, 83%). As stakeholders confirmed the accuracy of each interpretation and no further comments were received, trustworthiness was established. Further efforts to enhance trustworthiness, and reliability in the outcomes of this study, included the use of TA best practices to analyse stakeholder evidence (Braun & Clarke, 2006).

This pragmatic investigation was contextually bound to adolescent sport in NZ, rendering transferable outcomes among its priorities. Efforts were thus made to ground this study in the context of adolescent sport from which greater transferability could be obtained. For example, pre-reading situated the issue of SUDAA in the context of adolescent sport and stakeholders were reminded of the pragmatic aims of this study throughout all phases of research. To further enhance trustworthiness, and particularly transferability, "peer debriefing" (Thomas, 2006, p. 243) was conducted. To this end, the researcher engaged in informal discussions with knowledgeable peers who critically reviewed, and agreed with, the contextual relevance of this evidence to adolescent sporting contexts.

7.6 Results and discussion

The results of this study are presented in this section using the voices of stakeholders from adolescent sporting contexts. Figure 25 shows the three major themes which emerged through the deductive analysis of this narrative evidence.

Figure 25

Major themes of study three

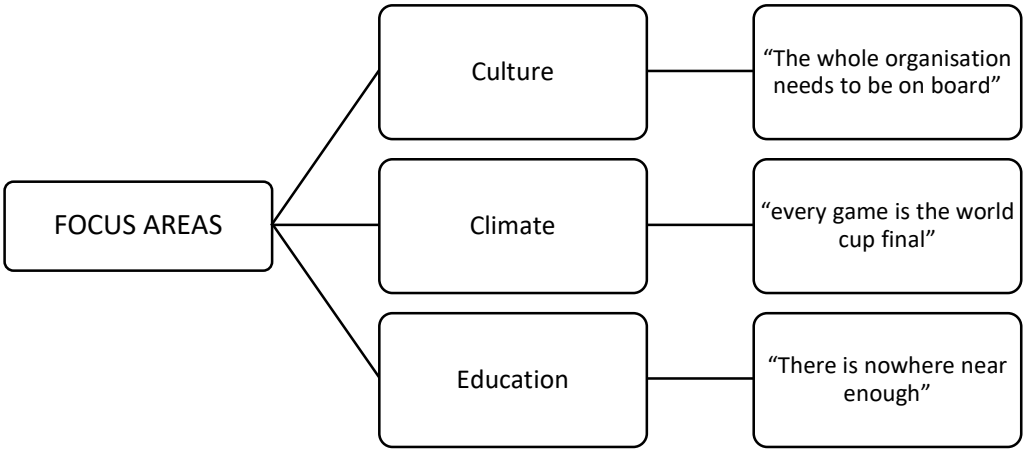
Three minor themes emerged in each major theme as displayed throughout this section. Following each display, the results of each minor theme are presented and discussed in consideration of existing evidence. In these results, stakeholder contributions are labelled numerically to uphold participant confidentiality (e.g., Stakeholder 1 = S1). Each major theme shown in Figure 25 is summarised following the discussion of its respective minor themes.

7.6.1 Major theme 1: Focus areas

Stakeholders shared their perspectives on the focus areas they considered essential to reduce SUDAA, based on their experiences in adolescent sport. As displayed in Figure 26, and explained in this section, stakeholders believed Culture, Climate, and Education were critical Focus areas.

Figure 26

Major theme, minor themes, and excerpt examples of Focus areas



Minor theme 1.1: Culture, results

Stakeholders recognised the important role of anti-doping culture at all levels of sport if SUDAA were to reduce. Stakeholders emphasised the important role of sports organisations in this process: "It's organisational right? The whole organisation needs to be on board" (S2). Participants felt that anti-doping cultures: "should be the norm" (S5) and driven by sports organisations:

> *Organisationally, this has to systemically come down from the top. Particularly if you have a top tier coach that's, you know, running the cutter and no one is checking in on what's going on then it's easy for that stuff to happen so it's got to be part of organisational culture and in rules and regs [regulations] and everything else (S2).*

On reflection of personal experiences, stakeholders felt a lack of consideration was given to SUDAA: "There is just no system" (S1). Several stakeholders expressed concern that efforts to reduce SUDAA may be diluted if not made a cultural priority in the crowded context of adolescent sport: "It is really important that it doesn't get washed up in, there's a lot best practice things that people are trying to throw into sport" (S4).

Stakeholders expected that efforts to reduce SUDAA may be challenged by a culture of trust in the context of adolescent sport: "here in NZ we do have a really high trust environment in sport" (S2). Stakeholders linked this extent of trust to diffused responsibilities regarding SUDAA: "No one wants to take any responsibility for any substances" (S5) and a lack of boundaries regarding supplement provision: "parents put a lot of trust in coaches from everything; overloading to supplements … " (S2). In the absence of boundaries and responsibilities, stakeholders expressed a need to remain vigilant for negative influences which may pose risks to SUDAA: "we need to be, everyone; players, parents, coaches, everyone, alerted to the fact that we aren't as squeaky clean as we think we are …" (S3). Stakeholders recognised a lack of cultural initiative to prevent SUDAA and emphasised this as a necessary focus area to reduce these behaviours.

Minor theme 1.1: Culture, discussion

These results reveal a lack of priority is placed on preventing SUDAA in adolescent sporting contexts. In the absence of a cultural focus on anti-doping, this evidence shows that a high trust environment and paucity of boundaries on athlete support persons' involvement in SUDAA, results in responsibility scarcely taken for SUDAA. In this context, support persons' control over adolescent supplement use went unquestioned which was influential to SUDAA. This situation is similar to literature which described disengagement from doping responsibilities in adolescent sport to limit the ability for threats to clean sport to be acknowledged or challenged (Engelberg & Moston, 2016; Patterson & Backhouse, 2018). Similar to previous recommendations (Backhouse et al., 2018; Patterson & Backhouse, 2018), this evidence suggests that collective accountabilities are required at the cultural level of adolescent sport to prioritise anti-doping. Specifically, these results reveal a need for adolescent sporting cultures to be underpinned by boundaries which limit support persons' involvement and control of SUDAA.

Minor theme 1.2: Climate, results

Stakeholders unanimously agreed that the motivational climates which underpin adolescent sport are influential to SUDAA. Stakeholders also identified a predominant performance orientation in this context where emphasis was placed on winning: "At youth levels, every game is the world cup final, the most important one" (S5). Due to their prevalence, stakeholders anticipated reducing ego-orientations in this context would be "tricky" (S3). Regardless, stakeholders believed addressing performance climates in adolescent sport was a necessary focus area to reduce SUDAA:

> *you would be hoping to create an environment where coaches aren't ego-oriented; making athletes get up and feeding them supplements that aren't labelled, not explaining anything. I hopefully never have to work with a coach like that to begin with so that I don't have to work with athletes who are in that situation (S5).*

Within ego-oriented climates, stakeholders discussed specific situations in which preventative initiatives were required due to adolescent's heightened doping vulnerability:

> *venturing into it [doping] and started thinking about it so obviously, when people are injured they start thinking about how can I get back quicker or when they are being selected or missed out on selection particular things and then they start venturing down another pathway to come back bigger and better or whatever (S2).*

It was in ego-oriented climates that stakeholders thought adolescents were at greatest risk of SUDAA yet had the least support to avoid these behaviours: "If you are in a pressure situation where you have a coach feeding you something and you're unsure, where do you go? Who do you talk to?" (S5). Stakeholders perceived a lack of impartial support regarding SUDAA however felt the provision of such was an important focus area to reduce these behaviours.

Minor theme 1.2: Climate, discussion

This evidence reveals a unanimous view among stakeholders that ego-oriented motivational climates are predominant in adolescent sport and influential to SUDAA. These results are consistent with existing opinion that the discourse of performance in adolescent sport is influential to athletes' engagement in whatever it takes to win (Johnson, 2012; Mudrak et al., 2018). It was in ego-oriented climates that stakeholders recalled observations of widespread supplement use and expressed their belief that this climate presents a risk to adolescent doping. These results have similarities to previous findings that ego-oriented climates were associated with adolescent doping, doping intent and consideration (Johnson, 2012; Kavussanu et al., 2002; Ntoumanis et al., 2017). This evidence reflects a need to focus on reducing ego-oriented climates in adolescent sport to decrease their influence on SUDAA.

Minor theme 1.3: Education, results

Stakeholders unanimously advocated education as an essential focus area to reduce SUDAA: "I think education is huge" (S1). Despite its perceived importance, stakeholders felt there was insufficient access to anti-doping education in their environment: "There is education, but it isn't enough, there is nowhere near enough" (S3). Where available, stakeholders considered anti-doping education to be athlete-centric: "The education bit is obviously really important and … is directed straight at the athletes" (S4) however believed a wider strategy was required:

> *If I was taking a step back and I was the organisation, school, club, or regional sport body or whatever, it's probably the systems and structures around the education. Specifically the who, how and when so trying to identify who needs to be targeted to make sure the messaging is going to have some impact (S4).*

Stakeholders indicated a high prevalence of supplement use in adolescent sport and believed there was a lack of awareness about the risks associated with this behaviour. On reflection of recent anti-doping education, one participant explained the shock of audience members regarding the risks of supplement use: "it was being masked and the sophistication of the labelling on the bottles etc. … it just blew that whole room away" (S1). Stakeholders also believed greater education about supplement use was required among parents and coaches who were frequently observed to provide these substances to adolescent athletes. In particular, stakeholders thought parents were a primary influencer of adolescent supplement use: "Parents … they want their kids to be the next best thing so what they are putting, or shoving, in their mouths, who knows! It might be multi-vits, but it might not be!" (S2). In light of the context in which stakeholders observed adolescent supplement use, participants agreed that education was a critical focus area to reduce SUDAA.

Minor theme 1.3: Education, discussion

These results show that stakeholders perceive education as a key focus area to reduce SUDAA. This outcome is consistent with a recent anti-doping standard which positions education as a key strategy to prevent doping (World Anti-Doping Agency, 2020b). Further, these findings reveal stakeholders perceptions that education is necessary for several audiences in adolescent sport, in addition to athletes. Mazanov et al. (2015) complemented these findings by suggesting that athletes have long been the sole focus of anti-doping education at the detriment of other audiences. Despite the perceived need for broad education, it is evident that anti-doping education is perceived to have insufficient reach in adolescent sport. These insufficiencies pose challenges for audiences who influence SUDAA to engage with anti-doping. These results contrast the current availability and accessibility of several anti-doping education

resources in NZ (Drug Free Sport New Zealand, 2020a). These findings are therefore consistent with previous research which revealed a lack of awareness among stakeholders about the provision of anti-doping education (Allen et al., 2017). This lack of awareness appears due to inadequate promotion of anti-doping education, and perceived relevance of SUDAA, in adolescent sporting communities. According to literature, these findings contrast the obligation of sports organisations to ensure anti-doping education is available throughout their membership (Patterson et al., 2016; World Anti-Doping Agency, 2015). Ultimately, these results show a need for greater awareness of, and engagement in, anti-doping education at all levels of the adolescent sporting environment to reduce SUDAA.

This evidence highlights a need for education, with all influential audiences, about the risks associated with adolescent supplement use. Stakeholders' specific focus on supplement related education contrasts traditional detection-deterrence based approaches which focus on the consequences of Anti-Doping Rule Violations[21] (deterrence) and doping control processes (detection) (Patterson et al., 2016; Patterson et al., 2019). These traditional approaches are suggested to be based on instances of doping (Patterson et al., 2016) which participants did not perceive as prevalent adolescent behaviours. Instead, this concentrated focus on supplement risk education is informed by stakeholders' frequent observations of consumption among adolescent athletes, as encouraged or instructed by support personnel.

Summary of Major theme 1: Focus areas

Major theme one has revealed the focus areas which stakeholders considered vital to reduce SUDAA. Stakeholders believed the culture of adolescent sport, the climates which underpinned this context, and accessibility to education in this environment were key focus areas to decrease SUDAA. Stakeholders also described a lack of organisational attention to anti-doping in the culture which underpinned adolescent sport. This lack of cultural emphasis on anti-doping was suggested to result in a lack of preventative initiatives which stakeholders believed had a negative influence on SUDAA. Stakeholders also associated increased risks of SUDAA with predominant ego-orientations in adolescent sport. It was in these climates that stakeholders were concerned adolescents would do what it took to enhance their performance, including SUDAA. Finally, stakeholders emphasised that education needed to be a focus area in adolescent sport if SUDAA were to reduce. To that end, stakeholders advocated for greater awareness of, and accessibility to, anti-doping education throughout the adolescent sporting community.

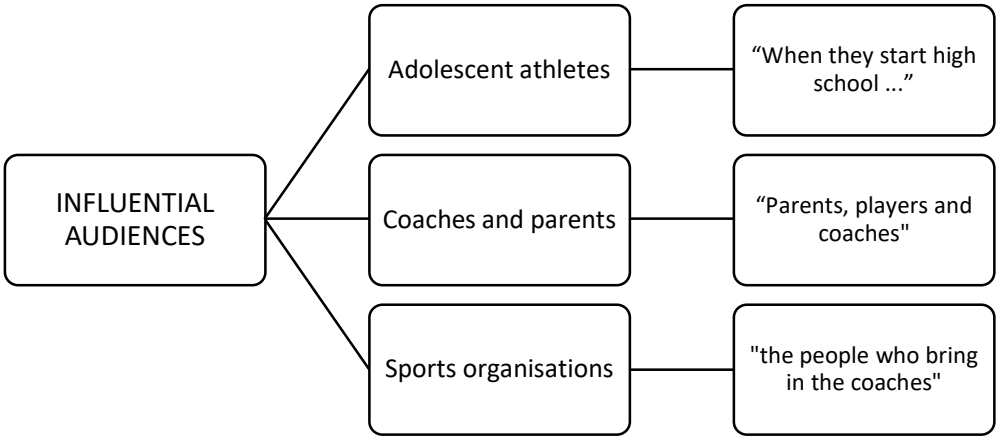
[21] A violation of one or more of the Sports Anti-Doping Rules. Drug Free Sport New Zealand. (2020f). *Sports Anti-Doping Rules.* https://drugfreesport.org.nz/uploads/site/resources/20191119_SADR_2020_FINAL_191119.pdf

7.6.2 Major theme 2: Influential audiences

Based on their experiences in adolescent sport, stakeholders revealed adolescent athletes, coaches, parents, and sports organisations as audiences who influence SUDAA. These influential audiences are displayed as minor themes in Figure 27, supported by stakeholder excerpts. In this section, the results for each minor theme are presented and then discussed in consideration of existing evidence. The major theme of Influential audiences will then be summarised.

Figure 27

Major theme, minor themes, and excerpt examples of Influential audiences



Minor theme 2.1: Adolescent athletes, results

Stakeholders agreed that adolescent athletes were a priority audience for initiatives to reduce SUDAA. Further, participants emphasised the need for preventative initiatives to reach adolescents before these behaviours began. Stakeholders therefore believed that efforts to prevent SUDAA should initiate: "When they start high school; parents and kids" (S3). As this stakeholder revealed, participants discussed the importance of parental involvement in the prevention of SUDAA during early adolescence. In exploring practical ways to reach adolescent athletes, stakeholders considered delivery in school contexts to be most efficient: "at that lower level but I think somewhere in that school space somehow, whether it is into the curriculum level as well" (S2). While schools were considered a useful environment to reduce SUDAA, stakeholders agreed there was high demand to access this audience: "Secondary schools are a challenging space, there is so much going on" (S3). As such, one stakeholder suggested that accessibility would depend on: "… working out where in that secondary school space and how to be effective getting in that door" (S2). Further, secondary schools were considered an important site for the prevention of SUDAA as some stakeholders believed these behaviours began in this environment: "It's also going back to the schools and having

that education in there because that's where it starts" (S1). Despite the acknowledged challenges to access school environments, stakeholders advocated this as a relevant and practical context for efforts to reduce SUDAA with adolescent audiences.

Minor theme 2.1: Adolescent athletes, discussion

These outcomes reveal a shared opinion among stakeholders that adolescent athletes should be considered a priority audience for the prevention of SUDAA. These results are consistent with WADA's recent identification of young athletes as a target audience for anti-doping education (World Anti-Doping Agency, 2020b). This evidence indicates a perceived need for initiatives to reduce SUDAA to reach athletes at earlier developmental stages than permitted by a traditional foci on elite level athletes (Patterson et al., 2016). These results also posit early adolescence as a viable stage for the prevention of SUDAA which is considered the least likely phase for these behaviours to have initiated. These insights are consistent with literature that has indicated adolescence to permit a unique opportunity to prevent SUDAA after which exposure to, and engagement in, these behaviours is anticipated to increase (Sarafino et al., 2008; Smith et al., 2018).

The evidence also suggests that specific developmental characteristics render early adolescence an opportune time to prevent SUDAA. These findings are consistent with a widespread view in literature that the attitude and value formation processes of adolescence make this a stage in which anti-doping initiatives may have a positive impact (Backhouse et al., 2009; Backhouse et al., 2012; Sarafino et al., 2008). This evidence also identifies adolescent developmental characteristics which make athletes vulnerable to external influences including social media, norms and others' behaviour. Vulnerabilities to these factors are concerning as their influence on the development of habitual substance use among adolescence may have long term implications (Farrington & Hawkins, 1991; Hawkins et al., 1992). These findings suggest that efforts to prevent the initiation, and thus habitual engagement, of SUDAA are required in NZ sport and may have greatest effect during early adolescence.

Minor theme 2.2: Coaches and parents, results

Stakeholders considered: "Parents, players and coaches" (S3) as audiences who were influential to SUDAA. Stakeholders also shared their concerns about the extent to which parents provision of supplements to adolescent athletes had become normalised: "parents at that stage are shoving s*#t into their mouths" (S2). While stakeholders agreed that parental influence decreased with age: "As kids grow too they don't want to listen to Mum and Dad" (S1), it was evident that their control over SUDAA remained: "the kids are happy to open their mouths while Mum and Dad pop a couple of pills in for them as they walk out the door … like,

'do you even know what your Mum just gave you?'" (S2). Stakeholders revealed a perceived legitimacy of adolescent supplement use among parents: "Everyone wants that quick fix for everything and that's probably one of the scenarios that the parents are jumping on as well" (S2). Stakeholders also anticipated that parents control of adolescent behaviour may hinder efforts to reduce SUDAA: "well hang on that's my kid and I know what's best for them" (S3), despite a perceived lack of knowledge about these behaviours, among this audience:

> *To be fair to parents, I don't think they have any idea. They are convinced they are doing the right thing but if they really knew, if they just had simple examples … it all becomes education (S1).*

Another stakeholder agreed and stated that: "Resistance is just because they are uneducated" (S3). Stakeholders also suggested that adolescents were vulnerable to the influence of their coaches, some of whom were perceived to influence SUDAA:

> *It is a dangerous time too [adolescence] … 13, 14 and those PE coaches that look 'really good'; those are the guys that are the really dangerous coaches as they can manipulate those kids really easily. They are very influential (S1).*

The extent of coach influence on SUDAA was a further concern of stakeholders who suggested that coaches provided adolescents with substances: "Sometimes it is those people they [athletes] are getting it from" (S6). Due to the role of some coaches in SUDAA, stakeholders agreed the effectiveness of efforts to prevent these behaviours may be challenged: "Some coaches don't value it [anti-doping] so much" (S6). Adolescents observations of supplement use by their coaches were a further concern of stakeholders who thought this exposure may thwart the prevention of SUDAA: "There are actually a number of coaches who use these supplements themselves … that might be a challenge" (S3).

Due to their perceived influence on SUDAA, stakeholders prioritised the involvement of coaches and parents in efforts to reduce these behaviours from the: "… development phase which basically aligns with secondary school" (S4). Stakeholders suggested that key messages to prevent SUDAA needed to be consistent by including: "… parents and the coaches, everyone in the same room, so it's the same story" (S2). Stakeholders agreed that "every coach doing a coaching qualification" (S6) should receive anti-doping education and thus engage in efforts to reduce SUDAA. It was noted however that not all codes or coaching disciplines had relevant frameworks in place which was an accepted barrier to engaging with parents and coaches.

Minor theme 2.2: Coaches and parents, discussion

These results show that parents and coaches have a direct influence on SUDAA, and supplement use in particular. Stakeholders described their frequent observations of parent, and to a lesser extent coach, directed supplement use among adolescents to enhance performance. As consistent with previous research (Gillet et al., 2010; Hodge et al., 2013), these findings reveal that controlling behaviours among support personnel, limit adolescents' opportunities to make volitional decisions about supplement use. As reflected in the concerns of stakeholders, previous research identified that autonomy controlling behaviours negatively influenced athletes doping susceptibility and attitudes toward this behaviour (Hodge et al., 2013; Patterson & Backhouse, 2018). The controlling behaviours identified in these results had a clear influence on supplement use however stakeholders anticipated this control to also pose adolescent doping risks. In contrast to these findings, Dunn and colleagues (2001) placed importance on adolescents being afforded opportunities to make informed decisions about their behaviour. Consistent with the views of Gillet et al. (2010), these results advocate for autonomy supportive coaching and parenting practices in adolescent sport. That is, to reduce the current salience of autonomy control on SUDAA, coaches and parents are encouraged to consider adolescent perspectives and enhance their exposure to opportunities to experience self-determination (Ntoumanis & Standage, 2009).

These findings also reveal a need for coaches and parents to acquire greater knowledge about the risks associated with adolescent supplement use. These results support literature which suggested that insufficient knowledge about SUDAA renders coaches and parents ill prepared to address these behaviours (Allen et al., 2017; Patterson & Backhouse, 2018; Sajber et al., 2013). Results from this study indicate that a lack of knowledge about SUDAA contributes to the encouragement of adolescent supplement use by coaches and parents. Despite stakeholder opinions that parents and coaches act with best intent, their direct influence on supplement use was considered to heighten the odds of SUDAA. These findings are consistent with previous research which found that coaches and parents were influential to increased willingness, intent, and attitudes toward doping among adolescent athletes (Dodge & Clarke, 2015; Garthe & Maughan, 2018; Morente-Sánchez & Zabala, 2013; Yager & O'Dea, 2014). Consistent with literature, this evidence shows a need to prioritise parents and coaches as an audience for the prevention of SUDAA (Blank et al., 2015; Erickson et al., 2017; Patterson et al., 2016). This evidence posits that tailored initiatives to reduce SUDAA are required among support personnel, namely coaches and parents. These results also suggest these efforts may have greatest effect if they increase awareness of the risks associated with these adolescent behaviours, and also to reduce the observed control of support personnel on supplement use.

Minor theme 2.3: Sports organisations, results

Stakeholders agreed that administrators in sports organisations were influential to SUDAA through their authority over support personnel in adolescent sport. Stakeholders specifically referenced the influential role of sports administrators who recruited coaches of adolescent sport: "I would include the administrators, the people who bring in the coaches. If you get the wrong eggs in that's where it comes in" (S6). This stakeholder also believed that efforts to reduce SUDAA may be nullified if an individual with a negative influence was recruited in this context: "It only needs to be one bad person" (S6). Additional to the recruitment of coaches, administrators were perceived to have a wide-reaching influence on the culture of adolescent sport and thus an important role in SUDAA:

> *they [athletes] are part of an environment, especially for youth, which is led further up the chain. It is the coach driving the culture … but then that stems from the administrator and who they employ as a coach. As they probably have similar values of 'we win at all costs, this is us' then they are going to employ a coach with that philosophy and then that coach is going to feed that to the athletes (S5).*

Despite their less direct influence on adolescent behaviours, stakeholders agreed that sports organisations were influential to the occurrence, and prevention, of SUDAA.

Minor theme 2.3, Sports organisations: discussion

This evidence reveals that stakeholders perceive administrators, and the sports organisations they represent, to influence SUDAA. These results also highlight the influence of organisational priorities on the culture of adolescent sport which currently lack focus on anti-doping. These outcomes contrast previous research which identified collaboration between sports organisations and coaches on practical solutions to prevent SUDAA (Patterson & Backhouse, 2018). Consistent with the views of Patterson et al. (2016), these results show that sports organisations have a role in reducing SUDAA by prioritising its prevention and leading an anti-doping stance throughout their community. These findings indicate however that it is first necessary to enhance awareness and recognition among sports organisations of their influence on these adolescent behaviours. From there, sports organisations can contribute to reducing SUDAA by reviewing their provision of initiatives to prevent these behaviours and their position on anti-doping. These findings also suggest that sports organisations should assess the extent of ego-orientation in their strategies for adolescent sport (i.e., coach recruitment), and thus their influence on SUDAA by way of performance priorities.

Summary of Major theme 2: Influential audiences

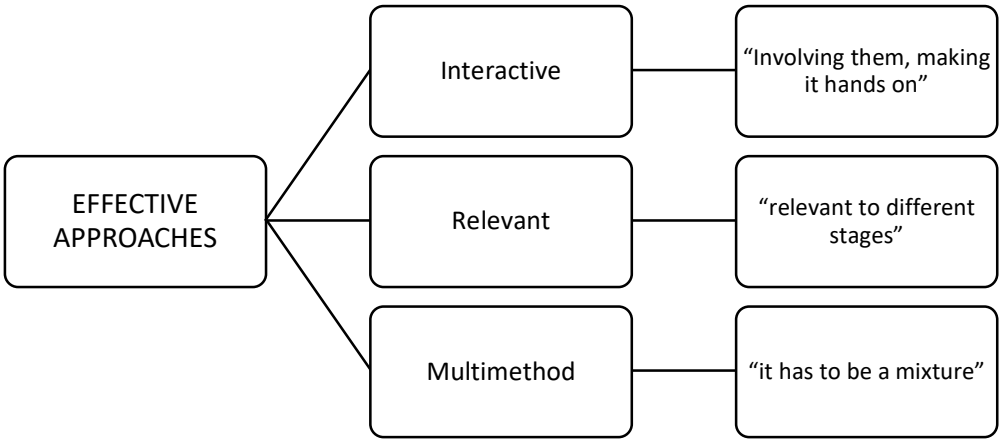
A key outcome of this study was the identification of audiences who stakeholders perceived were influential to SUDAA. As displayed in Figure 27, these audiences included adolescent athletes, coaches, parents, and sports organisations. Stakeholders believed that each audience had a specific influence on SUDAA and subsequently advocated for these cohorts to receive tailored initiatives to reduce these behaviours. These findings complement literature which emphasised the need to consider audiences which influence SUDAA in efforts to prevent its occurrence (Backhouse et al., 2009). Stakeholders also agreed that early adolescence is a viable developmental phase for the prevention of SUDAA. This evidence also posits coaches and parents as priority audiences for anti-doping education which stakeholders implored to focus on the risks associated with adolescent supplement use. These results emphasise a need for greater understanding among coaches, parents, and sports organisations of the influence of ego-orientations on SUDAA. Through enhanced awareness of their role in SUDAA, this study has shown that each influential audience should gain cognisance of how their practices and priorities can reduce, rather increase, these adolescent behaviours.

7.6.3 Major theme 3: Effective approaches

Stakeholders discussed the approaches they believed would effectively reduce SUDAA. These suggestions were based on factors which stakeholders perceived influential to these behaviours, in consideration of their experiential knowledge in adolescent sport. As shown in Figure 28, and discussed in this section, stakeholders identified that effective approaches to reduce SUDAA would be interactive, relevant, and use multiple methods. These effective approaches emerged as minor themes whose results are presented and discussed in the section which follows. This section then closes with a summary of this major theme.

Figure 28

Major theme, minor themes, and excerpt examples of Effective approaches



Minor theme 3.1: Interactive, results

Stakeholders agreed that interactive approaches would most effectively reduce SUDAA with adolescent athlete, parent and coach audiences. Among adolescent athletes, stakeholders believed that kinaesthetic activities would be an effective, interactive approach: "Involving them, making it hands on" (S2). One stakeholder compared the effectiveness of interactive approaches with the ineffectiveness of didactic methods among adolescent audiences: "We have had nutrition talks where the kids have looked at a screen and read but we have had nutrition talks with a table full of actually the product and they take it in, they do!" (S1). Stakeholders also felt that visual methods could effectively convey key messages to adolescent athletes: "We have started an infographic project, it's the only way our athletes read anything. We put some emojis on it" (S5). Another stakeholder explained this approach was effective because: "Kids are more visual … if they see something as pictures it's good because that's what they see these days. They don't really focus on a whole lot of lines and a whole lot of reading" (S1). Stakeholders also believed videos were an effective approach to ensure key messages had an impact among adolescent audiences: "Video which generally gets messages over quicker" (S3). Stakeholders also perceived storytelling as an effective, interactive approach among adolescents and suggested the value of individuals effected by SUDAA to share their experience:

> *I think an athlete who has actually been caught and take some of these kids through, and coaches but the story would change a little bit. Take the kids through actually this is what I did, and this is what happened, and this is what it did to my life … Even an athlete telling coaches their story, if they had a coach who pushed it on them, tell them that story (S2).*

With coach and parent audiences, stakeholders believed interactive group discussion would be an effective approach to address SUDAA:

> *I believe the conversation, in person, being able to ask the questions and have the conversation and hearing other people's questions may provide things you have not heard of that can provide a lot more value as opposed to online (S3).*

Similar to their views on effective approaches with adolescents, stakeholders believed videos could reduce SUDAA with coach and parent audiences by raising their awareness of these behaviours in practical contexts:

> *Perhaps a video could just get chucked up in front of people … a really common thing that could be a major … we find that really impactful if you just show that at the end of the evening, the parents will drive home thinking about, 's*%^ that's me!' (S4).*

Another stakeholder emphasised the effectiveness of concise and emotive approaches when interacting with coaches and parents: “very simple; it was very direct, and it was very shocking” (S1). In a personal context, stakeholders agreed that the effectiveness of interactive approaches were determined by the facilitator: “The quality of the practical is dependent on the quality of the person delivering it” (S4). However, it was acknowledged that impactful facilitators were difficult to source: “Delivery is really important; it can be hard though getting a good person to deliver” (S4). This stakeholder also revealed specific complexities in the topic of SUDAA for which an effective facilitator would need to be: “Someone who is confident enough to deliver that” (S4). A suggested remedy to these challenges, and to maintain effectiveness, was a collaborative approach which included a familiar facilitator with an informed expert:

> *I think it’s a combination of someone with the background and someone who is respected, like a mentor in the industry. You would get [name] to speak with someone so you would get someone who works with them every day and someone with more expertise (S6).*

Another stakeholder suggested that expertise would be important to heighten interaction among parents and coaches: “People who can provide evidence is probably where is it most impactful ... you can give some evidence to back up what you are talking about, you generally get more buy in” (S4). Varied stakeholder perspectives about the type of facilitator to enhance coach and parent interaction in reducing SUDAA reflected the nuances of their respective sporting contexts.

Minor theme 3.1: Interactive, discussion

These results show that stakeholders consider interaction as critical to the effectiveness of efforts to reduce SUDAA with adolescent athletes, coaches and parents. This evidence reveals three interactive approaches that stakeholders believe will effectively reduce these behaviours, with respective solutions for adolescent, coach and parent audiences. These findings indicate that kinaesthetic activities will most effectively reduce SUDAA with adolescent audiences through the development of personal skills which transfer to practical contexts. Among coaches and parents, interactive group discussion appears a viable method to enable peer learning about role specific practices to reduce SUDAA. These interactive approaches are consistent with literature which considered the development of practical life skills and group discussion as effective approaches to enhance engagement with doping prevention (Backhouse et al., 2009; Patterson et al., 2019).

These outcomes also suggest visual methods are effective means to increase interaction with adolescents, coaches and parents. Through the use of videos, icons and symbols, these results

suggest greater interaction and effectiveness may be obtained in efforts to SUDAA. According to stakeholders, the effectiveness of visual learning is heightened when content has clear associations to the practices and role(s) of athletes and support personnel. These findings also posit exposure to real life stories from individuals affected by SUDAA as an effective approach to reduce these behaviours with adolescent audiences. Further, these results show that coaches and parents may effectively interact with anti-doping through initiatives facilitated by experts in fields relevant to SUDAA. These outcomes are consistent with literature which advocated for educational initiatives to be practical, engaging and tailored to specific audiences (Backhouse et al., 2009; Patterson et al., 2019; Rodek et al., 2012). This evidence reveals that interactive and visual methods will reduce SUDAA to greatest effect with adolescent athletes, coaches and parents. These results also show that genuine accounts of those affected by SUDAA, and contributions from relevant experts, are interactive approaches anticipated to effectively reduce these behaviours.

Minor theme 3.2: Relevant, results

Stakeholders unanimously believed that effective approaches to reduce SUDAA needed clear relevance to the role of audience members in adolescent sport: "It's also about relevance" (S3). To increase the perceived relevancy of SUDAA among coaches and parents, stakeholders emphasised the need to use practical examples from sporting contexts. One participant provided an example of how this topic could be framed in a practical way: "They always used to have chocolate milk and I used to think it was pretty unhealthy and now they have protein! Situations like that where things can pop up that are relevant to different stages" (S4). Stakeholders agreed this example was an appropriate model which would increase the relevancy of efforts to reduce SUDAA. Further, stakeholders believed effective approaches to decrease these behaviours would provide skills and information which had relevance to focus areas and practices in adolescent sport:

> *The positive side of education as well, long term health benefits; do you know that this actually does to organs of the body? How can you get that from food? What does that equal? Trying to give them some positive scenarios so that you are educating them with what else to do (S2).*

Stakeholders engaged in lengthy discussion about increasing the perceived relevance of SUDAA in adolescent sport by embedding anti-doping content into existing frameworks: "they have to do their module dependent on the level they are at … doesn't matter if it is mum, dad, volunteer coach whoever, it applies to them … " (S4). This stakeholder reflected on a recent programme they had engaged in through their sport and thought the approach used had viability for alignment with anti-doping content: "they have a really good police checking

system that happens for every coach around the country so for me, this should come secondary to police checking" (S4). In light of the importance which this, and other, stakeholder(s) placed on anti-doping, their disappointment that initiatives to reduce SUDAA were not yet considered relevant in their practical environment was evident. One stakeholder stressed the importance of community wide access to anti-doping initiatives: "Getting that out into the wider environment would be amazing … We are just so far behind" (S1). In comparison to adolescent sporting contexts in other countries, stakeholders expressed their surprise that efforts to prevent SUDAA were lacking in NZ: "I am shocked that there wouldn't be something like that here" (S6) as it was considered to: "Leaves everything pretty open" (S3). These results indicate that relevancy is key to effectively reducing SUDAA through means that target audiences can apply in their practical context. These results also show the important role of anti-doping initiatives to heighten the relevancy of SUDAA in this environment, from which effective prevention can occur.

Minor theme 3.2: Relevant, discussion

These results indicate that SUDAA needs to be considered a relevant issue in adolescent sport to obtain engagement, and then effectiveness, in efforts to reduce these behaviours. These findings are consistent with literature which claimed that unless SUDAA is deemed contextually relevant, individuals are unlikely to perceive a need to engage in their prevention (Lara-Bercial et al., 2017; Moston et al., 2015; Patterson & Backhouse, 2018). Similarly, this evidence shows that SUDAA may be reduced with greater effect if preventative initiatives have clear relevance to recipients' sporting practices. These findings complement literature which has advocated for anti-doping efforts to include knowledge and practical skills of relevance to target audiences (Patterson et al., 2019). Additional to increased interaction, the effectiveness of relevance based approaches to reduce SUDAA have been established in previous research. For example, studies show that the development of practical life skills, and the provision of healthy alternatives to enhance performance, can prevent adolescent doping (Barkoukis et al., 2013; Gatterer et al., 2019). While literature has explained that adults are oriented toward relevancy (Knowles et al., 2011), these results propose that contextually relevant approaches to reduce SUDAA may also have a positive effect with adolescent athletes.

These findings show that a lack of attention paid to the prevention of SUDAA in adolescent sport is influential to a perception that these behaviours are contextually irrelevant. This evidence contrasts previous research which identified anti-doping as inherent in the philosophies which underpin initiatives for athletes and coaches in their sporting contexts (Allen et al., 2017; Patterson & Backhouse, 2018). Aligned to previous approaches, these results suggest that SUDAA will gain greater relevancy in adolescent sport if initiatives to

reduce these behaviours are embedded in existing frameworks (e.g., coaching qualifications). These stakeholder views are consistent with literature which recommended embedded approaches as effective means to obtain greater anti-doping awareness and engagement (Patterson et al., 2016; Patterson et al., 2019). With further convergence to literature, this evidence suggests that online learning is not an effective means to prevent doping with adolescents when used in isolation (Backhouse et al., 2009; Singler & Treutlein, 2010). In contrast, these findings emphasise the practical benefits of online education to enhance the relevancy of SUDAA by embedding preventative content in existing frameworks for coaches and parents. Alongside increased relevancy, these results suggest this approach will reduce accessibility challenges for coaches and parents, and thus increase engagement in anti-doping.

Minor theme 3.3: Multimethod, results

Stakeholders unanimously agreed that an isolated approach would ineffectively reduce SUDAA: "It is really hard to make one thing go; it has to be a mixture" (S1). In these results, stakeholders differentiated between primary methods to reduce SUDAA (minor theme 3.1) and secondary methods that are discussed in this section. Stakeholders considered primary methods as formal and comprehensive (i.e., interactive workshops) and, by comparison, saw a place for secondary methods to normalise the reduction of SUDAA in wider sporting communities. One stakeholder suggested broad approaches were required to enhance the collective impact of primary and secondary efforts to reduce SUDAA: "There has to be something that is across the board of all of this that kind of brings it all together … TV campaigns, or social media ads, a countermeasure" (S3). In agreement, another stakeholder suggested that social media permitted engagement with a wide audience. This participant also advocated for positive approaches to reduce SUDAA, as opposed to use of a negative lens:

> *Social media is a massive player … If you could develop something that fed more positive stuff through social media than all that body imagery; for every body image post, there was another that follows … to show this body isn't real, that was photoshopped, you don't need supplements (S2).*

While stakeholders did not consider isolated use of online education as an effective method to reduce SUDAA with adolescents, they did consider it suitable in a multimethod approach. Several stakeholders identified the use of similar blended approaches in their sporting frameworks: "We have both … there is an online component and practical components" (S4). Based on their experiences with like approaches, stakeholders agreed that multimethod techniques provided a practical means to expose influential audiences to repetitive and consistent messaging to reduce SUDAA: "They have got to constantly keep hearing these messages…" (S2). Stakeholders unanimously agreed that a multimethod approach, comprised

of audience specific and community wide initiatives, would have a positive effect on reducing SUDAA.

Minor theme 3.3: Multimethod, discussion

A key finding of this study is that isolated approaches will ineffectively reduce SUDAA. As consistent with existing views, this evidence reveals that a multimethod approach will have greatest impact on preventing these behaviours (Gatterer et al., 2019; Patterson et al., 2016; Patterson et al., 2019). Aligned to stakeholders' expectations, previous research found that multimethod approaches established anti-doping cultures which had a positive effect on the prevention of adolescent doping (Codella et al., 2019; Goldberg & Elliot, 2005). As complemented by the views of Patterson et al. (2016) and existing evidence, a multimethod approach appears the most suitable means to engage audiences who influence SUDAA, in the prevention of these behaviours.

In addition to targeting the audiences which directly influence SUDAA, these results show that community wide efforts to normalise anti-doping may assist to reduce these behaviours. These results are consistent with tenets of the Social Norms Approach which aims to establish desired norms, and challenge undesired norms, in specific communities (Berkowitz, 2004). These results indicate that social tools (i.e., social media) may establish and promote anti-doping norms in adolescent sport. The viability of these suggestions are supported by existing evidence which substantiated the effectiveness of a Social Norms Approach to reduce adolescent substance use (Chou et al., 1998; Ntoumanis et al., 2014; Wiefferink et al., 2008). In consideration of their previous effectiveness, a Social Norms Approach appears a suitable means to reduce SUDAA by way of anti-doping norms which reach widely throughout NZ sport.

Summary of Major theme 3: Effective approaches

Stakeholder perspectives on effective approaches to reduce SUDAA have revealed that interactive, relevant and multimethod techniques are required. Due to the unique characteristics of each audience found to influence SUDAA, these results have identified approaches which stakeholders perceived would effectively reduce these behaviours with adolescents, coaches and parents. Despite sports organisations being identified as influential to SUDAA, stakeholders did not indicate approaches to reduce these behaviours with this audience. As such, effective approaches to reduce SUDAA in sports organisations remains an area for further research. A key outcome of this study is that multimethod approaches will most effectively reduce SUDAA in the practical context of adolescent sport. This evidence has shown that multimethod approaches are necessary to maximise the reach and contextual relevance of efforts to reduce SUDAA in ways that elicit audience specific interaction. The

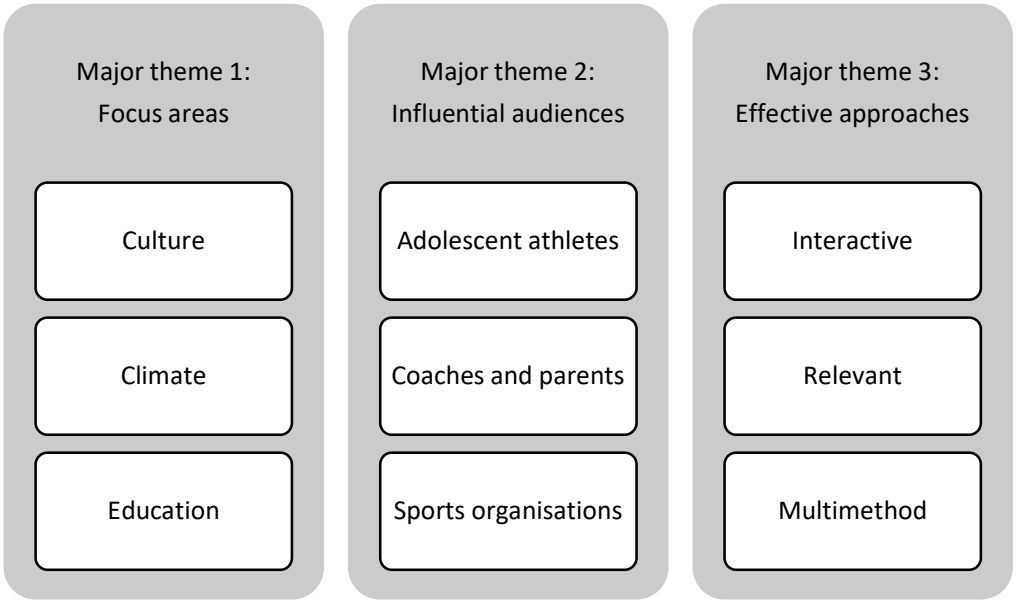
effective approaches discussed in this section have outlined practical solutions to reduce SUDAA in adolescent sport which are considered in the practical recommendations of this thesis (chapter 9).

7.7 Chapter summary

This chapter has responded to RQ3 by obtaining stakeholder perspectives on practical solutions to reduce SUDAA in NZ sporting contexts. Evidence presented in this chapter has advanced understanding of factors which influence these behaviours and has revealed the audiences who stakeholders believe should be involved in the prevention of SUDAA. As presented in Figure 29, stakeholders revealed three major themes, and nine minor themes, as critical elements of outcome-oriented solutions to reduce these adolescent behaviours.

Figure 29

Major and minor themes of study three



As shown in Figure 29, stakeholders perceived that focus areas to reduce SUDAA should include the culture of adolescent sport, the climates which underpin this context, and accessibility to anti-doping education. Stakeholders also revealed the audiences they believed most influential to SUDAA including adolescent athletes, coaches, parents and sports organisations. Due to their perceived influence on SUDAA, these audiences were prioritised as recipients of tailored efforts to reduce these behaviours. The evidence presented in this chapter also revealed that stakeholders believed effective approaches to reduce SUDAA should be underpinned by interaction, relevance and multimethod techniques.

The findings presented in this chapter enhance existing knowledge of factors and audiences which influence SUDAA. Aligned to the pragmatic aims of this thesis, these findings also revealed outcome-oriented solutions to reduce SUDAA based on the experiential knowledge of stakeholders from adolescent sporting contexts. This evidence contributes to knowledge in the field by identifying sports organisations, and their administrators, as influential to these adolescent behaviours. This chapter is followed by the conclusion of this thesis (chapter 8) where evidence from this study is integrated with the outcomes of preceding research components. Inferences made from these integrated data inform practical recommendations to reduce SUDAA in NZ sporting contexts which are presented in chapter nine.

7.7.1 Practical implications

The previously unheard voices of stakeholders from adolescent sporting contexts have provided deep and contextual explanations to extant knowledge of factors which influence SUDAA. Stakeholder perspectives also informed several practical implications to reduce these behaviours which are presented in this section, guided by an existing problem solving framework (Guyer, 1998).

Multiple approaches to reduce SUDAA

This study reveals that varied approaches are required to effectively reduce SUDAA. The outcomes of this inquiry show that multiple approaches are necessary to provide members of the adolescent sporting community with greater access to initiatives which seek to reduce these behaviours. These findings have implications for the organisations and personnel who develop anti-doping initiatives. Specifically, these findings suggest that the content, budget and promotion of anti-doping approaches should consider the diverse needs of the audiences who influence SUDAA. These considerations are likely to require additional fiscal contributions and expertise than accommodated in traditional education programmes thus may be determined by organisational constraints and affordances.

Multiple audiences to reduce SUDAA

This evidence shows the influence of adolescent athletes, coaches, parents, and sports organisations on SUDAA. These findings have implications for audiences whose recognition of their influence on SUDAA is an important component of reducing their impact on these behaviours. These audiences should also be prioritised as recipients of anti-doping initiatives, therefore governing bodies must consider how their organisational strategies contribute to reducing SUDAA with each cohort. Key considerations to reduce SUDAA with each influential audience are provided below.

Adolescent athletes

These results have implications for adolescent athletes whose engagement in initiatives to reduce SUDAA should begin early. These findings also have implications for those who develop and deliver initiatives to reduce SUDAA with adolescent audiences. This evidence suggests that efforts to reduce SUDAA among adolescent athletes should be developmentally appropriate and use kinaesthetic, visual and narrative methods.

Coaches and parents

This evidence has implications for those who develop initiatives to reduce SUDAA among coaches and parents. These results indicate that SUDAA will be reduced most effectively through the engagement of coaches and parents in interactive peer discussion, videos, and with contributions from subject matter experts. These initiatives should emphasise the relevance of SUDAA to coach and parent roles in adolescent sport and would obtain greatest reach when embedded in existing frameworks.

Sports organisations

These findings have implications for sports organisations who should seek practical ways to prioritise the prevention of SUDAA in all aspects of their work. For example, the evidence suggests a specific area of focus for sports organisations should be to review their strategic priorities in the recruitment of coaches for adolescent sport. Sports organisations should also remain cognisant of opportunities to embed anti-doping content in existing frameworks to reach widely throughout their membership.

Responsibility for SUDAA

As SUDAA has been established as a relevant issue in adolescent sport, these outcomes show that proactive and collective efforts are required to reduce these behaviours. This study reveals however that stakeholders perceive a lack of guidance about SUDAA in this environment. Given their influence and reach to relevant populations, sports organisations are in a unique position to establish anti-doping norms and to provide guidance to reduce SUDAA in practical contexts.

Chapter 8 Conclusion

8.1 Chapter introduction

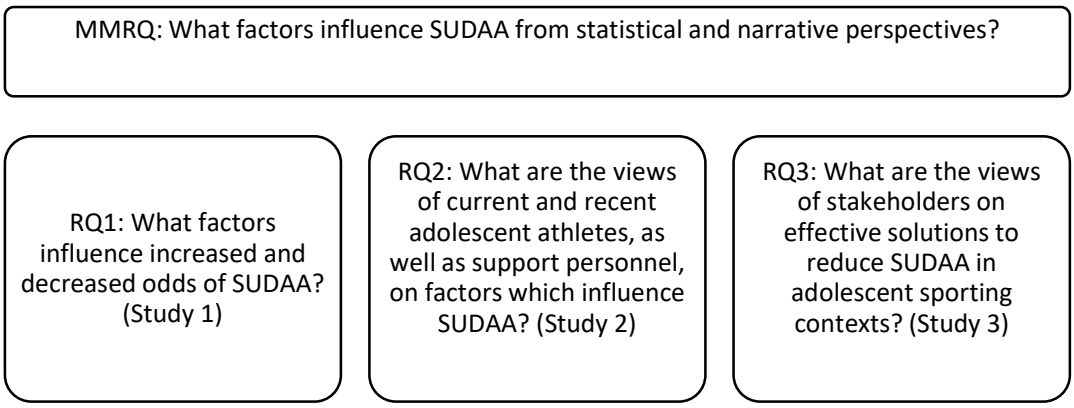
This chapter concludes this thesis and identifies factors which influence supplement use and doping among adolescent athletes (SUDAA) in NZ sporting contexts. This chapter is presented in three sections. First, this thesis is summarised in consideration of its aims and research questions (RQs) before integrated evidence from each component of research is described. Second, interpretations drawn from the integrated data are presented through a socio-ecological perspective which identifies audiences and factors which influence SUDAA. The second section of this chapter also discusses six meta-themes which increase and decrease the odds of SUDAA. The third section of this chapter identifies the contributions that this thesis makes to existing knowledge. This final section also reveals the strengths and limitations of this thesis, provides the researcher's retrospective reflection of this academic journey and outlines directions for future research. This chapter closes with concluding statements of this thesis. Owing to the sequential nature and pragmatic philosophical position of this thesis, the conclusions presented in this chapter inform practical recommendations to reduce SUDAA which are provided in chapter nine.

8.2 Thesis summary

This thesis set out to investigate factors which influence SUDAA in NZ sporting contexts. To generate a comprehensive understanding of these factors, an explanatory, sequential MMR design was implemented. A second aim of this thesis was to identify outcome-oriented solutions to reduce SUDAA in the context of adolescent sport. Underpinned by a pragmatic philosophical position, and a contextually grounded approach, this thesis was guided by the RQs introduced in chapter two and restated in Figure 30.

Figure 30

MMR questions



Note. MMRQ = Mixed Methods Research Question. RQ = Research Question. SUDAA = Supplement use and doping among adolescent athletes.

Restated from Figure 3.

The MMRQ which guided this pragmatic thesis has been answered through the integrated evidence presented in this chapter. RQ1 was answered in chapters three and four through the conduct and analysis of a nationwide, quantitative study (study 1). This initial study captured the views of adolescent athletes about factors which influence SUDAA. RQ2 was responded to in chapter five through a qualitative investigation of the perspectives of current and recent adolescent athletes, as well as support personnel, on factors which influence SUDAA (study 2). Due to the explanatory and sequential nature of this thesis, the outcomes of study two added a greater depth of explanation to quantitative evidence from study one. A comprehensive process of methodological triangulation was conducted to integrate the evidence obtained in studies one and two. These interpretations were presented in chapter six and informed the design of study three which is detailed in chapter seven. To respond to RQ3, study three obtained the perspectives of stakeholders from adolescent sporting contexts. Stakeholder views extended previous understanding of factors which influence SUDAA and identified practical solutions to reduce these behaviours.

In response to the MMRQ of this thesis, evidence from each study was integrated through methodological triangulation (Denzin, 1978; O'Cathain et al., 2010; Tashakkori & Teddlie, 2003). As introduced in chapter six, methodological triangulation was the most appropriate approach to merge data from core and supplementary research components in this thesis due to its unparalleled suitability for these means in MMR (Honorene, 2017; O'Cathain et al., 2010; Tashakkori & Teddlie, 2003). To draw inferences from these triangulated data, joint displays were used to merge the inferences made in chapter six (based on data from study 1 and 2),

with stakeholder perspectives from chapter seven (study 3). These merged data were considered alongside literature reviewed in chapter one and reflective field notes recorded throughout this thesis. The joint display of integrated quantitative and qualitative data permitted convergence, divergence, complementarity and silence to be discovered (Guetterman et al., 2015; Heale & Forbes, 2013; Schoonenboom & Johnson, 2017). The use of joint displays also enhanced credibility in this data integration process and thus, in the quality of inferences drawn (Fetters et al., 2013; Guetterman et al., 2015). The researcher also had familiarity and confidence with integrating data using joint displays which enhanced integration efficiencies and inference quality in this chapter.

8.2.1 Factors which influence SUDAA

A key interpretation from the integrated evidence revealed that SUDAA is influenced by interconnected factors and audiences in the adolescent sporting environment. This thesis has identified factors which influence SUDAA at intrapersonal, interpersonal, and cultural levels of this nuanced context. The interconnected factors found to influence SUDAA corroborate previous claims that doping is a complex and convoluted issue (Erickson et al., 2015; Hauw & McNamee, 2015; Lazuras et al., 2015). Further, these finding complement an existing view that there are: "… many pieces in the puzzle of doping behaviour" (Barkoukis et al., 2013, p. e339).

The identified interconnection between multiple factors which influence SUDAA extend knowledge drawn from previous research which has predominantly focused on isolated factors. The narrow views afforded by previous inquiry have been criticised for providing partial explanations of doping behaviour (Barkoukis et al., 2011; Johnson, 2011). Further, investigations of the influence of isolated factors on SUDAA have translated to preventative initiatives which address these behaviours at an athlete level. Key outcomes of this thesis contrast former athlete-centric perspectives about the occurrence and prevention of SUDAA. Instead, these findings contribute to knowledge by identifying intrapersonal, interpersonal, and cultural level factors which influence these adolescent behaviours.

Through a pragmatic lens, this thesis shows the importance of understanding the interconnected factors and audiences that effect SUDAA to reduce their influence and thus reduce these behaviours. In contrast to an historic focus on isolated factors, inferences from the evidence integrated at the conclusion of this thesis informed a socio-ecological perspective of factors which influence SUDAA (Figure 31). As discussed in this chapter, a socio-ecological perspective provides a contextually grounded and pragmatic view of interactions between factors that directly and indirectly influence SUDAA at all levels of adolescent sport. Owing to

the pragmatic nature of this MMR design, the knowledge generated through this perspective informs practical recommendations to reduce SUDAA as presented in chapter nine.

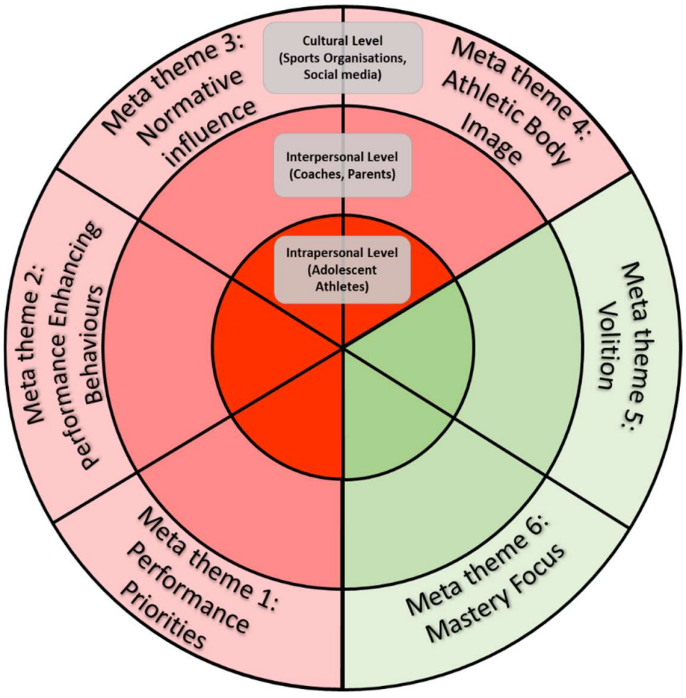
8.2.2 Socio-ecological perspective of factors which influence SUDAA

Owing to the pragmatic aims of this thesis, the interconnected factors identified to influence SUDAA at varied levels of NZ sporting contexts are considered from a socio-ecological perspective (Figure 31). Bronfenbrenner's (1977) Socio-Ecological Model provides a suitable framework to consider factors which relate to individual behaviour, at multiple levels of an environment. Further, this framework affords an opportunity to observe complex and omnidirectional interactions between influential factors in a specific context (Rowe et al., 2013; Sallis et al., 2008). Akin to the aims of pragmatic inquiry, socio-ecological views provide a holistic lens through which a contextually driven understanding of influential factors can emerge within an environment (DiClemente et al., 2005; Giles-Corti, 2006; Lounsbury & Mitchell, 2009). Thus, it is through holistic and contextual knowledge enabled by a socio-ecological perspective that pragmatic solutions for real-world issues can be informed, as sought in the aims of this thesis.

At an individual level, a socio-ecological perspective is relevant to adolescents in NZ due to their use in existing curricula. In the educational domain, socio-ecological views have been used with the intent to heighten adolescents' awareness and criticality of factors which influence their perceptions, observations and experiences (Te Kete Ipurangi, n.d.). It is therefore suitable that a socio-ecological perspective displays factors which influence SUDAA in Figure 31, as detailed in the following section. This figure reveals audiences which influence SUDAA at intrapersonal, interpersonal, and cultural levels of adolescent sport. Figure 31 also shows the six meta-themes influential to increased and decreased odds of SUDAA. The audiences and meta-themes revealed to influence SUDAA through this socio-ecological perspective are discussed following the presentation of Figure 31.

Figure 31

Socio-ecological perspective of factors which influence SUDAA



Note. Red meta-themes influence increased SUDAA, green meta-themes influence decreased SUDAA. Informed by Bronfenbrenner's (1977) definitions of the socio-ecology of human development.

Introduction of the socio-ecological perspective of factors which influence SUDAA

The socio-ecological perspective presented in Figure 31 reveals factors and audiences which influence SUDAA at three levels of the adolescent sporting environment. Figure 31 also illustrates six meta-themes which influence increased (red) and decreased (green) SUDAA. This socio-ecological perspective is described in the section which follows with reference to the meta-themes, and interconnected audiences, that influence SUDAA. These meta-themes are also discussed throughout this section in consideration of relevant literature.

Description

The socio-ecological perspective of factors which influence SUDAA (Figure 31) displays three circles which delineate multiple levels of the adolescent sporting environment. Factors and audiences identified to influence SUDAA at each level of this context are also presented. Adolescent athletes are situated in the centre circle as an isolated audience which influences SUDAA at an intrapersonal level. The interpersonal level is presented in the second circle of Figure 31 to show that coaches and parents have a direct influence on SUDAA. The distal circle in this figure reveals that sports organisations and social media have direct and indirect influences on SUDAA at the cultural level of adolescent sport.

In Figure 31, the circles which define the intrapersonal, interpersonal and cultural levels of this research context are intersected by six meta-themes which influence SUDAA. The meta-themes influential to increased SUDAA include performance priorities (meta-theme 1), performance enhancing behaviours (meta-theme 2), normative influence (meta-theme 3) and athletic body image (meta-theme 4). Each of these meta-themes are coloured red to illustrate their negative influence on increased SUDAA. These meta-themes are briefly defined in Table 35 and explored throughout this chapter in consideration of their respective influence on SUDAA. The intersections between these meta-themes and audiences indicate how their interactions influence adolescent behaviours in adolescent sporting contexts. For example, confidence sourced through winning was an intrapersonal level factor which influenced increased SUDAA and as such, is illustrated in the centre circle of meta-theme one (Figure 31).

Figure 31 also shows the meta-themes which decrease SUDAA including volition (meta-theme 5) and mastery focus (meta-theme 6). These meta-themes are coloured green to reflect their positive influence on decreased SUDAA as outlined in Table 35 and discussed throughout this chapter. The factors and audiences identified to reduce SUDAA, and the levels at which they reside in adolescent sport, are explained by meta-theme in this section. For example, a lack of performance pressure decreased SUDAA in mastery-oriented climates. As this evidence pertains to sporting climates established by coaches and parents, this influential factor is discussed regarding meta-theme six where it is displayed at the interpersonal level (Figure 31).

Table 35

Thesis meta-themes and brief descriptions

Meta-theme	Title	Description
1.	Performance priorities	A central focus on winning and outcome-oriented priorities in adolescent sport.
2.	Performance enhancing behaviours	Adolescents' use of supplements and doping for the purposes of enhancing performance.
3.	Normative influence	Norms which surround adolescent athletes and influence their views and behaviours regarding SUDAA.
4.	Athletic body image	The appearance that adolescents associate with athletes.
5.	Volition	Adolescents' perceived ability, and opportunities, to make willing choices about their behaviour (Bandura, 1977).
6.	Mastery focus	A central focus on development and improvement as priorities in adolescent sport.

Note. SUDAA = Supplement use and doping among adolescent athletes.

Audiences which influence SUDAA

A key outcome of this thesis is the identification of audiences which influence SUDAA at varied levels of the adolescent sporting environment. As shown in Figure 31, adolescent athletes,

coaches, parents (as athlete support personnel) and sports organisations have respective influences on these adolescent behaviours. As detailed further in this section, cultural level audiences (i.e., sports organisations) predominantly have a direct influence on parents and coaches (interpersonal level) and an indirect influence on adolescent athletes (intrapersonal level). Further, parents and coaches (interpersonal level) have a direct influence on SUDAA at the intrapersonal level.

Intrapersonal level: Adolescent athletes

The outcomes of this thesis place adolescent athletes at the centre of their sporting context and as the proximal audience regarding SUDAA (Figure 31). As discussed in this section, this thesis reveals that intrapersonal level factors are influential to increased (e.g., meta-theme 3) or decreased (e.g., meta-theme 5) SUDAA. The evidence also shows that the impact of these influential factors are associated with specific vulnerabilities and developmental characteristics of adolescence. For example, meta-theme four shows that adolescents prioritise, and source confidence from, an athletic body image. These findings are consistent with literature which has suggested that adolescent egocentrism, and a focus on self-presentation, are developmental characteristics which have influenced adolescent substance use (Backhouse et al., 2015; Berger, 2017; Kanayama et al., 2008). This thesis also shows that developmental characteristics may heighten adolescents' vulnerability to interpersonal and cultural level influences. Another example from meta-theme four reveals that subjective and descriptive norms have a direct, interpersonal level influence on increased SUDAA. These outcomes are consistent with literature which considered adolescents vulnerable to the influence of social norms (Grootens-Wiegers et al., 2017). This developmental literature complemented existing evidence in the field which found that adolescents were vulnerable to norms which supported doping (Backhouse et al., 2015; Dodge & Jaccard, 2008).

From an outcome-oriented perspective, these findings highlight a need to consider adolescent developmental characteristics to reduce SUDAA. Specifically, the malleability afforded by aspects of adolescent development have been attributed to the viability of doping prevention during this stage (Cieciuch et al., 2016; Smith et al., 2018; Woolf & Swain, 2014). It is also anticipated that the effectiveness of doping prevention during adolescence may provide enduring benefits through the early establishment of an anti-doping orientation. Consistent with existing views, and owing to development characteristics, this thesis reveals that efforts to prevent SUDAA may have greatest effect if initiated before the age of 13 years. These findings are complemented by a predominant view in literature advocates for adolescents to be considered a target audience for doping prevention from early in their athletic pathway (Backhouse et al., 2012; Morente-Sánchez & Zabala, 2013; World Anti-Doping Agency, 2020b).

Interpersonal level: Coaches and parents

The outcomes of this thesis show that coaches and parents have a direct influence on SUDAA across all meta-themes presented in Figure 31. For example, meta-theme one (performance priorities) shows that coaches have a direct influence on the extent of performance pressure experienced by adolescent athletes. In turn, coach and parent priorities on winning in ego-oriented climates directly influence increased odds of SUDAA. In contrast, meta-theme six (mastery focus) shows that coaches' focus on skill development and improvement has a direct influence on a lack of performance pressure at the intrapersonal level which reduces the odds of SUDAA. These outcomes show the direct influence of coaches and parents on adolescents' increased or decreased odds of supplement use or doping.

From a pragmatic perspective, these results highlight a need for coaches and parents to be prioritised as target audiences for efforts to reduce SUDAA, as recently advocated by WADA (World Anti-Doping Agency, 2020b). While this thesis similarly prioritises coaches and parents as target audiences for the prevention of SUDAA, the rationale for doing so contrasts that provided in literature. Moreover, WADA identified support personnel as a target audience for anti-doping education due to their role to "educate and counsel" (p. 19) individuals of their responsibilities to anti-doping (World Anti-Doping Agency, 2020b). Comparatively, this thesis suggests that coaches and parents are priority audiences for the prevention of SUDAA due to their direct influence and control of these behaviours. For example, coaches and parents have a direct influence on increased SUDAA through performance priorities (meta-theme 1) and performance enhancing behaviours (meta-theme 2). Further, coaches and parents have a direct influence on reduced SUDAA through the provision of opportunities for adolescents to experience volition (meta-theme 5), and through their mastery focus in adolescent sport (meta-theme 6). These findings offer a new perspective to previous reasons for the inclusion of coaches and parents in anti-doping. This evidence also highlights a need to understand the nature of coach and parent influence on SUDAA (e.g., increased or decreased) to inform effective preventative measures.

The socio-ecological perspective of factors which influence SUDAA provides further insights to these adolescent behaviours by identifying cultural level factors which directly shape the priorities and actions of coaches and parents in sporting contexts. Through this direct influence, cultural level factors have an indirect impact on adolescent athletes (intrapersonal level). For example, meta-theme one shows that the performance priorities of sports organisations (cultural level) have a direct influence on coach and parent-led, ego-orientations and winning priorities (interpersonal level). Through their direct influence on coaches and parents, the priorities of sports organisations indirectly influence adolescent doping

consideration in response to perceived performance pressure. These findings suggest it is necessary that efforts to reduce SUDAA heighten awareness among coaches and parents of their direct influence on these behaviours. Further, it is prudent that coaches and parents gain greater knowledge of the cultural level factors which influence their priorities and behaviours in adolescent sport.

Cultural level: Sports organisations

A noteworthy outcome of this thesis was the identified influence of sports organisations on SUDAA. As shown in Figure 31, sports organisations reside at the cultural level of adolescent sport. It is from the cultural level that sports organisations influence SUDAA through performance priorities (meta-theme 1), performance enhancing behaviours (meta-theme 2) and mastery focus (meta-theme 6). This thesis reveals that the orientation of focus areas and strategic priorities in sports organisations influence increased or decreased odds of SUDAA.

This thesis also shows the direct influence of sports organisations on parents and coaches (interpersonal level) and therefore their indirect effect on SUDAA (intrapersonal level). For example, meta-theme one reveals a lack of organisational guidelines regarding SUDAA in a high trust environment. This cultural level influence has a direct influence on coach and parent directives for adolescents to use supplements to enhance performance (meta-theme 2). These findings are consistent with literature which claimed that cultural level influences can dictate the constraints, opportunities and behaviours of specific populations (DiClemente et al., 2009). In sum, these findings show that sports organisations have an indirect influence on SUDAA in NZ sporting contexts.

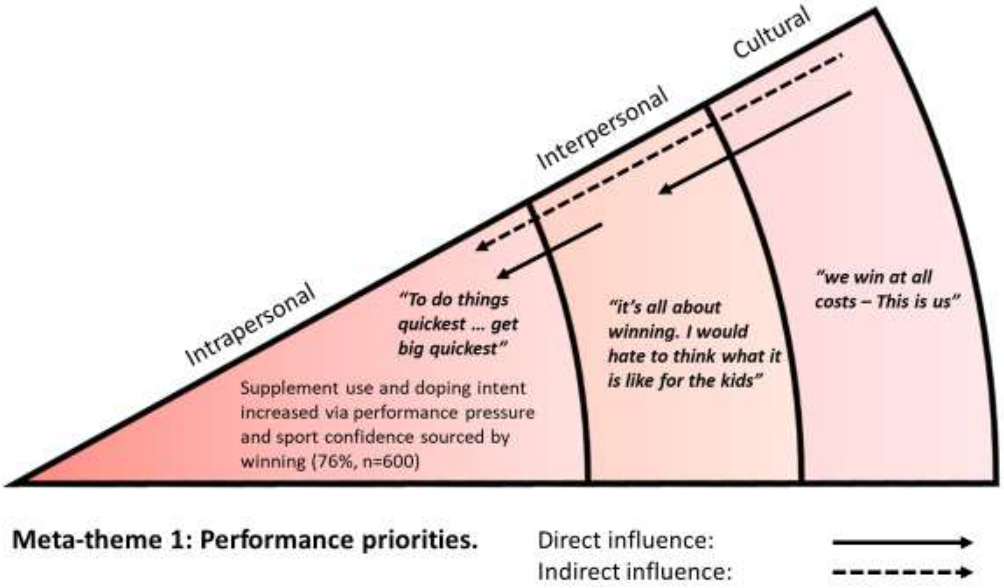
Meta-theme one shows the direct influence of organisational performance priorities (cultural level) on ego-oriented motivational climates and performance expectations among coaches and parents (interpersonal level). Also revealed in meta-theme one is the indirect influence of cultural level priorities on SUDAA (intrapersonal level), through their direct impact on coaches and parents (interpersonal level). In contrast, meta-theme six shows that sports organisations have an indirect influence on reducing SUDAA when focused on mastery. This cultural level influence affords coaches and parents the freedom to establish a motivational climate in which adolescents can source confidence through mastery. These results have important implications for SUDAA which appears to reduce when adolescents source confidence through skill development and improvement. This evidence reveals the effect of sports organisations on increased or decreased SUDAA through their direct influence on coaches and parents, and their indirect influence on adolescent athletes. These outcomes highlight the need for sports organisations to be considered a target audience of efforts to reduce SUDAA.

Meta-theme 1: Performance priorities

Interconnections between factors and audiences indicate that adolescents' exposure to performance priorities at any level of their sporting context may influence increased SUDAA. The interconnections between factors and audiences which influence performance priorities, and increased SUDAA, are displayed in Figure 32 and discussed in this section.

Figure 32

Meta-theme 1: Performance priorities



Note. Meta-theme one is coloured red as performance priorities increase the odds of SUDAA.

As shown in Figure 32, sports organisations influence performance priorities at all levels of adolescent sport. This thesis reveals that cultural level priorities are established by sports organisations when their strategies for adolescent sport are oriented toward performance. As detailed in Figure 32, performance priorities in sports organisations have a direct influence on coaches and parents, and an indirect influence on increased SUDAA.

The direct influence of sports organisations on coaches and parents were evident in coach led, ego-oriented motivational climates and parent driven performance expectations. In this context, parent and coach priorities on winning and outperforming others have a direct influence on increased SUDAA. These outcomes complement previous research which identified associations between adolescent doping and coach led, ego-oriented motivational climates (Blank et al., 2016; Donovan et al., 2002; Ehrnborg & Rosén, 2009).

Performance priorities at cultural and interpersonal levels were also found to influence increased SUDAA at the intrapersonal level. For example, performance priorities among

coaches and parents resulted in performance pressure and urgency among adolescent athletes. As shown in Figure 32, adolescents used supplements and considered doping to meet performance expectations in an ego-oriented climate. These findings are consistent with evidence which has revealed adolescent substance use (including doping) in response to pressure to uphold performance expectations (Berger, 2017; Blank et al., 2016). This evidence also shows that in an ego-oriented sporting climate, performance priorities can be internalised to the extent that adolescents source confidence through winning. Results of studies two and three also revealed that performance priorities in adolescent sport increase with age and competitive level. Thus, the influence of performance priorities on increased SUDAA are anticipated to gain salience throughout adolescence which should be considered in anti-doping strategies and initiatives.

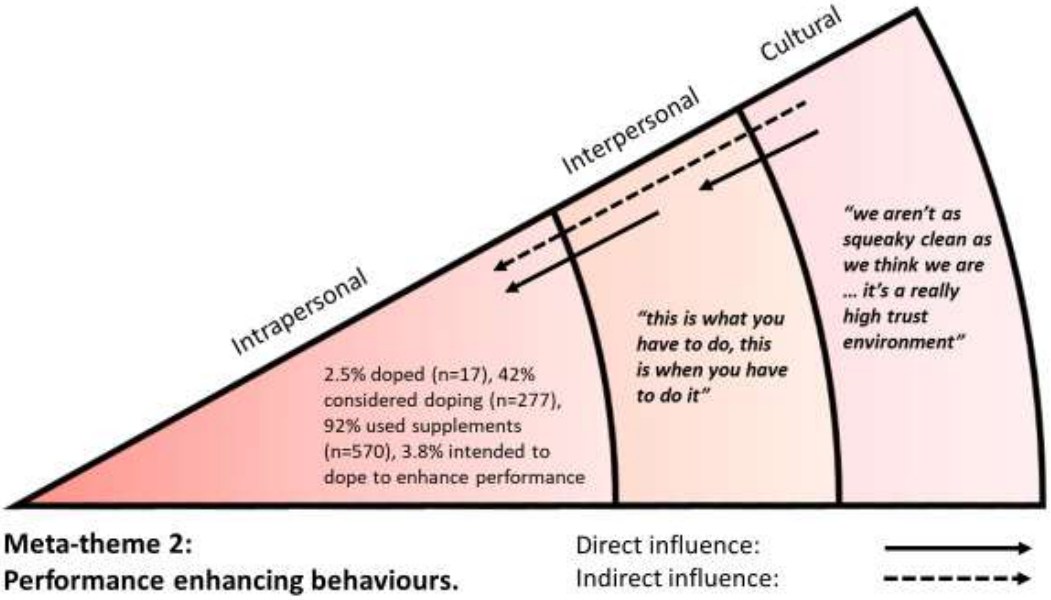
Also shown in Figure 32 is an association between performance priorities, confidence sourced through winning and increased SUDAA. These novel findings contribute to knowledge by showing that SUDAA is influenced by interactions between adolescent confidence sources (intrapersonal level), ego-oriented sporting climates (interpersonal level) and performance priorities (cultural level). To conclude, meta-theme one shows the interconnected factors related to performance priorities which influenced increased SUDAA. As these behaviours are influenced by performance priorities at all levels of adolescent sport, these results show the need for community wide efforts to reduce the focus placed on winning in adolescent sport. In doing so, this evidence suggests that the negative influence of performance priorities on SUDAA may decrease.

Meta-theme 2: Performance enhancing behaviours

Factors and audiences were identified to influence increased SUDAA to enhance performance at all levels of adolescent sport (Figure 33). Interconnections between these influential factors and their effect on performance enhancing behaviours are detailed in this section.

Figure 33

Meta-theme 2: Performance enhancing behaviours



Note. Meta-theme two is coloured red as performance enhancing behaviours increase the odds of SUDAA.

This thesis shows that a lack of organisational guidance and boundaries regarding SUDAA has a direct influence on coach and parental control (interpersonal level) of adolescent supplement use to enhance performance (interpersonal level). Figure 33 also shows a high trust environment at the cultural level of adolescent sport. Interactions between a lack of organisational guidance and a high trust culture contributed to a sporting environment in which coach control over adolescents' performance enhancing behaviours was unquestioned. An example of this situation is presented in Figure 33 as coaches instructed adolescents to use supplements to enhance their performance. These findings have implications for sports organisations whose provision of transparent guidance about SUDAA is required. In particular, boundaries appear necessary to discourage support personnel's control of adolescent supplement use to enhance performance. These boundaries are important to reduce coach and parent involvement in adolescent behaviours with potentially harmful consequences (see chapter 1), particularly among the athletes they are dutybound to care for.

The interactions identified in Figure 33 between the a high trust environment, and a lack of cultural level boundaries on SUDAA also had a direct influence on autonomy controlling behaviours among coaches and parents in adolescent sport (interpersonal level). These outcomes show that authoritative behaviours are accepted in adolescent sport where they have a direct influence on increased SUDAA (Figure 33). While this evidence pertains to supplement use, previous research identified similar autonomy controlling behaviours to have

a negative influence on adolescent attitudes about doping, and susceptibility to its engagement (Hodge et al., 2013; Patterson & Backhouse, 2018). This evidence suggests that the autonomy controlling behaviours which influence supplement use in NZ sporting contexts may also pose risks to adolescent doping which necessitates action at an interpersonal level.

With similarities to previous research, coach and parent directed supplement use indicates that these behaviours are perceived as a legitimate means to enhance adolescent performance (Backhouse et al., 2015; Mudrak et al., 2018; Sagoe et al., 2014). These findings highlight a need for greater knowledge among coaches and parents about the risks associated with adolescent supplement use. From a pragmatic perspective, these results also indicate a need for greater awareness of the contrasting benefits of developmentally appropriate behaviours to enhance adolescent performance among coaches and parents. Based on their effectiveness in previous prevention programmes (Botvin & Kantor, 2000), the provision of practical alternatives to supplement use (e.g., nutrition, training and recovery practices) are anticipated to contribute to reduced SUDAA.

Adolescents' self-reported engagement in performance enhancing behaviours, intentions and consideration are also displayed in Figure 33. This evidence shows that the majority of adolescent athletes use supplements to enhance performance. The prevalence of adolescent supplement use is higher in NZ than among comparative international cohorts (Barkoukis et al., 2015; Braun et al., 2009; Diehl et al., 2012; Zelli, Mallia, et al., 2010). These findings also support previous claims that adolescent supplement use is a normative discourse in contemporary sport (Garthe & Maughan, 2018; Hoffman et al., 2008; Moston et al., 2015).

The evidence also reveals that a minority of adolescent athletes had doped or intended to do so, in efforts to enhance performance. The identified prevalence of doping in this thesis is similar to international research on this behaviour with comparable athlete populations (Backhouse et al., 2015; Dodge & Jaccard, 2008; Zelli, Mallia, et al., 2010). These findings position doping as a relevant issue in adolescent sport. This issue appears salient if doping intentions are held among the minority of adolescents who experience volition and thus, may action their intent. Figure 33 also shows that almost half of the adolescent participants in this thesis had considered doping to enhance their performance. In previous research, these considerations were suggested to indicate doping susceptibility (Gucciardi et al., 2010). The present extent of doping consideration thus suggests that a noteworthy cohort of adolescent athletes in NZ are susceptible to doping which is anticipated to exacerbate with performance pressure.

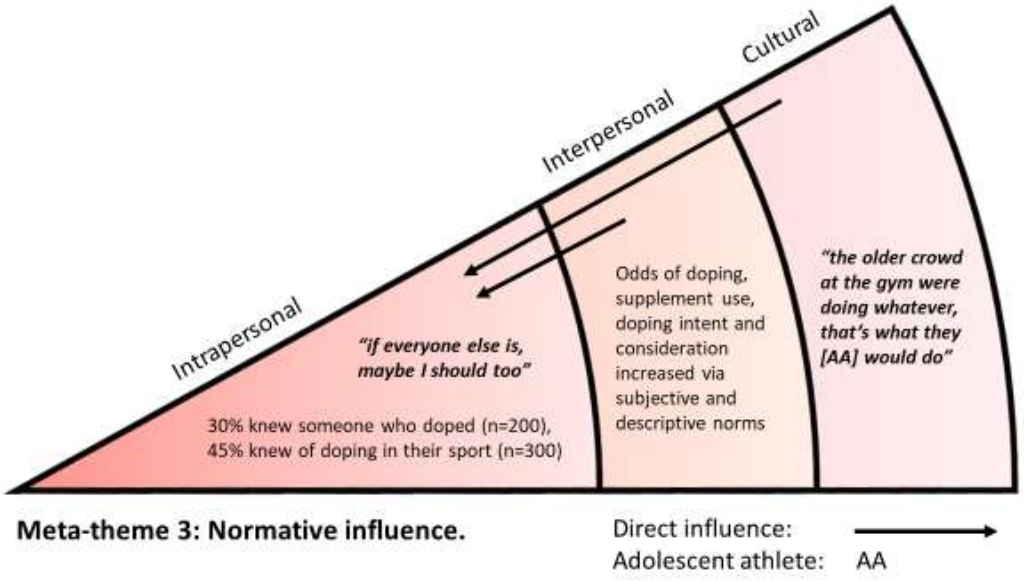
Finally, Figure 33 illustrates interconnections between factors and audiences at all levels of adolescent sport which increase SUDAA to enhance performance. While accepted, these indirect and direct influences meant many adolescents felt forced to do things they didn't want to. Moreover, some adolescents perceived a lack of control about whether or not they would dope. At an organisational level, these results reveal a need for boundaries and guidelines regarding SUDAA. These findings also reveal a current need to address controlling behaviours among coaches and parents, particularly those which involve SUDAA to enhance performance. Further, this evidence indicates a need to challenge the perception that supplement use is a legitimate behaviour to enhance adolescent performance, at all levels of adolescent sport.

Meta-theme 3: Normative influence

The interconnected factors and audiences which influenced supplement use and doping as normative behaviours in adolescent sport are shown in Figure 34 and detailed in this section.

Figure 34

Meta-theme 3: Normative influence



Note. Meta-theme three is coloured red as normative influences increase the odds of SUDAA.

As shown in Figure 34, cultural level factors have a direct influence on increased SUDAA. As indicated by the solid arrow in Figure 34, adolescents' exposure to the behaviour of others outside of their sporting context (i.e., in gym environments) have a direct influence on SUDAA. It also appears that adolescent observations of others' consumption is fundamental to a unanimous perception that supplement use is a normative athlete behaviour. These results are consistent with previous research which found that SUDAA was influenced by adolescent

observations of doping behaviour in external contexts (e.g., gyms, Kindlundh et al., 1999; Pedersen & Wichstrom, 2001). These findings indicate a social learning effect in the context of SUDAA as adolescents imitate the actions to which they are exposed (Bandura, 1977).

Adolescent exposure to supplement use, and perceptions of doping, also have a direct influence on SUDAA through the development of subjective and descriptive norms (Figure 34). Moreover, these results show that SUDAA is directly influenced by adolescent perceptions that SUDAA is accepted (subjective norm), prevalent (descriptive norm) or normative within their sporting environment. These findings are complemented by evidence which found that adolescent perceptions and acceptance of others' behaviour resulted in a social norm about doping (Eisenberg et al., 2014; Hahn-Smith & Springer, 2005; Johnson, 2012). As consistent with previous research, these results reveal adolescent vulnerabilities to norms associated with SUDAA (Backhouse et al., 2015; Dodge & Jaccard, 2008). For example, Figure 34 shows that subjective norms (interpersonal level) have a direct influence on increased doping intent, consideration, engagement, and supplement use among adolescent athletes. These findings are consistent with previous research which identified doping norms to influence adolescent doping, doping intent and consideration, as well as attitudes toward this behaviour (Lazuras et al., 2015; Ntoumanis et al., 2014; Smith et al., 2010). Figure 34 also reveals the direct influence of descriptive norms (interpersonal level) on increased supplement use and doping consideration among adolescent athletes (intrapersonal level). This evidence is consistent with previous research in which descriptive norms predicted doping intentions among adolescent athletes (Lazuras et al., 2010; Wiefferink et al., 2008). The direct interpersonal level influence of subjective and descriptive norms on increased SUDAA reveal a need to challenge contemporary norms in adolescent sport which consider these behaviours as accepted and prevalent.

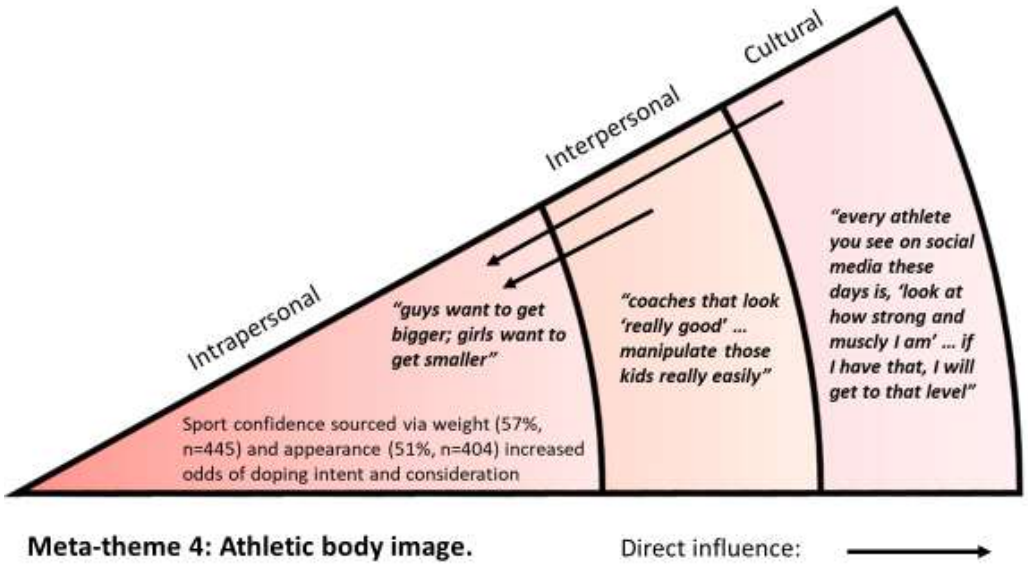
The evidence presented in Figure 34 reveals normative influences related to doping which increase SUDAA at all levels of adolescent sport. At the cultural level, these findings show that adolescent exposure to others' behaviour in external contexts has been a catalyst for the initiation of SUDAA. This exposure has a direct and on-going influence on SUDAA when reinforced by descriptive and subjective norms at the interpersonal level. These results reveal adolescent vulnerabilities to normative influences as descriptive norms increased their odds of supplement use, doping, doping intent and consideration. These outcomes also illustrate a need for adolescents to acquire skills to critically evaluate the behaviours and content to which they are exposed. Further, these results suggest perceived norms about doping must be challenged to reduce their influence on SUDAA.

Meta-theme 4: Athletic body image

The evidence displayed in Figure 35 shows the interconnected factors that influence adolescent perceptions of athletic body image and their impact on increased SUDAA. This section examines interactions between these factors, and their resultant influence on SUDAA.

Figure 35

Meta-theme 4: Athletic body image



Note. Meta-theme four is coloured red as athletic body image increases the odds of SUDAA.

Figure 35 shows that cultural, interpersonal, and intrapersonal level factors were influential to athletic body image and increased SUDAA. This evidence reveals that social media has a direct influence on SUDAA at the intrapersonal level. Firstly, social media is a prominent source of information for adolescents about supplements and doping. Secondly, social media is a vehicle through which adolescents are frequently exposed to athletic body imagery. This imagery has further implications for SUDAA as it is commonly associated with the marketing of supplement products. As shown in Figure 35, adolescents' exposure to appearance related cultural norms has a direct influence on increased SUDAA, particularly when supplement use is promoted as an effective means to obtain aesthetic ideals. These findings are consistent with previous research which identified SUDAA to obtain appearance related norms (Bloodworth & McNamee, 2010; Murray et al., 2016; Yager & O'Dea, 2014).

These outcomes also illuminate an appearance focused narrative which exists among adolescent athletes. This narrative is reinforced by adolescent observations of supplement use among influential others to enhance their appearance (i.e., supplement use by coaches). As detailed in Figure 35, these observations have a direct influence on the attention which

adolescents pay to their own self-presentation and on a perceived norm of supplement use to obtain aesthetic ideals. These findings are consistent with previous research which found that adolescent priorities to obtain an athletic body image were reinforced through exposure to context specific norms (Field et al., 2005; Frison et al., 2013; Smolak et al., 2005). Due to the influence of coaches on adolescent behaviour (meta-themes 1 and 2), it is unsurprising that observations of coach supplement use has a direct influence on increased SUDAA. These outcomes show a need for coaches to gain greater awareness of their influence on adolescent perceptions and behaviours, particularly regarding substance use to enhance appearance.

The findings presented in Figure 35 also show the importance that adolescents place on athletic body image. These results are consistent with associations that existing evidence has made between adolescent susceptibility to body imagery and developmental sensitivities to appearance related norms (Berger, 2017; Santrock, 2014). Findings from this thesis further reflect the importance of appearance to adolescent athletes as over half of the participant cohort sourced confidence through self-presentation. These findings are noteworthy as adolescents' doping intentions and consideration increased when they sourced confidence through feeling good about their body weight and appearance (Figure 35). As adolescents perceive supplement use an accepted and effective means to achieve an ideal body image, it is unsurprising that consumption is considered a means to gain confidence (through self-presentation). As self-presentation has been considered an uncontrollable source of confidence (Vealey, 2001), these results suggest that adolescents who obtain confidence through their appearance are more likely to use supplements or to dope. Future efforts to reduce SUDAA may benefit from efforts to increase adolescent nutrition and strength training self-efficacy as positive alternatives to foster healthy body image, particularly among those who source confidence through self-presentation.

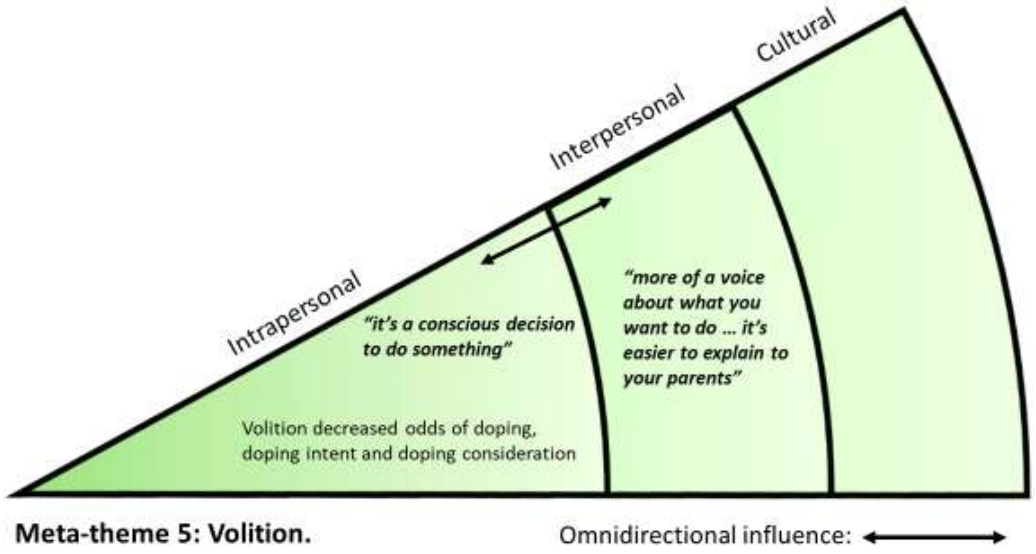
To conclude, interconnected factors which influence athletic body image exist at all levels of adolescent sport (Figure 35). Cultural and interpersonal level factors have a direct influence on increased SUDAA. In particular, social media content which portrays supplement use as an effective means to achieve an athletic body image is influential to SUDAA. These outcomes illustrate adolescent vulnerabilities to the pervasive influence of body image via social media. As such, developmentally appropriate approaches to reduce SUDAA are required and should aim to increase media literacy and healthy body imagery. This approach may assist adolescents to critically evaluate the content and behaviours they are exposed to, and thus decrease their influence on increased SUDAA.

Meta-theme 5: Volition

A key finding of this thesis is the influence of adolescent volition on reduced SUDAA. As shown in Figure 36, volition is the only meta-theme in which influential factors were not identified at the cultural level. Instead, volition is influenced by omnidirectional relationships between adolescents, their coaches and parents, as discussed in this section.

Figure 36

Meta-theme 5: Volition



Note. Meta-theme five is coloured green as volition decreases the odds of SUDAA.

The omnidirectional interaction identified between interpersonal and intrapersonal levels shown in Figure 36 indicates that coaches and parents have a direct influence on adolescent volition however that this influence was reciprocal. That is, before adolescents receive opportunities to experience volition, they need to effectively communicate their intentions, and display their maturity, to their coaches and parents. It is only by convincing this interpersonal level audience of their capacity to make decisions according to their own will that coaches, and parents afforded opportunities for adolescents to experience volition. These results also show that coaches and parents maintain a direct influence on adolescent volition as they determine the extent to which athletes can be autonomous in sporting contexts.

This evidence shows that the odds of SUDAA decrease when athletes experience volition. These findings contribute to the field by identifying the important role of adolescent volition in decreasing SUDAA. These results also reveal that athletes' opportunities to experience volition, as provided by coaches and parents, are essential to reducing these behaviours. The pragmatic importance of these opportunities are evident in Figure 36 as volition decreased adolescents' odds of doping, doping intent and consideration. The contextual relevance of these findings

has also been reinforced in literature which has advocated that adolescents are provided opportunities to experience autonomy, and independent decision-making, in their sporting milieu (Sport New Zealand, 2015). Furthermore, the value of volition cannot be overlooked from a developmental perspective as the provision of opportunities for athletes to enhance autonomy is a need of adolescence (Gaudreau et al., 2016; Mageau & Vallerand, 2003).

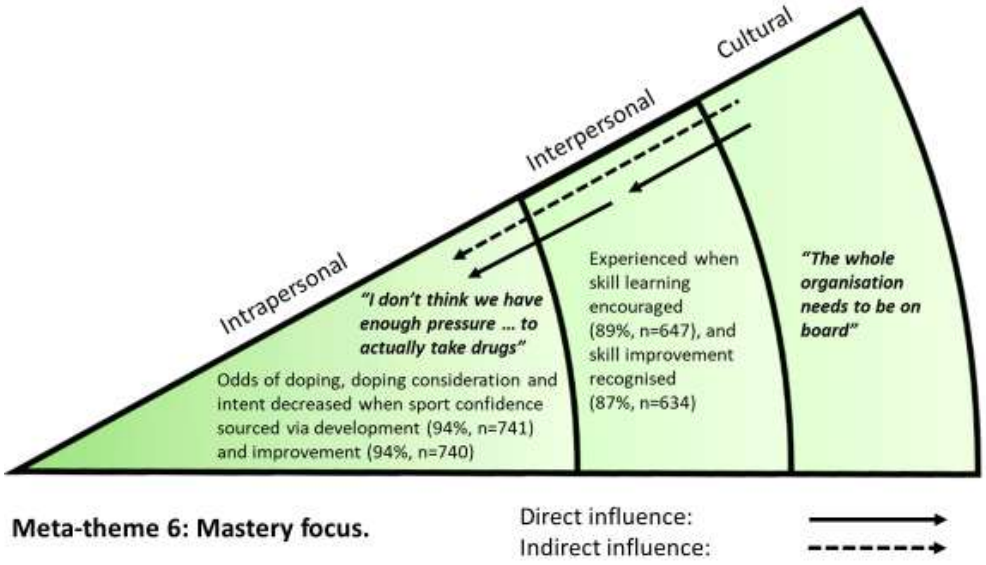
The knowledge generated in this thesis contributes to the field and offers unique perspectives for future initiatives to reduce SUDAA. Firstly, these results show the importance of volition in reducing these adolescent behaviours. Based on these findings it is anticipated that the development of independent decision-making skills among adolescents may have a positive effect on reducing SUDAA. Secondly, this research revealed reciprocity between athletes, coaches and parents regarding adolescent volition. As adolescent opportunities to experience volition were dependent on communication between these parties, the development of appropriate communication skills between adolescents, parents and coaches may further assist to reduce SUDAA. Finally, this evidence reveals a need for adolescent athletes to receive sufficient opportunities to experience volition in their sporting context to reduce SUDAA. These findings have important implications for coach and parent education initiatives which should provide best practices to enhance adolescent volition in sporting domains.

Meta-theme 6: Mastery focus

Figure 37 shows a mastery focus in adolescent sport is influential to reduced SUDAA. Factors which interact to influence a mastery focus, and reduce SUDAA, are discussed in this section.

Figure 37

Meta-theme 6: Mastery focus



Note. Meta-theme six is coloured green as a mastery focus decreases the odds of SUDAA.

At a cultural level, the evidence presented in Figure 37 reveals the importance of a collective focus on mastery in sports organisations to reduce SUDAA. These results show the positive and direct influence of a mastery focus in sports organisations on coach-led, mastery-oriented motivational climates in adolescent sport (interpersonal level). Further, an organisational focus on mastery has an indirect influence on reducing SUDAA at the intrapersonal level. These results show that an organisational focus on mastery has a positive influence on reducing SUDAA for which transparent links should be made in organisation-targeted initiatives to decrease these behaviours.

Figure 37 also shows that a focus on mastery at the cultural level has a direct influence on mastery-oriented motivational climates established by coaches at the interpersonal level. For example, when sports organisations consider mastery a priority of adolescent sport, coaches feel able to establish mastery-oriented climates. It is important to note however that the extent to which coaches and parents perceive they can establish a mastery-oriented climate is determined by their perception of an organisational focus on mastery (versus performance).

The findings displayed in Figure 37 also reveal that, in mastery-oriented climates, adolescents do not experience performance pressure and thus do not perceive a need to dope. These findings oppose the outcomes of adolescent participation in ego-oriented climates where perceived pressure to win is influential to increased odds of doping (Figure 32). As consistent with literature, adolescents perceive mastery-oriented climates when their coaches and parents prioritise skill development and improvement, and acknowledge their contributions to the team (Nicholls, 1989; Vealey et al., 1998). These findings have practical implications for the development of mastery-oriented motivational climates which, among broader benefits for adolescent athletes, may assist to reduce SUDAA.

This thesis reveals that a mastery focus at the interpersonal level has a direct influence on the extent to which adolescents have opportunities for skill development and improvement in their sporting context. As shown in Figure 37, mastery was a predominant source of adolescents' confidence which, in turn, decreased their odds of doping, doping intent and consideration. The effect of a mastery focus in this evidence compliments previous research which identified mastery-oriented climates to deter adolescents from doping and to influence their rejection of offers to engage (Degenhardt et al., 2010; Smith et al., 2010). As a mastery focused sporting context has been identified to reduce SUDAA, it is necessary that adolescents are provided opportunities to develop their skills and are acknowledged for their team contributions. In light of evidence that performance priorities increase during adolescence, it is

critical that a mastery focus is emphasised as athletes age to combat the negative influence of ego-orientations on increased SUDAA (meta-theme 1).

The interactions between factors associated with a mastery focus at all levels of adolescent sport, and thus influenced reduced SUDAA, are evident in Figure 37. A domino effect is evident between these factors as a mastery focus at the cultural level directly influences the presence of mastery-oriented motivational climates at the interpersonal level. A mastery focus in adolescent sporting climates then provides adolescents with opportunities to source confidence through mastery which reduces the odds of SUDAA. These outcomes highlight the need to embed a mastery focus at all levels of adolescent sport to reduce SUDAA. These results have implications for coach and parent focused education initiatives which should seek to establish practical ways to enhance mastery-orientations in adolescent sport. These findings also advocate that sports organisations review their priorities for adolescent sport and seek to identify opportunities to enhance a focus on mastery, thus contributing to reducing SUDAA.

Contrasts identified in this socio-ecological perspective

In addition to the interconnected factors that influence SUDAA, it is important to acknowledge the contrasting evidence revealed in this socio-ecological perspective. In Figure 31, two major contrasts are evident: between meta-theme one (performance priorities) and meta-theme six (mastery focus), also between meta-theme two (performance enhancing behaviours) and meta-theme five (volition). These contrasts are perhaps unsurprising as these meta-themes have an opposing influence on increased SUDAA (meta-themes 1 and 2) or decreased SUDAA (meta-themes 5 and 6).

Firstly, opposing outcomes are drawn at the cultural level where performance is prioritised (meta-theme 1) and where a mastery focus is taken (meta-theme 6). As shown in Figure 31, several factors in meta-themes one and six directly oppose one another, as does their influence on SUDAA. That is, performance priorities increase SUDAA (meta-theme 1) while a mastery focus decreases SUDAA (meta-theme 6). These findings indicate that adolescent sporting contexts are underpinned by differing priorities and areas of focus which respectively influence SUDAA. These outcomes have important implications for sports organisations who require greater awareness of their influence on the orientations which underpin adolescent sport, and therefore, SUDAA. To reduce these adolescent behaviours, these results advocate for proactive measures to increase a mastery focus at all levels of adolescent sport.

Secondly, opposing interpersonal level influences are evident in consideration of performance enhancing behaviours (meta-theme 2) and volition (meta-theme 5). Meta-theme two shows that coaches and parents have a direct influence on adolescent supplement use to enhance

performance. These results show that autonomy controlling behaviours thwart adolescents' opportunities to experience volition which increases SUDAA. These findings contrast the outcomes of meta-theme five which reveals the positive influence of coaches and parents providing adolescents with opportunities to make and implement decisions according to their own will. More specifically, these autonomy supportive behaviours are influential to adolescent volition which has been revealed to decrease SUDAA. As coach and parent behaviours have a direct influence on SUDAA, these findings indicate a need for autonomy controlling behaviours to be avoided in adolescent sport. These results also have implications for coach and parent education which should include best practices to enhance autonomy supportive behaviours in adolescent sport. This evidence also highlights a need for coach and parent practices which maximise adolescents' opportunities to experience volition in sporting contexts. While greater autonomy may have broader developmental benefits, access to volition has merit to decrease adolescent doping intentions, consideration and engagement and thus should be prioritised in adolescent sport.

8.2.3 Concluding statements on the socio-ecological perspective of factors which influence SUDAA

This chapter has discussed factors and audiences which influence supplement use, doping, doping intentions and consideration among adolescent athletes in NZ sporting contexts. Many important findings emerged from a socio-ecological perspective of this evidence (Figure 31) however three key outcomes appear pivotal to reduce SUDAA. These outcomes are summarised below and inform the practical recommendations presented in chapter nine.

Interconnected nature of factors which influence SUDAA

In response to its aims and RQs, this thesis has identified factors which influence SUDAA in NZ sporting contexts. An unexpected yet critical finding was the interconnection between factors which influence SUDAA at various levels of adolescent sport. From a pragmatic perspective, knowledge of these interconnections has enhanced existing understanding of factors which increased or decreased SUDAA in sporting contexts. As supported by previous research, the identified interactions between audiences and factors which influence SUDAA mean that isolated approaches will ineffectively reduce these behaviours (Backhouse et al., 2009). In contrast, these results indicate that SUDAA will be reduced most effectively through a whole of sport approach. It is through collective efforts that all parties involved in adolescent sport should recognise their influence on SUDAA and unite to reduce these behaviours.

Adolescent exposure to factors which influence SUDAA

A further outcome of this research is that SUDAA is anticipated to reduce through adolescents' exposure to factors identified to reduce these behaviours (meta-themes 5 and 6). Conversely, efforts to reduce SUDAA should aim to decrease adolescents' exposure to factors identified to increase SUDAA (meta-themes 1 to 4). This exposure-based approach shows promise to reduce SUDAA based on its previous success in decreasing substance use and other problematic behaviours in adolescent populations (Backhouse et al., 2009; Hawkins et al., 2002). To ensure adolescents are suitably exposed to the factors which reduce SUDAA as intended, literature has advocated that efforts to reduce adolescent behaviours are supported by practical recommendations (Bry et al., 1982; Newcomb et al., 1986). Thus, insights generated in this thesis inform the exposure-based, practical recommendations presented in chapter nine.

Audience specific approaches to reduce SUDAA

This thesis identified audiences which influence SUDAA at varied levels of the adolescent sporting environment (see Figure 31). These outcomes contrast historic, athlete-focused approaches to anti-doping and instead advocate that efforts to reduce SUDAA also target coaches, parents and sports organisations. Due to the varied characteristics of each audience, and their respective influence on SUDAA, these results suggest that audience specific approaches will most effectively reduce these behaviours. Based on the outcomes of this thesis, audience specific initiatives should focus on the respective influence of each audience on SUDAA (e.g., coach influence on adolescent supplement use). Additionally, these specific approaches should consider the factors which influence the priorities and behaviours of respective audiences (e.g., the influence of sports organisations on coaches).

To conclude, this thesis revealed several audiences and factors which influence SUDAA in NZ's sporting context. As displayed in Figure 31, these influential factors interconnect at intrapersonal, interpersonal and cultural levels of this environment. A socio-ecological perspective of these results has shown that these interconnected factors have direct and indirect influences on SUDAA. This thesis has also identified that adolescent athletes, parents, coaches and sports organisations are influential to SUDAA and each have a critical role in reducing these behaviours. It is therefore evident that a multifaceted and whole of sport approach is required to effectively reduce, and prevent, SUDAA.

8.2.4 Contributions of this thesis to existing knowledge

The interconnection between factors which influence SUDAA

A key outcome of this thesis is the interconnected nature of audiences and factors which influence SUDAA and reside at intrapersonal, interpersonal, and cultural levels of the adolescent sporting context. Owing to their respective salience on SUDAA, these audiences have been identified as priority audiences for efforts to reduce these behaviours. Further, the interconnected nature of this context means that interactions between sports organisations, support personnel and athletes are influential to SUDAA. These outcomes advance knowledge by articulating the direct, indirect and omnidirectional influence of factors and audiences on SUDAA, at varied levels of adolescent sport.

Essential audiences in efforts to reduce SUDAA

The interconnected nature of audiences which influence SUDAA imply that efforts to reduce these behaviours will be ineffective unless a collective approach is taken. These outcomes contrast the predominant athlete-centric focus of previous research and prevention programmes. Instead, this evidence shows that athletes are one audience in the broader sporting landscape in which SUDAA is influenced. Due to the respective affordances, constraints and influence of each audience in the context of SUDAA, respective efforts are required to effectively reduce these behaviours. These constraints may include the influences identified to act on specific audiences in the context of adolescent sport (e.g., the direct influence of sports organisations on coaches). To enhance relevancy and effectiveness, initiatives to reduce SUDAA should make practical links to the role of each audience in adolescent sport. Further, this thesis found that administrators in sports organisations were influential to SUDAA. As such, individuals in these roles are an important audience for efforts to reduce these adolescent behaviours. These outcomes may be unique to NZ sporting contexts however they contribute to the audiences previously identified to influence SUDAA and provide a broader perspective of target groups for future preventative efforts.

The influence of adolescent sources of sport confidence on SUDAA

To the researcher's knowledge, this thesis is the first to identify associations between SUDAA and sources of confidence. The evidence has shown that SUDAA decreased when confidence was sourced through mastery (i.e., developing skills). In contrast, SUDAA increased when adolescents sourced confidence through demonstrating ability (i.e., winning) and self-presentation (i.e., appearance). As detailed in this chapter, adolescent sources of confidence were directly influenced by coaches, parents and exposure to social media content. Sports organisations also had an indirect influence on adolescent confidence sources. For example, confidence sourced through mastery decreased SUDAA. However, adolescent opportunities to

experience mastery (e.g., through skill development) were afforded, or thwarted, by interpersonal and cultural level factors. These findings illustrate the important role of confidence sources in SUDAA and as such, their necessary consideration in preventative initiatives. These outcomes also show the influence of coaches, parents, social media and sports organisations on adolescent confidence sources. To reduce SUDAA, these findings indicate that skill development and mastery should be emphasised as sources of adolescent confidence. Additionally, winning and appearance are unstable confidence sources which negatively influence SUDAA and thus should be avoided in adolescent sport.

The influence of adolescent volition on reduced SUDAA

This thesis shows that opportunities to experience volition decrease the odds of doping, doping intent, and consideration among adolescent athletes. From a socio-ecological perspective, volition is experienced through an omnidirectional relationship between adolescent athletes, their coaches and parents (Figure 36). In other words, before coaches and parents afforded adolescents with opportunities to experience volition, athletes needed to communicate their desire, and maturity, to make decisions according to their own will. This evidence shows it is only then that adolescents are afforded opportunities to experience volition and thus, decreased odds of SUDAA. This new knowledge highlights a need for adolescent opportunities to develop communication and volitional decision-making skills in their sporting context. These outcomes therefore emphasise a need for coaches and parents to adopt practices, and present situations, for adolescents to make and execute autonomous decisions in sport.

Inaugural evidence from NZ sporting contexts

This thesis presents inaugural evidence on factors which influence SUDAA in NZ sporting contexts. This explanatory, sequential MMR design allowed a unique depth of comprehension to be obtained about factors which influence SUDAA from multiple perspectives. The knowledge gained through this inquiry was enhanced through an intersubjective researcher position which permitted a greater extent of contextual relevancy. The previously unheard voices of participants from NZ sporting contexts also contributed to the development of a robust understanding of factors which influence SUDAA. Through multiple perspectives, practical solutions to reduce SUDAA have been generated in light of factors which influence these behaviours (see chapter 9). As this investigation was the first to explore SUDAA in NZ, its outcomes contribute to global knowledge on factors which influence these behaviours.

8.3 Strengths and limitations of this thesis

Strengths

Researcher position

A strength of this thesis was the intersubjective position of the primary researcher who was also the Education Manager at DFSNZ.[22] This researcher position offered a unique opportunity to strengthen this investigation through an intimate knowledge of this research topic and setting. This contextual awareness was pivotal to conducting a robust programme of research in adolescent sporting contexts from which the perspectives of multiple participants were obtained. Owing to the pragmatic nature of this thesis, this researcher position was advantageous to derive outcome-oriented solutions to SUDAA with greater transferability to adolescent sporting contexts. As practical application of evidence from doping research to sporting contexts were an acknowledged challenge of National Anti-Doping Organisations (Gatterer et al., 2019), strengths of this intersubjective position have also contributed to this field of research.

Participant response

The conduct of this research was met with pleasing support from NZ's sporting community which was mirrored by the extent of participation in its respective studies. The number of participants recruited for each study permitted comprehensive evidence to be obtained from multiple perspectives. The robust findings derived from this expansive cohort contributed to the rich understanding of SUDAA gained as an outcome of this thesis. The extent of interest in this research was not anticipated as the concepts of SUDAA were expected to be unfamiliar in the context of adolescent sport. The voluntary nature of each study was a further reason for the unanticipated level of interest. A notable strength of this thesis was the participant cohort for study one which recruited 1298 adolescent athletes. This cohort represents the largest adolescent audience to have engaged in research about supplement use and doping in NZ. This sample size also allowed robust statistical procedures to be conducted which were an asset to the outcomes of this research. Across all studies in this thesis, 1330 participants were recruited thus providing multiple perspectives on SUDAA from which insightful conclusions were drawn.

The inclusion of stakeholder voice

To the researcher's knowledge, this study is the first to utilise stakeholder participation to develop a greater understanding of factors which influence SUDAA and to identify practical solutions to reduce these behaviours. Stakeholder participation was a strength of this

[22] DFSNZ is NZ's National Anti-Doping Organisation. Drug Free Sport New Zealand. (2020e). *Overview*. https://drugfreesport.org.nz/what-we-do/

explanatory, sequential MMR design as stakeholders' contextual insights added validity, relevance and trustworthiness to the outcomes of this thesis. Further, the perspectives and experiential knowledge of stakeholders were well suited to the pragmatic aims of this thesis as they enhanced the translation of its findings to practical sporting contexts. Stakeholder participation is rare in this field of research however this thesis has shown its unparalleled ability to obtain contextual insights on supplement use and doping, with transferability to the environments in which preventative initiatives are required.

Explanatory, sequential MMR design

A further strength of this thesis was its explanatory, sequential MMR design. This design allowed knowledge to develop sequentially, using varied research methods and participant cohorts as informed by previous studies. The strengths of this MMR design were maximised through the large pool of adolescent participants recruited in study one from which a broad understanding of the research issue was generated. The knowledge gained in this initial study reliably informed the design of study two. This qualitative investigation captured the perspectives, reflections and lived experiences of a specific subset of current and recent adolescent athletes and support personnel. The interpretations of evidence from study one and two then informed the design and conduct of study three. This final study obtained stakeholder views on the evidence obtained in previous studies and, as a result, identified outcome-oriented solutions to reduce SUDAA. Additional to the ability for knowledge to build across several research components, this research design afforded an opportunity to obtain multiple perspectives on SUDAA which provided robust responses to this thesis' RQs.

Limitations

Quantitative survey design

The survey used in study one included several limitations including its length and direct or indirect positioning of items. For example, participant responses attenuated as the survey progressed. The reasons for this decrease in responding remain unclear however the length of this data collection tool appears a likely reason (see Appendix D). Secondly, the indirect and direct nature of survey items may have been an additional limitation of this study. Specifically, several participants terminated their involvement in the survey as they reached questions which were posed directly about sensitive topics (i.e., doping). Despite considerable thought being given to these aspects during the development and testing of this survey, the attenuation of responses remain a limitation of study one. A final limitation of this survey design was its cross-sectional nature. While this design allowed associations to be drawn, it limited the ability to identify causality between measured constructs. Additional research is

required to ascertain if factors which increase and decrease the odds of SUDAA in this thesis, also have predictive qualities.

Qualitative participant recruitment

Due to the sequential nature of this MMR design, the participant criteria for studies two and three were informed by the outcomes of preceding phases of research. For example, the participant criteria for study two was guided by the outcomes of study one. This sequential process was in accordance with the design of this thesis whose studies explained, or added new perspectives to, the outcomes of a previous phase of research. As such, the participant criteria for study two sought the views of current and recent adolescent athletes, as well as support personnel, to explain the outcomes of study one through multiple perspectives. Additionally, the participant criteria for study three called for the perspectives of stakeholders with experience in adolescent sport to explain the evidence obtained in studies one and two. A possible limitation of this thesis is that individuals who did not identify with one of these cohort labels (e.g., adolescent athlete) may not have considered themselves a potential participant. The views of these individuals may have been relevant to this research regardless of the labels that they associated with. As such, a further limitation may be that the views of individuals who did not associate with the labels used to recruit participants were not represented in the outcomes of this thesis.

Social desirability

A further limitation of studies two and three were the potential for social desirability to have affected the evidence obtained. The effects of social desirability may have influenced participants to contribute to focus group discussion through views that conformed with others' opinions or in ways individuals believed the researcher wanted to hear. To combat these effects, the researcher made efforts to provide a non-judgemental atmosphere, to encourage honest responding and to build rapport with, and between, participants. The researcher also provided several reminders of the confidential and voluntary nature of participation in this research. Regardless, social desirability may have impacted the evidence obtained and may be a limitation of this thesis.

Sample size

A specific limitation of study two was the imbalance of adolescent athlete participants by gender. In study two, 13 female (n = 13) and three male participants (n = 3) were recruited. When considering the saturation of data obtained in study two, little divergence was identified between the adolescent male, and recent adolescent male, participants. This convergence was considered to provide satisfactory insights to the perspectives of male adolescents in the context of this research which did not seek to compare the experiences of participants by

gender. Regardless, the gender imbalance of adolescent athlete participants remains a limitation of study two.

A limitation of study three may have been the isolated data collection opportunity and sample size (n = 6). As outlined in chapter two, study three was considered a supplementary component of this MMR design and was not anticipated to include multiple data collection opportunities, nor to recruit a large participant cohort. As a result, the outcomes of study three are based on the views of six stakeholders in the context of one group discussion. These results may be considered to represent a limited diversity of perspectives and thus, a limitation of this study.

A final limitation of the samples recruited for participation in this thesis may be the limited geographical locations of data collection for studies two and three. While it may have been advantageous to collect data at additional locations throughout NZ, the fiscal and human resources allocated to this thesis were prohibitive to do so. The data obtained in these studies were considered to sufficiently reflect the perspectives of a wide range of relevant participant cohorts, however the few cities in which data were collected may be considered a limitation of this thesis.

Voluntary research participation

The voluntary nature of involvement in each study of this thesis may present a further limitation to its outcomes. Without incentive for involvement, participants of each study are likely to have been intrinsically motivated to contribute to research about doping. Thus, a limitation of this thesis may be that the evidence obtained does not represent the perspectives of individuals who may have been extrinsically motivated to contribute to research of this kind.

Original assumptions on the prevention of SUDAA

A limitation of study three may have been influenced by an original focus on identifying practical outcomes to reduce SUDAA with adolescent athlete audiences (in isolation). This approach was informed by an assumption that SUDAA may be reduced through athlete-centric approaches which the outcomes of this thesis have since corrected. Instead, stakeholders prioritised multiple audiences as recipients of efforts to reduce SUDAA early in the process of data collection. The researcher responded to these views by reframing subsequent questions to consider broader target audiences in efforts to reduce SUDAA (i.e., coaches, parents, sports organisations). Despite these efforts, the initial athlete-centric focus of data collection may have been a limitation of study three.

8.3.1 Researcher reflexivity

As introduced in chapter two, the researcher conducted this thesis with a reflexive perspective therefore prospective and retrospective reflexivity were identified (Edge, 2011). Prospective reflexivity was outlined in chapter two and this concluding chapter provides a suitable opportunity to retrospectively reflect on this research journey. A first-person perspective will be taken throughout this section to allow more genuine reflections to be made. As characteristic of retrospective reflection (Attia & Edge, 2017), I will first identify the effect that my knowledge, opinions and values as an intersubjective researcher may have had on this research. Secondly, I will discuss the effect that engagement in this thesis had on me.

My effect on the research

My intersubjective researcher position was introduced in chapter two as being underpinned by extensive knowledge and professional experience in the field of doping and supplement use. Also identified in study two was my experience in NZ sporting contexts as an athlete, coach and support person. My intersubjective researcher position was also acknowledged through transparent identification of my role as the Education Manager at DFSNZ. This experiential knowledge, and depth of understanding about the research context, inherently shaped my perspectives throughout this thesis from which I could not be separated. Due to my researcher position, it is important to identify and reflect on the effect that I may have had on this thesis. A reflective process is also important to enhance validity and transparency in the outcomes of this research.

Based on my experiential knowledge, efforts were made to remain aware of my unconscious bias and to be non-judgemental to insights obtained throughout this research. To document my observations, ideas and reflections throughout the conduct and analysis of each study, reflective field notes were maintained (Bogdan & Biklen, 2007). These notes proved a useful reference tool to identify potential biases and judgements as I made sense of the evidence obtained, and as my understanding of SUDAA emerged. These reflections were also a beneficial source of context in discussions with supervisors and recall when writing this thesis.

Further measures taken to reduce my potential effect on the direction of data collection and analysis included pilot testing, parallel coding and the use of biostatistical support. Each of these efforts are detailed in respective chapters of this thesis. Frequent and comprehensive discussions were also shared with research supervisors and critical peers to identify potential biases in the conduct and outcomes of this research. Recognising potential biases also provided useful cues for action throughout this thesis. For example, it was anticipated that my intersubjective researcher position may have unintentionally influenced participant's comfort

to contribute honestly to group discussion. Awareness of this potential effect acted as a cue from which I made specific efforts to verbally explain the purpose of this thesis and my intersubjective position within it. Alongside these explanations, participants were invited to ask questions of me regarding my role and any aspect of this research. This open dialogue enhanced rapport and comfort between participants and I, prior to and during data collection.

The personal effect of this research

The experience I had throughout this thesis was well articulated in literature which stated that researchers do not return to the starting point of their inquiry, instead they develop through a cyclical process of observing, reflecting and acting (Attia & Edge, 2017; Sandywell, 1996). This sentiment is true of my experiences, knowledge, and practices of inquiry developed through this academic journey.

I approached this thesis as a working parent of a new-born baby and thus knew I was embarking on a simultaneous path of personal and professional growth. From a practical perspective, the demands of this situation posed a myriad of challenges which required strategies to overcome. The determination required to complete this thesis in consideration of my personal situation was fuelled by my passion for its subject matter. Further, my desire for the outcomes of this research to contribute to positive sporting experiences for the next generation of athletes was pivotal to my motivation throughout this journey.

From a professional perspective, being so deeply immersed in my field of expertise for an extended period allowed me to develop a unique comprehension of SUDAA. On reflection of this thesis, I do not believe that my resultant depth of understanding of these adolescent behaviours, or sporting contexts, could have been achieved by any other means. My hope is that the extent of knowledge I have gained through this intensive research process has enduring benefits for the prevention of SUDAA within and outside of NZ.

My engagement in this comprehensive process of inquiry also increased my critical evaluation of the world and my awareness of personal biases across varied domains. For example, throughout this thesis I have become cognisant of my heightened curiosity to gain robust knowledge about issues in my practical environment. I have also become increasingly aware of the extent of questioning I now engage in and my confidence in inquiry. Additionally, I now consider multiple perspectives on a range of personal and professional matters and have increased awareness of decisions made without critical evaluation of influential factors.

Reflection on MMR

Despite my previous experience with MMR, I approached this thesis considering myself a (predominantly) qualitative researcher. While I have always appreciated the benefits of quantitative inquiry, my interest in qualitative research methods reflected the value I inherently place on understanding the lived experiences of others. The MMR journey I undertook throughout this thesis presented me with an opportunity to engage in thorough statistical analysis which I initially acknowledged as a challenge. On reflection, the quantitative learning and development I undertook throughout this thesis was not only personally rewarding, but a contributing factor to the strengths of this research.

The process of MMR design, conduct and analysis undertaken in this research also altered my perception of comprehensive, holistic inquiry. Specifically, my experiences in this thesis increased my appreciation for evidence based, and outcome-oriented, decision-making practices in the research design process. I complete this thesis with increased respect for MMR designs to meticulously understand a research issue as well as the confidence and desire to use MMR to generate robust outcomes in future research.

Reflection on pragmatism

This thesis sought to identify outcome-oriented solutions for the real-world issue of SUDAA in practical sporting contexts. The overarching purpose of this research was therefore suitably underpinned by a pragmatic perspective. Owing to the explanatory, sequential MMR design of this thesis, its pragmatic nature afforded me to generate a robust understanding of SUDAA through multiple perspectives in adolescent sporting contexts. The evidence which informed this understanding provided descriptive accounts of factors, organisations and individuals who influence adolescent behaviour in this practical environment. The pragmatic nature of this research allowed its findings to translate into contextually grounded outcomes for implementation among those who SUDAA impacts in practical environments. I complete this research journey with the perspective that pragmatism is an effective and holistic paradigm for investigations which seek to identify practical solutions for real-world issues. While a pragmatic approach would have limited capacity to inform theory, I have a keen interest to conduct future research underpinned by this paradigm when practical outcomes are sought.

Reflections on SUDAA

I began this research journey with an assumption that deterring individual athletes from doping would sufficiently prevent SUDAA. On reflection, this initial assumption failed to consider the many factors and audiences whose interactions I now acknowledge to influence these behaviours. This initial perspective also reflected my lack of understanding about the

powerful influence of other individuals, organisations and external factors (e.g., social media) on adolescent behaviour. In retrospect, my original assumptions about SUDAA reflect insufficient consideration of the role of developmental characteristics in these behaviours. Interestingly, these characteristics are now fundamental to my understanding of what influences SUDAA and how these behaviours may be reduced. The knowledge gained throughout this thesis highlights the need for greater attention to be paid to developmental characteristics when considering adolescent behaviours in practical sporting environments, particularly SUDAA.

What I would do differently

As mentioned, this thesis originated with an athlete-centred approach to reduce SUDAA. This initial perspective contrasts the outcomes of this thesis which reveal the whole of sport approach which is required to prevent these adolescent behaviours. As these factors have been identified at all levels of the adolescent sporting environment, it is evident that SUDAA is influenced by several external forces to which adolescents are vulnerable. With the benefit of hindsight and robust knowledge gained throughout this thesis, I would now design a more holistic inquiry that considers the influence of a broad range of external influences on SUDAA.

As previously acknowledged, my understanding of the important role of adolescent developmental characteristics on SUDAA emerged throughout this thesis. For example, it became obvious that these characteristics were associated with adolescent vulnerabilities to normative influences, confidence sources and priorities related to body image. On reflection, I would have designed this thesis with greater consideration of the impact of developmental characteristics and vulnerabilities on SUDAA. I would also consider the influence of a broader range of extrinsic factors (e.g., exposure to gym environments) on adolescent behaviour from a development perspective. While these aspects were not included in this thesis from its outset, it is hoped that these reflections positively contribute to future research in this field.

Lastly, it was intended that several manuscripts would have been submitted for journal publication prior to the completion of this thesis. Constraints of the demands of my researcher position were prohibitive to complete these manuscripts to the desired standard prior to the submission of this thesis. Draft manuscripts have been prepared and plans are in place for their submission and review as this thesis concludes. Owing to the importance I place on accessibility to evidence and best practice information; it would have been ideal if publications from this thesis were available at this time and thus is an area I would have done differently.

8.3.2 Directions for future research

Several considerations for future research were presented throughout this thesis however key directions for further investigations are detailed below.

Socio-ecological perspective

This thesis indicates that socio-ecological frameworks are an effective tool to gain a comprehensive understanding of factors which influence SUDAA in specific environments. As shown in this thesis, a socio-ecological perspective offers a clear view of the interconnected and varied factors which have a direct and indirect influence on adolescent behaviour. Socio-ecological perspectives also provide a promising framework for the prevention of SUDAA as shown to positive effect in the fields of health promotion and behavioural sciences (Giles-Corti et al., 2005; Rowe et al., 2016). Future research should therefore consider the use of socio-ecological approaches to obtain a holistic and contextual understanding of SUDAA and transfer this knowledge to practical, preventative outcomes.

IPLOC

In study one, IPLOC[23] was identified to influence increased odds that adolescents would use supplements. Study one also revealed that IPLOC was influential to decreased odds that adolescents would intend to dope soon. The contrasting effects of adolescent IPLOC on increased supplement use and decreased doping intent warrant future research.

Factors which reduce adolescent supplement use to enhance performance

As detailed in chapter four, this thesis failed to identify factors associated with decreased odds of adolescent supplement use to enhance performance. The health and behavioural risks linked to this behaviour (chapter 1), coupled with the high prevalence of consumption in this cohort (chapter 3), emphasise the need to better understand factors which reduce adolescent supplement use for the purpose of performance enhancement.

Sources of sport confidence

This thesis provides new knowledge to the field by identifying associations between confidence sources and increased or decreased odds of SUDAA. These findings were drawn from the use of four of nine original subscales from the Sources of Sport Confidence

[23] Internal perceived locus of causality (IPLOC) is an aspect of autonomy through which adolescents perceive their goals and actions are internally driven and free of external influence. Ng, J., Lonsdale, C., & Hodge, K. (2011). The basic needs satisfaction in sport scale (BNSSS): Instrument development and initial validity evidence. *Psychology of Sport and Exercise, 12*, 257-264. https://doi.org/10.1016/j.psychsport.2010.10.006

Questionnaire (SSCQ, Vealey et al., 1998). To gain a more comprehensive understanding of the role of confidence sources on SUDAA, future research is required using all SSCQ subscales.

Athletic identity

Evidence obtained in study two found that adolescents' formation of an athletic identity was associated with their use of supplements to obtain an athletic body image and to enhance performance. It remains unclear if the development of athletic identity is associated with adolescent doping however, given its influence on supplement use in these findings, it remains an area which requires greater understanding.

Influence of sports organisations on adolescent doping behaviour

This thesis revealed that sports organisations (cultural level) had a direct influence on coaches and parents (interpersonal level) and an indirect influence on adolescent athletes (intrapersonal level) in the context of SUDAA. There is a scarcity of research to elaborate on the influence of sports organisations on adolescent behaviour, however their identified salience in this thesis indicates a need for further inquiry. Additionally, effective approaches to reduce SUDAA with sports organisations, as an audience which influences SUDAA, remain elusive and require greater understanding research.

The influence of motivational climate on adolescent confidence sources

Further research is required to understand the potential association between motivational climates and confidence sources in the context of SUDAA. This thesis identified the influence of confidence sources on increased or decreased odds of SUDAA, doping intent and consideration. This evidence has also identified that the motivational orientations of sporting climates (i.e., ego and mastery) had a role in determining athlete confidence sources. These findings suggest that motivational climate may have a greater role in SUDAA than previously understood, through their influence on adolescent confidence sources. Further research is required to investigate these associations in greater detail.

8.3.3 Post-doctoral research

Development and evaluation of a programme to reduce SUDAA

The outcome-oriented nature of this thesis, and responses to its RQs, provide the means to develop a comprehensive programme which reduces SUDAA in NZ sporting contexts. The outcomes of this research could reliably inform the development, implementation, and evaluation of an evidence-based programme to reduce these adolescent behaviours. The comprehensive nature of such an approach would require in-depth focus and long-term evaluation which is well suited to post-doctoral investigation.

8.4 Chapter summary

This chapter has identified and discussed factors which influence SUDAA in NZ sporting contexts from a socio-ecological perspective. This perspective provided a contextually grounded response to the aims and RQs of this thesis. This view also affords robust insights to factors which influence SUDAA at intrapersonal, interpersonal and cultural levels of adolescent sport. In this chapter, factors and audiences which influence SUDAA were identified and discussed through six meta-themes which increased or decreased these behaviours. Contributions of this thesis to the field were then presented, followed by the strengths and limitations of this programme of research. Researcher reflections of this academic journey then preceded directions for future research and concluding statements of this thesis. Evidence obtained in this programme of research informed practical recommendations to reduce SUDAA in NZ sporting contexts which are presented in chapter nine.

8.5 Thesis conclusion

The thesis aimed to identify factors which influence SUDAA in NZ sporting contexts. Based on a comprehensive understanding of these factors, this programme of research sought to identify outcome-oriented solutions to reduce these behaviours in practical environments. Returning to these aims, it is now possible to state that SUDAA is not influenced by an isolated factor. On the contrary, the socio-ecological perspective provided in this thesis shows that SUDAA is influenced by interconnected factors at intrapersonal, interpersonal and cultural levels of adolescent sport. While this research focused on adolescent athletes, its findings reveal the influential role of coaches, parents and sports organisations on these adolescent behaviours. As such, this thesis has provided robust evidence to identify the influence of these audiences on increased or decreased SUDAA. These outcomes indicate that isolated approaches will ineffectively reduce SUDAA which instead require a multimethod, whole of sport approach.

This thesis was the first comprehensive investigation of SUDAA in adolescent sporting contexts in NZ. At the outset of this dissertation, doping was described as a deleterious, unethical and problematic behaviour. It was also conveyed that doping posed salient consequences to athletes and threatened the integrity of sport. Despite these negative effects, this thesis has identified SUDAA thus positioning these behaviours as relevant issues in NZ sporting contexts. Through its pragmatic philosophical position, the outcomes of this thesis are situated in the practical context of NZ sport for which practical recommendations to reduce SUDAA are provided in chapter nine. These recommendations provide the best opportunity to protect adolescent athletes from the inherent harms of SUDAA and are advocated for wide adoption throughout adolescent sporting contexts as part of a collective approach to reduce SUDAA.

Chapter 9 Practical recommendations

9.1 Chapter introduction

The purpose of this chapter is to present practical recommendations to reduce supplement use and doping among adolescent athletes (SUDAA) in NZ sporting contexts. Owing to the pragmatic philosophical position of this thesis, the content presented following this chapter introduction is intended for stakeholders in the practical context of adolescent sport. As such, this chapter uses practical terms and avoids the use of technical jargon however, where necessary, footnotes provide greater detail. The recommendations provided in this chapter are informed by the views of adolescent athletes, support personnel and stakeholders obtained throughout this thesis. This chapter opens with a thesis summary and an overview of its key outcomes. Practical recommendations to reduce SUDAA are then provided for each audience found to influence SUDAA. These recommendations are intended for implementation by support personnel, sports organisations and stakeholders in NZ's sporting community. Due to the interconnected nature of factors which influence SUDAA, these solutions are not intended for isolated use. Instead, these recommendations should be considered as part of a whole of sport approach to reduce SUDAA.

9.2 Practical recommendations to reduce supplement use and doping among adolescent athletes (SUDAA)

9.2.1 Introduction to the research which informed these recommendations

These practical recommendations were informed by three studies conducted in 2018 and 2019 in NZ sporting contexts. Each investigation sought to identify factors which influenced adolescent supplement use[24] and doping[25] from the perspectives of adolescent athletes, athlete support personnel and stakeholders. These studies also aimed to identify outcome-oriented solutions to reduce these adolescent behaviours in practical sporting environments. By way of participation in this research, a total of 1330 individuals contributed to these practical recommendations which are intended for use by athlete support personnel, sports organisations and other stakeholders in NZ sport.

9.2.2 Factors which influence SUDAA

The most important finding of this research was that factors which influence SUDAA were interconnected throughout the adolescent sporting environment. These influential factors

[24] Supplements included pre-workouts, creatine and protein, used to enhance performance.
[25] Doping was considered the use of banned substances to enhance performance (e.g., EPO, steroids).

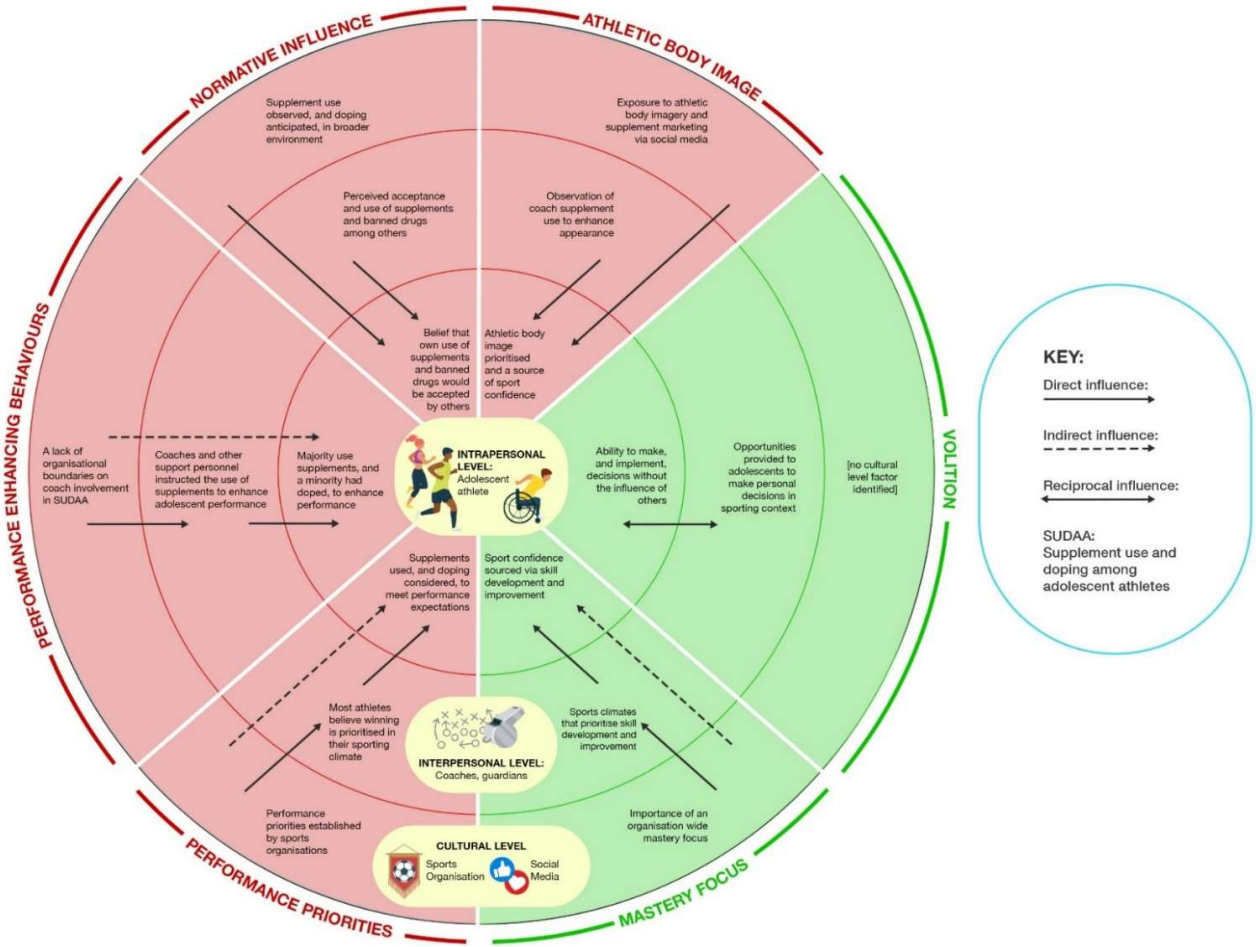
were identified at intrapersonal, interpersonal and cultural levels of adolescent sport as shown in Figure 38. For example, the performance priorities of sports organisations meant coaches were recruited based on previous performance outcomes (i.e., winning records). Organisationally-led performance priorities were influential to the focus that coaches placed on winning in the adolescent sporting climates they established. In these climates, adolescents perceived a need to win and meet performance expectations. It was also in this climate that adolescent athletes used supplements and considered doping to enhance their performance. These findings provide one example of how interconnected factors in adolescent sport were influential to SUDAA.

This research also revealed audiences that influence SUDAA and interactions between them. These influential audiences included adolescent athletes, athlete support personnel (i.e., coaches, guardians) and sports organisations. Interactions between these audiences meant that the behaviours and expectations of one group influenced that of another. Figure 38 shows an example of this domino effect as sports organisations had a direct influence on coaches, and coaches had a direct influence on adolescent athletes. Due to the interactions between factors and audiences which influence SUDAA, efforts to reduce these behaviours will be ineffective if they target a single audience (e.g., adolescent athletes), or an isolated factor (e.g., performance priorities). Instead, a collective approach which considers the interactions between factors and audiences which influence SUDAA is the most viable solution to reduce these behaviours in the practical context of adolescent sport.

In the following section, factors which influence SUDAA are shown in Figure 38. This figure displays audiences who influence these behaviours with three circles which extend outward from the centre. At the centre of this figure are adolescent athletes (intrapersonal level) while the second circle includes support personnel, including coaches and guardians (interpersonal level). The far circle contains sports organisations and social media (cultural level). This figure also shows six meta-themes which increased or decreased SUDAA. In each meta-theme, arrows are used to show the influence of one factor, or audience, on another. Items which are coloured red show they influenced increased SUDAA while items coloured green decreased these adolescent behaviours. This figure is followed by recommendations to reduce SUDAA for each audience found to influence these behaviours. These recommendations are intended for consideration as audience specific components of a collective approach to reduce SUDAA in adolescent sport.

Figure 38

Factors and audiences which influence SUDAA



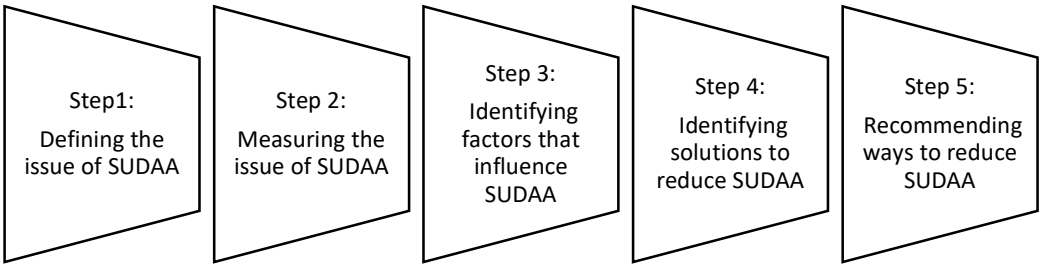
Note. Informed by Bronfenbrenner's (1977) definitions of the socio-ecology of human development.

9.2.3 Practical recommendations

Practical recommendations are presented in this section for audiences found to influence SUDAA (displayed in Figure 38). Each recommendation was informed by the voices of adolescent athletes, support personnel and stakeholders from NZ sporting contexts. The development of these recommendations were also guided by five steps of an existing problem-solving framework as shown in Figure 39 (Guyer, 1998).

Figure 39

Steps taken to develop practical recommendations



Note. Steps one to four were conducted throughout this thesis. Step five is presented in this chapter.

Prior to the presentation of each recommendation, the influence of each audience on SUDAA is summarised. These summaries describe the influence of one audience on another in the context of SUDAA (e.g., the influence of coaches on adolescent athletes). These practical recommendations are followed by outcome-oriented suggestions for their implementation in adolescent sport. Due to the interconnected nature of factors and audiences which influence SUDAA, these recommendations are not intended for use in isolation. Instead, each recommendation should be considered as part of a whole of sport approach to reduce SUDAA.

Adolescent athletes

Adolescent athletes are an obvious audience in the occurrence and prevention of SUDAA. This research found that SUDAA occurred due to the direct and indirect influence of several factors and audiences. For example, SUDAA was directly influenced by performance or mastery focused priorities in adolescent sport. SUDAA was also influenced by the behaviours that adolescents perceived were normal, the imagery they observed via social media, and the extent to which they could make their own decisions in sporting contexts. This research also found specific developmental characteristics that made adolescents more vulnerable to supplement use and doping. For example, SUDAA was influenced by adolescents' observations of others' behaviour, their sources of confidence and the extent of opportunities they received to make decisions about their behaviour. Consistent with previous research, this evidence

suggests that efforts to prevent SUDAA should be initiated during early adolescence.[26] Preventative efforts may be most effective during this stage as adolescents' beliefs, attitudes and values continue to develop.[27] These developmental characteristics render early adolescence a suitable stage to prevent SUDAA, before these behaviours begin.

The evidence also found that adolescent priorities and behaviours were shaped by interconnected factors in their sporting environment. For example, adolescent supplement use was influenced by observations of this behaviour among others in their sport and in gym environments. As shown in Figure 38, this research found that sports organisations had a direct influence on support personnel and through them, an indirect influence on adolescent athletes. Additionally, support personnel had a direct influence on adolescent athletes, particularly through their priorities on winning, and controlling behaviours, in adolescent sport. As an example, Figure 38 shows that a drive for performance among coaches and parents resulted in their directives for adolescents to use supplements to enhance performance. These findings revealed that athlete support personnel had a direct influence on SUDAA.

As part of a collective approach, it is recommended that attention is paid to increasing adolescents' exposure to factors which decrease SUDAA (e.g., opportunities for independent decision-making). Those working with adolescent athletes should also prioritise skill development and provide frequent opportunities for adolescents to make and execute personal decisions in their sport. Efforts to reduce SUDAA should focus on decreasing athletes' exposure to factors which increase these behaviours (e.g., performance pressure). Practical recommendations to reduce SUDAA with adolescent audiences are presented in Figure 40.

[26] Anti-doping education is advocated to begin early in the athletic pathway. Smith, A., Stewart, B., Westberg, K., & Stavros, C. (2018). *Performance and image enhancing drugs and substances: Issues, influences and impacts*. Routledge.

[27] Early adolescence (13 to 14 years of age) is considered a viable window to prevent behaviour due to specific developmental processes. Cieciuch, J., Davidov, E., & Algesheimer, R. (2016). The stability and change of value structure and priorities in childhood: A longitudinal study. *Social Development, 25*(3), 503-527. https://doi.org/10.1111/sode.12147

Figure 40

Practical recommendations to reduce SUDAA with adolescent audiences

The evidence indicated that initiatives to reduce SUDAA with adolescent audiences will be most effective when they are interactive, engaging and supported by visual material. SUDAA may also be reduced when adolescents are exposed to genuine accounts of others who have been impacted by these behaviours. To reduce SUDAA, conscious efforts should be made to increase adolescents' access to expert support (e.g., qualified nutritionists) and for anti-doping norms to be consistently reinforced in their practical sporting environment.

Athlete support personnel (coaches, guardians)

This research found that athlete support personnel had a direct influence on SUDAA. Due to this influence, support personnel have been considered a priority audience for efforts to reduce these adolescent behaviours. The evidence has shown that coaches and guardians were most influential to SUDAA via the priorities, expectations, and orientations they established in adolescent sport. For example, the emphasis which support personnel placed on winning had a direct influence on increased SUDAA. Consistent with existing knowledge,[28] evidence showed that priorities placed on winning in adolescent sporting environments increased supplement use, doping consideration and intentions among adolescent athletes. Comparatively, when support personnel focused on mastery (e.g., skill development), adolescents were less likely to experience performance pressure. As shown in Figure 38, a mastery focused climate allowed athletes to source confidence through skill development and

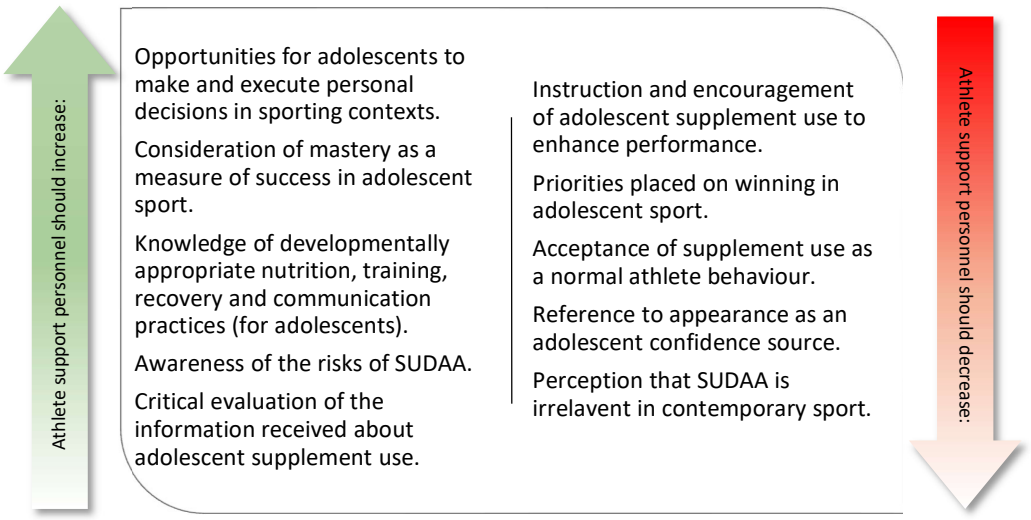
[28]Ego-oriented climates which prioritise winning have been associated with adolescent doping. Ntoumanis, N., Barkoukis, V., Gucciardi, F., & Chan, D. (2017). Linking coach interpersonal style with athlete doping intentions and doping use: A prospective study. *Journal of Sport & Exercise Psychology, 39*, 1-11. https://doi.org/10.1123/jsep.2016-0243

improvement which reduced their odds of SUDAA. The results also showed that transparent and developmentally appropriate communication between athletes and support personnel allowed adolescents to make independent decisions which reduced SUDAA.

Findings from this investigation also showed the direct influence of sports organisations on support personnel. The interactions revealed in this context showed that sports organisations were influential to the effect that support personnel had on SUDAA. Performance priorities, and a lack of organisationally-led boundaries on the involvement of support personnel in SUDAA, had a direct influence on controlling behaviours among coaches and guardians in sporting contexts. For example, when sports organisations measured success in adolescent sport by winning, coaches were found to control performance enhancing behaviours among athletes.[29] In this example, support personnel had instructed adolescents to use supplements to enhance their performance. Based on this evidence, practical recommendations are provided for support personnel (i.e., coaches) in Figure 41. These recommendations should not be considered in isolation and instead as part of collective approach to reduce SUDAA.

Figure 41

Practical recommendations to reduce SUDAA with athlete support personnel



Support personnel can contribute to reducing SUDAA through increased vigilance of the organisational influences which impact their priorities and behaviours in adolescent sport. For example, coaches may benefit from increased awareness of the pressure they experience to

[29] Autonomy controlling behaviours are another persons' actions which undermine adolescent abilities to experience self-determination in sport. Gillet, N., Vallerand, R., Amoura, S., & Baldes, B. (2010). Influence of coaches' autonomy support on athletes' motivation and sport performance: A test of the hierarchical model of intrinsic and extrinsic motivation. *Psychology of Sport and Exercise, 11*(2), 155-161. https://doi.org/10.1016/j.psychsport.2009.10.004

win, and their resulting behaviours and practices which focus on performance. Support personnel are also encouraged to acquire knowledge about SUDAA[30] and to critically evaluate the related information they are exposed to. It is also advocated that support personnel engage in peer discussion (e.g., with other coaches and guardians) to obtain practical solutions to reduce SUDAA.

Sports organisations

This research found that sports organisations were influential to SUDAA however lacked initiatives to reduce these behaviours. In the context of SUDAA, the results showed that sports organisations had a direct influence on support personnel, an indirect influence on adolescent athletes, and a broad influence on their sporting community. The data also indicated that sports organisations may not consider SUDAA a relevant issue in their environment and may be unaware of their influence on these behaviours.

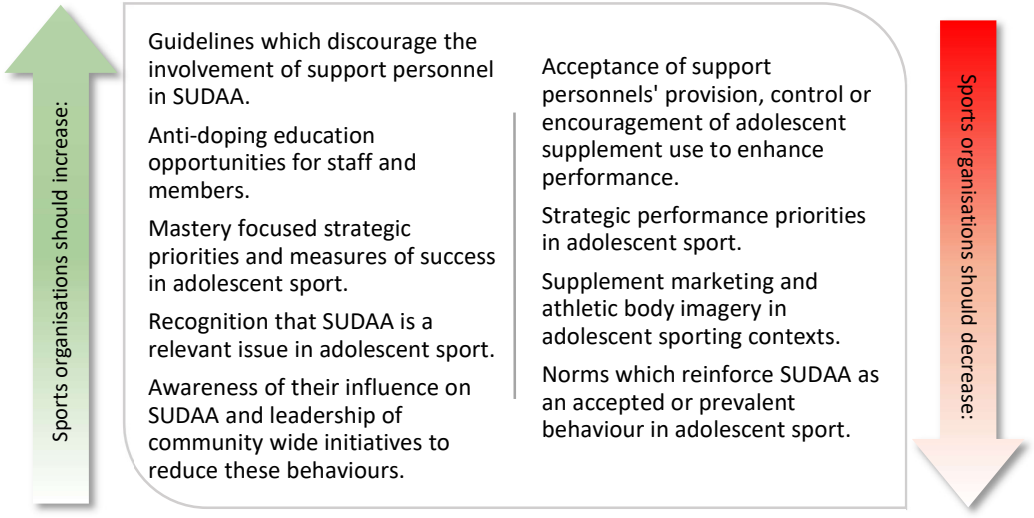
The results also showed that sports organisations influence SUDAA through their strategic priorities in adolescent sport. Specifically, when sports organisations prioritised performance, their recruitment of coaches and measurements of success in adolescent sport were perceived to be based on winning. These priorities had a direct influence on the motivational climates that athlete support personnel then established in adolescent sport. Organisationally-led performance priorities also had a direct influence on controlling behaviours among coaches in efforts to win. It was in this context that the indirect influence of sports organisations, and the direct influence of coaches, resulted in supplement use and doping consideration among adolescent athletes.

In contrast, the evidence revealed that an organisational focus on mastery had a direct influence on the emphasis which coaches, and guardians placed on development and improvement in adolescent sport. In this example, sports organisations had an indirect influence on adolescent access to mastery as a source of confidence which, in turn, decreased SUDAA. That is, when adolescents sourced confidence through developing and improving skills, they had fewer odds of doping. These examples show the critical influence of sports organisations on increased or decreased SUDAA. As shown in Figure 42, sports organisations have a pivotal role in a whole of sport approach to reduce these behaviours.

[30] Anti-doping education courses and resources are available on the DFSNZ website. Drug Free Sport New Zealand. (2020a). *Education*. https://drugfreesport.org.nz/what-we-do/education

Figure 42

Practical recommendations to reduce SUDAA with sports organisations



This research found that sports organisations are in an authoritative and influential position to lead community wide efforts to reduce SUDAA. Sports organisations can contribute to reducing these adolescent behaviours by increasing opportunities for anti-doping education at all levels of their membership. Sports organisations can also encourage and facilitate anti-doping education among their team members. These education initiatives should acknowledge the influential role of each audience on SUDAA and aim to develop the skills required for group members to contribute to reducing these behaviours. To enhance the perceived relevancy and reach of anti-doping education, sports organisations could also support a reduction in SUDAA by embedding suitable content into their existing frameworks. Further, these findings advocate for sports organisations to consider practical ways to establish anti-doping norms throughout their sporting communities as part of a collective approach to reduce SUDAA.

9.3 Chapter summary

This chapter outlined factors and audiences which influence SUDAA in NZ sport. Based on this evidence, practical recommendations to reduce these behaviours were provided. These recommendations targeted adolescent athletes, support personnel and sports organisations as audiences who influence SUDAA. To contextualise these recommendations, the influence of each target audience on SUDAA was explained before outcome-oriented solutions to reduce these behaviours were shared. The interconnectedness between audiences and factors which influence SUDAA render isolated approaches ineffective to reduce these behaviours. Instead, these recommendations offered audience specific components of a collective approach to reduce SUDAA throughout NZ's adolescent sporting environment.

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Glossary

Key term	Explanation
Adolescence	The developmental period which proceeds childhood and precedes adulthood (Sawyer et al., 2018). To align with NZ's schooling system, this thesis considers adolescence from ages 13 to 18 years.
Adolescent autonomy	Characterised by moral decisions, thoughts and feelings which are an individuals' own, in contrast to those which are influenced by the beliefs of others (Steinberg, 1999).
Anti-doping	Initiatives which seek to protect the integrity of sport and clean athletes by opposing the use of *Prohibited List* items (i.e., substances or methods) for the purpose of enhancing performance.
Athlete	Any individual who competes in a sport under the authority of a *sports organisation* (World Anti-Doping Agency, 2015).
Athlete Support Personnel	Any coach, parent, manager, or other person working with an *athlete* who competes in sport (World Anti-Doping Agency, 2015).
Autonomy control	The actions of another person, or socio-contextual factors, which thwart adolescents' ability to experience *self-determination* (Ntoumanis & Standage, 2009).
Autonomy support	The actions of another person, or socio-contextual factors, which consider adolescents' feelings and views, and foster their ability to experience *self-determination (Ntoumanis & Standage, 2009).*
Banned drugs	Substances on the *Prohibited List*.
Complementarity	Data from separate studies which complement each other (Tashakkori & Teddlie, 2003).
Convergence	Agreement between data from two different studies (Fielding, 2012).
Descriptive norm	Perceptions of *doping* prevalence in a specific environment (Rivis & Sheeran, 2003).
Divergence	Disagreement between data from two different studies (Tashakkori & Teddlie, 2003).
Doping	The occurrence of one or more of the *anti-doping* rule violations stated in Article 2.1 – 2.10 of the *World Anti-Doping Code* (World Anti-Doping Agency, 2015). I.e., the use or attempted use of banned substance(s) or method(s) (Yager & O'Dea, 2014).
Drug Free Sport NZ	A crown entity established under the Sports Anti-Doping Act (2006) which is the recognised *National Anti-Doping Organisation* for NZ (Drug Free Sport New Zealand, 2020e).
Early-adolescence	The initial stage of the developmental period of *adolescence* (i.e., 13-14 years of age).
Education (anti-doping)	One of four interrelated strategies to prevent doping, alongside detection, deterrence and enforcement (World Anti-Doping Agency, 2020b).
Ego-orientation	An emphasis on outcomes, outperforming others, attention to top performers, and punishment of mistakes in a sporting context (Smith et al., 2008).

Explanatory, sequential mixed methods research	The research design used in this thesis which utilises mixed research methods in a sequential order for greater explanation of preceding evidence, and to inform proceeding inquiry (Creswell et al., 2003).
Internal Perceived Locus of Causality (IPLOC)	An aspect of autonomy which refers to an individuals' belief that they initiate and regulate their actions (Reeve et al., 2003).
Late-adolescence	The final stage in the developmental phase of *adolescence* (i.e., 17-18 years of age).
Mastery-orientation	An emphasis on self-referenced development and improvement, effort, and team contributions in sporting contexts (Smith et al., 2008).
Mid-adolescence	The mid way point of the developmental phase of *adolescence* (i.e., 15-16 years of age).
Motivational climate	An athletes' perception of coach-led motivational climates in their sporting context; *ego-oriented* or *mastery-oriented* (Smith et al., 2008).
National Anti-Doping Organisation	A signatory to the *World Anti-Doping Code* with the primary authority and responsibility to adopt and implement anti-doping rules, collect samples, manage test results and provide anti-doping education (World Anti-Doping Agency, 2015).
National Sports Organisation	A body that represents its members in NZ who are involved in a specific sporting activity (Drug Free Sport New Zealand, 2020f).
Prohibited List	The list of substances and methods prohibited by WADA (World Anti-Doping Agency, 2020a).
Self-determination	Adolescents' ability to make decisions and act on their own accord, determined by satisfaction of their basic psychological needs; autonomy, competence and relatedness (Deci & Ryan, 2002).
Silence	Evidence is identified in data from one study which is absent in another (O'Cathain et al., 2010).
Sports Anti-Doping Rules	Ten rules made by Drug Free Sport NZ under section 16 of the Sports Anti-Doping Act (2006) (Drug Free Sport New Zealand, 2020f).
Subjective norm	Perceptions about the acceptance of a behaviour (i.e., doping) in a specific environment (Rivis & Sheeran, 2003).
Supplement	Classified as a food subset, supplements have been considered sports foods, medical supplements, ergogenic supplements, functional foods and others (Garthe & Maughan, 2018).
Volition	An aspect of autonomy which is experienced when adolescents perceive they make willing choices about their behaviour (Bandura, 1977).
World Anti-Doping Code	The fundamental document which underpins the World Anti-Doping Programme in sport which aims to harmonise and advance universal anti-doping efforts (World Anti-Doping Agency, 2015).

Note. Glossary items are specialist terms used across several chapters. Less frequently used terms are defined in-text. Italicised items refer to another term in this glossary for reference.

Abbreviations

Abbreviation	Title
AA	Adolescent athlete
ASP	Athlete support personnel
ATHENA	Athletes Targeting Healthy Exercise and Nutrition Alternatives
ATLAS	Adolescents Training and Learning to Avoid Steroids
DFSNZ	Drug Free Sport New Zealand
IPLOC	Internal perceived locus of causality
LST	Life skills training
MC	Motivational climate
MMR	Mixed methods research
MMRQ	Mixed methods research question
NZ	New Zealand
PBC	Perceived behavioural control
RAA	Recent adolescent athlete
RQ	Research question
SCT	Social Cognitive Theory
SDT	Self-Determination Theory
SI	Social Influence (approach)
SLT	Social Learning Theory
SNT	Social Norms Theory
SSC	Source of sport confidence
SUDAA	Supplement use and doping among adolescent athletes
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
WADA	World Anti-Doping Agency

Note. This list includes more frequently referenced abbreviations. All other abbreviations are detailed in-text.

Appendices

Appendix A Ethics approval for study one

AUTEC Secretariat

Auckland University of Technology
D-88, WU406 Level 4 WU Building City Campus
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

11 December 2017

Tony Oldham
Faculty of Health and Environmental Sciences

Dear Tony

Re Ethics Application: **17/175 Developing a drug free sport intervention for New Zealand youth contexts: a values based, action research approach.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTEC).

Your ethics application has been approved for three years until 11 December 2020.

Standard Conditions of Approval

1. A progress report is due annually on the anniversary of the approval date, using form EA2, which is available online through http://www.aut.ac.nz/researchethics.
2. A final report is due at the expiration of the approval period, or, upon completion of project, using form EA3, which is available online through http://www.aut.ac.nz/researchethics.
3. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form: http://www.aut.ac.nz/researchethics.
4. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.

Non-Standard Conditions of Approval

1. Provision of the AUT logo on the survey.

Non-standard conditions must be completed before commencing your study. Non-standard conditions do not need to be submitted to or reviewed by AUTEC before commencing your study.

Please quote the application number and title on all future correspondence related to this project.

AUTEC grants ethical approval only. If you require management approval for access for your research from another institution or organisation then you are responsible for obtaining it. You are reminded that it is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.

For any enquiries, please contact ethics@aut.ac.nz

Yours sincerely,

Kate O'Connor
Executive Manager
Auckland University of Technology Ethics Committee

Cc: sian@drugfreesport.org.nz; Sarah Kate Millar

Appendix B Ethics approval for study two

Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

29 November 2018

Tony Oldham
Faculty of Health and Environmental Sciences

Dear Tony

Re: Ethics Application: **18/373 Making a cleaner sport for New Zealand adolescent athletes: Capturing views on performance enhancing drugs dietary supplements and sport**

Thank you for your request for approval of an amendment to your ethics application.

The minor amendment to your application for the use of a 3rd party for transcription under a confidentiality agreement is approved.

I remind you of the **Standard Conditions of Approval**.

1. A progress report is due annually on the anniversary of the approval date, using form EA2, which is available online through http://www.aut.ac.nz/research/researchethics.
2. A final report is due at the expiration of the approval period, or, upon completion of project, using form EA3, which is available online through http://www.aut.ac.nz/research/researchethics.
3. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form: http://www.aut.ac.nz/research/researchethics.
4. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
5. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.

Please quote the application number and title on all future correspondence related to this project.

AUTEC grants ethical approval only. If you require management approval for access for your research from another institution or organisation then you are responsible for obtaining it. If the research is undertaken outside New Zealand, you need to meet all locality legal and ethical obligations and requirements.

For any enquiries please contact ethics@aut.ac.nz

Yours sincerely,

Kate O'Connor
Executive Manager
Auckland University of Technology Ethics Committee

Cc: kdn0383@autuni.ac.nz; Sarah Kate Millar

Appendix C Ethics approval for study three

Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
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www.aut.ac.nz/researchethics

24 September 2019

Tony Oldham
Faculty of Health and Environmental Sciences

Dear Tony

Re: Ethics Application: **18/373 Making a cleaner sport for New Zealand adolescent athletes: Capturing views on performance enhancing drugs dietary supplements and sport**

Thank you for your request for approval of amendments to your ethics application.

The amendment to the recruitment protocol for additional focus groups is approved.

I remind you of the **Standard Conditions of Approval**.

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard.

AUTEC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted. When the research is undertaken outside New Zealand, you need to meet all ethical, legal, and locality obligations or requirements for those jurisdictions.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries please contact ethics@aut.ac.nz. The forms mentioned above are available online through http://www.aut.ac.nz/research/researchethics

Yours sincerely,

Kate O'Connor
Executive Manager
Auckland University of Technology Ethics Committee

Cc: kdn0383@autuni.ac.nz; Sarah Kate Millar

Appendix D Study one data collection tool (survey)

Q1. Thank you for your interest in this study. In this questionnaire we will be asking for your thoughts about supplements and banned drugs in sport, alongside questions about how you use them. We created this questionnaire in a way that we can't identify anyone who completes it. As we will not know which answers are yours, we cannot take your answers out once you have completed the questionnaire. You can complete the questionnaire on your own using a laptop, mobile phone or tablet. The questionnaire should take around 18 minutes to complete.

Please read this Participant information sheet and click the most suitable statement below

(1 = I have had the opportunity to read the information sheet and agree to participate in this questionnaire, 2 = I have completed this questionnaire before (selecting this option will exit you from the questionnaire)).

Skip To: End of Survey If Thank you for your interest in this study. In this questionnaire we will be asking for your thoug... = I have completed this questionnaire before (selecting this option will exit you from the questionnaire)

Q2. Throughout this questionnaire please read each statement carefully and answer each question honestly. If you need to go backwards, click on the left facing arrow on the bottom of your screen.

How old are you today (years)? (1 = 12 or less, 2 = 13, 3 = 14, 4 = 15, 5 = 16, 6 = 17, 7 = 18, 8 = 19 or more)

Skip To: End of Survey If Throughout this questionnaire please read each statement carefully and answer each question hones... = 12 or less

Skip To: End of Survey If Throughout this questionnaire please read each statement carefully and answer each question hones... = 19 or more

Q3. **What is your gender?** (1 = male, 2 = female, 3 = gender diverse)

Q4. **At the moment, what sport do you participate in most?** [note: this item was removed from analysis for ethical reasons]

Q5. Please answer the rest of this questionnaire about the sport you have chosen. **How many hours a week do you engage in your sport?**

Q6. In this section we will ask how you feel about participating in your sport. Please read each statement and select the response which is most correct.

In my sport, I feel I am pursuing goals that are my own

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q7. I feel I participate in sport willingly

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q8. In my sport, I really have a sense of wanting to be there

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q9. In my sport, I feel I am doing what I want to be doing

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q10. In my sport, I feel that I am being forced to do things I don't want to do

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q11. I choose to participate in my sport according to my own free will

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q12. In this section, we will ask about situations in your sport where you gain self-confidence. Please read each statement and select the response which is most correct. Each statement in this block starts with 'I usually gain self-confidence in my sport'.

I usually gain self-confidence in my sport…when I win

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q13 ... when I demonstrate I am better than others

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q14 … when I show my ability by winning

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q15 ... when I know I can outperform others

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q16. ... when I prove I am better than opponents

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q17. I usually gain self-confidence in my sport... when I show I am one of the best

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q18. ... when I master a new skill

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q19. ... when I improve my performance on a skill

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q20. I usually gain self-confidence in my sport … when I improve my skills

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q21. ... when I perform in an environment I like

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q22. ... when I increase the number of skills I can perform

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q23. ... when I develop new skills and improve

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q24. ... when I feel good about my weight

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q25. ... when I feel I look good

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q26. I usually gain self-confidence in my sport... when I feel my body looks good

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q27. ... when I follow certain rituals (e.g. when I do the same things before each competition)

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q28. ... when I feel comfortable in the environment where I am performing

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q29. ... when I like the environment I am performing in

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q30. In this section, we will make statements about what your current team is like. Please read each one and select the response which is most correct. If you have more than one coach, the questions are about the one you spend most of your time with. If you participate in an individual sport like swimming or athletics, the 'team' means the group you train and compete with.

Winning is the most important thing for the coach

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q31. The coach makes athletes feel good when they improve at a skill

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q32. The coach spends less time with the athletes who aren't as good

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q33. The coach encourages us to learn new skills

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q34. The coach tells us which athletes on the team are the best

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q35. The coach tells athletes to help each other get better

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q36. The coach tells us that trying our best is the most important thing

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q37. The coach pays most attention to the best athletes

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q38. The coach says that teammates should help each other improve their skills

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q39. Athletes are taken out of games if they make a mistake

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q40. The coach says that all of us are important to the team's success

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q41. The coach tells us to try to be better than our teammates

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q42. (item only – no response taken)

In this section, we will ask you about supplements; why you think athletes use them and where athletes get their information about them from. We will also ask about the supplements you use. Remember, your responses are anonymous - we won't know who you are, or which responses are yours. Supplements are things like vitamins, pre-workouts, creatine, protein powders and sports drinks.

Q43. Why do you think athletes use supplements? (select as many as you like)

- To look better (1)
- To lose weight (2)
- To gain weight (3)
- To build muscle (4)
- To improve performance (5)
- To increase energy (6)
- To improve health (7)
- To recover faster from training or competition (8)
- To recover faster from injury (9)
- To make up for a poor diet (10)
- To reduce pain (11)
- To treat a medical condition / nutritional deficiency (12)
- To improve immune system (13)
- For the taste (14)
- Because other people use them (15)
- Because they are told to (16)

- Another reason (17)

Q44. Where do you think athletes get most of their information about supplements?

- Teachers (1)
- Friends (2)
- Teammates (3)
- Parents (4)
- Siblings (5)
- Sports coach (6)
- Strength and conditioning coach (7)
- Fitness trainer (8)
- Books / magazines (9)
- Doctor (10)
- Internet sites (11)
- Sales person / dealer (12)
- Social media (13)
- Sponsors (14)
- Other (15)

Q45. How frequently do you use supplements to improve your performance?

(1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very frequently)

Q46. In the past 6 months, which of these supplements have you used?

- Sports Drinks (1)
- Protein Bars (2)
- Protein powders (3)
- Recovery drinks (4)
- Amino acids or Branch Chain Amino Acids (BCAA) (5)
- Caffeine (including energy drinks, gels, gums, capsules) (6)
- Multi-vitamins or minerals (e.g. iron, calcium) (7)
- Creatine (8)
- Mass gainers (9)
- Beetroot / nitrate (10)
- Beta alanine / Bicarbonate (11)
- Diet pills / Fat Burners (12)
- Pre-workouts (13)
- Testosterone Boosters (14)
- I haven't used a supplement in the past 6 months (15)

Q47. (no response)

In this section we will ask you about banned drugs; why you think athletes use them and where they get their information about them from. We will also ask about the banned drugs you use. Please read each statement and select the response which is most correct. Remember, your responses are anonymous - we won't know who you are, or which responses are yours. 'Banned drugs' are banned in sport by the World Anti-Doping Agency and include things like steroids, testosterone, EPO and adrenaline. Recreational drugs like cannabis (weed) and cocaine are also banned in competition.

Q48. Why do you think athletes use banned drugs? (select as many as you like)

- To look better (1)
- To lose weight (2)
- To gain weight (3)
- To build muscle (4)
- To improve performance (5)
- To increase energy (6)
- To improve health (7)
- To recover faster from training or competition (8)
- To recover faster from injury (9)
- To make up for a poor diet (10)
- To reduce pain (11)
- To treat a medical condition / nutritional deficiency (12)
- To improve immune system (13)
- For the taste (14)
- Because other people use them (15)
- Because they are told to (16)
- Another reason (17)

Q49. Where do you think athletes get most of their information about banned drugs?

- Teachers (1)
- Friends (2)
- Teammates (3)
- Parents (4)
- Siblings (5)
- Sports coach (6)
- Strength and conditioning coach (7)
- Fitness trainer (8)
- Books / magazines (9)
- Doctor (10)
- Internet sites (11)
- Sales person / dealer (12)
- Social media (13)
- Sponsors (14)
- Other (15)

Q50. How frequently do you use banned drugs to improve your performance?

(1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Very frequently)

Q51. In this section we will ask how you would feel using banned drugs to improve your sporting performance. Please read each statement and select the response which is most correct. Remember, your responses are anonymous - we won't know who you are, or which responses are yours. Each statement in this section starts with 'If I used banned drugs to improve my sporting performance'

If I used banned drugs to improve my sporting performance ... I would feel disappointed with myself

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q52. ... I would regret it

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q 53. ... I would feel shame

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q54. ... I would feel badly

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q55. In this section, we will ask how you feel about the use of banned drugs in sport. Please read each statement and select the response which is most correct. Remember, your responses are anonymous - we won't know who you are, or which responses are yours.

Using banned drugs is necessary to be competitive

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q56. The use of banned drugs is not cheating since everyone does it

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q57. It should only matter how good a performance is, not how it is achieved

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q58. Athletes should not feel guilty about breaking the rules and taking banned drugs

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q59. The risks of banned drug use are exaggerated

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q60. The use of banned drugs is an unavoidable part of competitive sport

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q61. There is no difference between using banned drugs and other forms of performance-enhancing technology (e.g., compression clothing)

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q62. Making it legal to use banned drugs would be good for sports

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q63. In this section, we will ask about banned drugs and your sporting environment. Please read each statement and select the response which is most correct. Remember, your responses are anonymous - we won't know who you are, or which responses are yours.

Most people I know would think it was OK if I used banned drugs to improve my performance

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q64. At your level of competition in NZ, what percentage of athletes do you think use banned drugs to improve their performance? (answered on a pictorial percentage scale 0 to 100%)

Q65. In your sport, how often do you know of banned drug use?

(1 = Never, 2 = Rarely, 3 = Sometimes, 4 = Often, 5 = Always)

Q66. How many athletes do you know who use, or have used, banned drugs to improve their performance?

(1 = None, 2 = A few, 3 = Some, 4 = Several, 5 = A lot)

Q67. Most people who are important to me would want me to use banned drugs to improve my performance (1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q68. I feel in complete control of whether I will use banned drugs to improve my performance this season

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q69. Most people who are close to me would like me to use banned drugs to improve my performance

(1 = Strongly disagree, 2 = Disagree, 3 = Neutral, 4 = Agree, 5 = Strongly agree)

Q70. In this section, we will ask about situations where you may consider, or be tempted to use, banned drugs. Please read each statement and select the response which is most correct. Remember, your responses are anonymous - we won't know who you are, or which responses are yours. Each question in this block starts with 'How tempted would you be to use banned drugs to improve your performance this season'

How tempted would you be to use banned drugs to improve your performance this season … when your coach suggests so?

(1 = Not tempted, 2 = A little, 3 = Tempted, 4 = Somewhat, 5 = Very tempted)

Q71 ... when you believe that most of your peers use banned drugs?

(1 = Not tempted, 2 = A little, 3 = Tempted, 4 = Somewhat, 5 = Very tempted)

Q72 ... when you have been told to improve your performance?

(1 = Not tempted, 2 = A little, 3 = Tempted, 4 = Somewhat, 5 = Very tempted)

Q73 ... when you are preparing for an important competition?

(1 = Not tempted, 2 = A little, 3 = Tempted, 4 = Somewhat, 5 = Very tempted)

Q74 ... when you are feeling disadvantaged?

(1 = Not tempted, 2 = A little, 3 = Tempted, 4 = Somewhat, 5 = Very tempted)

Q75. If, under medical supervision, a banned drug was offered to you which was free or cheap, was not detectable and could make a useful difference to your performance, how much consideration would you give to taking it? (1 = None, 2 = A little, 3 = Some, 4 = More, 5 = A lot)

Q76. Do you think you will use banned drugs to improve your performance soon? (1 = No, 2 = Yes)

Q77. In the next year, how likely are you to use banned drugs to improve your performance?

(1 = Not likely, 2 = A little, 3 = Likely, 4 = Quite, 5 = Very likely).

Appendix E Participant recruitment information for study one, two and three

Study one (Participant: Adolescent athletes)

'AUT and DFSNZ are capturing the thoughts of 13-18-year-old athletes on supplement use and doping in sport throughout NZ. The findings will be used to make sport better for everyone by developing a programme which prevents doping in sport for the next generation of NZ athletes. The questionnaire is closing soon but it is really important that we hear the thoughts of as many NZ athletes as possible - to make sure yours are included, follow this link to complete a short questionnaire on any device: https://aut.au1.qualtrics.com/jfe/form/SV_esvT8IkbXMUUmq1'.

Study two (Participant: Adolescent athletes)

Are you 13-18 years old and competing in a sport in NZ?
Would you like to help us understand the things that influence an athlete's use of banned drugs to improve their sporting performance?
Would you like to contribute to the development of education content that reduces the likelihood of doping in the next generation of NZ athletes?
We are currently looking for 13-18-year-old athletes who would like to participate in a group discussion so we can learn from them about the things that influence the use of banned drugs to improve sporting performance. In these discussions, we also want to learn about athlete's thoughts on the ways that these behaviours can be reduced.
These confidential discussions will be held in Auckland and Christchurch in late 2018/early 2019. These discussions will take up to 1 hour and, to acknowledge their time, each participant will receive a $20 Prezi card.
If you are interested in participating in this study and would like more information (including the necessary consent forms), please email me (the Primary Researcher) at sian.clancy@aut.ac.nz

Study two (Participants: Recent adolescent athletes and Athlete support personnel)

Are you a parent, teacher-coach or physiotherapist of adolescent athletes in NZ?
Are you an athlete who is over 18 years of age with recent experience in adolescent sporting environments in NZ?
Would you like to increase our understanding of how we can create clean sport environments for young athletes in NZ?
We are currently looking for individuals with recent experience in NZ adolescent sporting contexts who are interested in sharing their experiences and views through a group discussion. We want to learn about the factors that influence adolescent athlete's use of banned drugs to improve their sporting performance. We also want to discuss participant views on how the likelihood of these behaviours can be reduced so we can work towards a clean sport environment for the next generation of NZ athletes.
Focus groups will take up to 1 hour and will be held in Auckland and Christchurch in late 2018/early 2019. We appreciate the time participants will spend contributing to these discussions and will provide a $20 Prezi card to acknowledge this. If you are interested in participating in this study, and you would like more information, please email me (the Primary Researcher) at sian.clancy@aut.ac.nz

Study three (Participant: Stakeholders)

Are you an athlete support person currently working with adolescent athletes in NZ?
Would you like to increase our understanding of how we can create clean sport environments for young athletes in NZ?
We are looking for individuals with current experience in NZ adolescent sporting contexts who are interested in sharing their knowledge and views through group discussion. We want to learn more about how the likelihood of doping can be reduced among adolescent athletes in NZ sport. This information will help us develop interventions that we hope will work towards a clean sport environment for the next generation of NZ athletes.
Participants will be required for a one-hour focus group held at AUT Millennium, Auckland in December. If you are interested in participating in this study, and you would like more information, please email me (the Primary Researcher) at sian.clancy@aut.ac.nz.

Appendix F Reasons for doping (full responses)

Reason for doping	Frequency (n)	Percentage (%)
To improve performance	625	12.9
To build muscle	493	10.1
To increase energy	484	10
To recover faster from training or competition	418	8.6
To recover faster from injury	374	7.7
Because other people use them	319	6.6
To reduce pain	317	6.5
Because they are told to	314	6.5
To lose weight	265	5.5
To look better	245	5.0
To gain weight	220	4.5
To treat a medical condition/nutritional deficiency	211	4.3
To improve health	148	3.0
To make up for a poor diet	144	3.0
Another reason	108	2.2
To improve immune system	100	2.1
For the taste	73	1.5

Appendix G Information sources about doping (full responses)

Information source (doping)	Frequency (n)	Percentage (%)
Internet sites	508	15.8
Social media	367	11.4
Teammates	352	10.9
Salesperson/dealer	351	10.9
Friends	303	9.4
Sports coach	281	8.7
Books/Magazines	229	7.1
Strength and conditioning coach	188	5.8
Fitness trainer	182	5.6
Doctor	116	3.6
Sponsors	108	3.3
Other	91	2.8
Parents	55	1.7
Siblings	54	1.7
Teachers	40	1.2

Appendix H Reasons for supplement use (full responses)

Reasons for supplement use	Frequency (n)	Percentage (%)
To improve performance	616	11.3
To build muscle	569	10.4
To increase energy	544	9.9
To recover faster from training or competition	526	9.6
To recover faster from injury	423	7.7
To treat a medical condition/nutritional deficiency	313	5.7
To lose weight	303	5.5
To reduce pain	294	5.4
Because other people use them	288	5.3
To improve health	282	5.2
Because they are told to	277	5.1
To look better	274	5.0
To gain weight	251	4.6
To improve immune system	190	3.5
To make up for a poor diet	173	3.2
For the taste	74	1.4
Another reason	17	1.3

Appendix I Information sources about supplement use (full responses)

Information source (supplements)	Frequency (n)	Percentage (%)
Internet sites	461	11.1
Sport coach	446	10.7
Teammates	435	10.5
Fitness trainer	383	9.2
Social media	375	9.0
Strength and conditioning coaches	356	8.6
Friends	313	7.5
Books/Magazines	296	7.1
Salesperson/dealer	265	6.4
Sponsors	222	5.4
Doctor	211	5.1
Parents	174	4.2
Siblings	86	2.1
Teachers	65	1.6
Other	61	1.5

Appendix J Supplements used (full responses)

Supplement(s) used in past 6 months	Frequency (n)	Percentage (%)
Sports drinks	437	24.1
Protein bars	263	14.5
Multi-vitamins or minerals (e.g. iron, calcium)	253	13.9
Caffeine (including energy drinks, gels, gums, capsules)	196	10.8
Protein powders	180	9.9
Recovery drinks	175	9.6
Had not used a supplement in the past 6 months	134	7.4
Pre-workouts	47	2.6
Beetroot/Nitrate	40	2.2
Amino acids or Branch chain amino acids (BCAA)	39	2.1
Creatine	17	0.9
Diet pills/Fat burners	11	0.6
Mass gainers	9	0.5
Beta-alanine/Bicarbonate	7	0.4
Testosterone boosters	6	0.3

Appendix K Study two data collection tool (focus group question schedule)

Item	Question
1	What pressures do you/your athletes face in sport?
2	What influences your/your athlete's behaviour in sport?
3	When people/young athletes speak about doping, what do they say?
4	What makes young athletes decide to dope?
5	What makes young athletes decide not to dope?
6	Imagine you were in charge of preventing young athletes from doping. How would you do it?

Appendix L Moderator's guide for focus groups (study 2 and 3)

BEFORE		
When	**Researcher action**	**Detail**
Within 2 months of FG	Ethics application	Study to have received full ethical approval
Within 2 weeks of FG	Receive completed confidentiality agreement	Contracted transcriber to complete and return completed confidentiality agreement (study 2 only)
Within 1 week of FG	Visit FG venue	- scope for potential distractions and practical ways to minimise them - investigate options for room set up to afford effective discussion - identify equipment required (e.g. chairs) - identify signage placement options to; 1) direct participants to FG venue, 2) indicate data collection was in progress.
Day before FG	Email participants and/or guardians	- remind participants of the date, time, and venue for the FG - remind participants of parking and venue information - provide a further opportunity to ask questions of the researcher - to continue to build rapport and acknowledge participation.
Day of FG	Set the scene	Arrive at FG venue no later than 1 hour before FG to: - Organise seating arrangements, door signage and refreshments - Begin background music to establish relaxed atmosphere on entry - Place name cards, pen, paper, and speaker prop (adolescent FG only) - Dictaphone(s) tested and placed.
DURING		
Participant arrival	Welcome	As participants arrived, researcher to: - welcome participant and personally introduce self - invite participant to take name tag and select a seat of choice when ready - participants invited to help themselves to refreshments as desired - introduce participants to each other, and initiate conversations, to build group rapport before the FG began.
Prior to data collection	Introduction	Once all participants were seated, researcher to: - open group discussion with an acknowledgement of participation - suitably describe purpose of FG for respective cohort based on: "When I analysed the findings of [state previous phase of research], I learnt things I would like to know more about. As an [state participant type], I consider you an expert and would like to hear your thoughts to increase my understanding of factors that influence adolescent athletes to use supplements and dope, and how we might reduce these behaviours".

	Guidelines	Before data collection commenced, researcher to provide FG guidelines: - There are no right or wrong answers to questions; all views are valuable. Not everyone will have the same opinion, but it is important that all views are heard and respected. Please respect other's views and do not share them outside of this discussion as explained in the [consent/assent] forms you have signed. - Refreshments have been provided, help yourselves to these at any time. - Turn all devices onto silent mode and do not use during data collection. - Avoid talking at the same time as another person as it is important that each view is heard clearly. The audio recording [introduce Dictaphone] will be challenging to transcribe if multiple voices are recorded at one time. - [Adolescents only]: introduce squishy ball as a speaker prop; whoever is holding the squishy ball has a turn to speak, please indicate if you would like this next and pass on. - You each have access to pen and paper. Please use this to record items you want to discuss later or that you are not comfortable to share verbally. - Reminder that participants do not have to respond to any question or discussion they do not wish to. - Researcher to explain she may take notes during the FG to look at later, they might include ideas, non-verbal communication observed and key themes in the conversation. - Provide an opportunity for questions before data collection begins. - Indicate the audio recording will now begin [turn Dictaphone on].
	Data collection	Researcher to indicate that data collection has begun and open discussion asking participants to introduce themselves to others: E.g. "Please introduce yourselves using your name and perhaps the sport you are involved with and/or your role and experience in that sport. This will also help to identify your voice when the audio recording is transcribed". Key reminders for researcher when facilitating FG discussion: - Ensure everyone says something to begin involvement in FG - If some participants are more vocal than others, use: 'what does everyone else think?' and 'can everyone think about a time when ….' and ask for responses to be reported back - Instead of 'you' use 'we' - Instead of 'why' use 'can you tell me more about that'? - Rephrase any questions that are met with silence - Repeat interpretation of a participant's comment if unclear to verify - Be vigilant of participant inclusion - Be vigilant of multiple speakers at one time [refer to speaker prop with adolescent cohorts) - Be vigilant of time spent on FG items to ensure each area is discussed in relevant depth within the time that participants are available for - Follow the FG question schedule as a guide but remain responsive to the direction of discussion and use appropriate probing questions to generate relevant responses/on-going dialect - Record notes during FG on general observations, non-verbal cues, things which stood out for later reference.

	Conclude data collection	As the discussion closes, researcher to: - provide an opportunity for participants to contribute comments they wish to share (may require references to notes taken throughout) - thank participants for their time and valuable contributions - remind participants to contact the researcher if they have any queries/concerns about topics raised in the FG regarding what will be done with data provided - remind participants that they would receive a copy of this study's outcomes if they ticked this option on their consent/assent form - finish audio-recording [turn off Dictaphone].
	Participant exit	As participants leave, researcher to: - thank each participant for their involvement - invite participants to take refreshments with them if they wish - [study 2 only] participants provided their koha in recognition for time spent contributing to the FG - where relevant, background music to be turned on again.
	Venue pack down	Research to: - return venue to original state (e.g. chairs in original positions) - remove signage relating to data collection
FOLLOWING		
Immediately after FG	Securely save data	Prior to leaving the data collection venue, researcher to: - save audio recording onto a password protected device - record reflective field notes in detailed form and securely save.
	Securely save participant forms	As soon as practical, researcher to: - securely save all participant assent/consent and guardian consent forms as indicated in ethical approval documentation.
Within two days following FG	Acknowledgement of participation	Researcher to email participants [or guardians] to acknowledge contributions to study
	Record reflective notes	Researcher to record reflective notes on experiences, learning and observations throughout data collection [study 2/3]. Specific reflections to be used to refine FG guidelines for further data collection [study 2].
As soon as practical following FG	Begin transcription	Researcher to: - send audio-recording to transcriber to begin transcription [study 2] - begin transcription [study 3].

Appendix M Study two evaluation objectives

Item	Objective
1	To explore participant's perspectives, lived experiences and observations of the pressures on adolescent athletes in NZ sporting contexts
2	To examine the effect of these pressures (evaluation objective 1) on adolescent athletes' perceptions and behaviours
3	To identify the factors that participants believe are influential to supplement use and doping among adolescent athletes
4	To assess the factors influential to adolescent athletes' decision-making about supplement use and doping.

Appendix N Study three data collection tool (focus group question schedule)

Item	Question
1	Based on what you now know*, what would you do to reduce Supplement Use and Doping among Adolescent Athletes (SUDAA) in NZ sporting contexts?
2	Based on what you know*, and your own experiences, what areas would you focus on to reduce SUDAA?
3	Who would you prioritise as the target audience for education which seeks to reduce SUDAA?
4	Based on your experience, in what ways are adolescents most effectively educated?
5	Who would be the most effective type of person to provide education to reduce SUDAA?
6	What challenges do you anticipate in: a) educating this target audience(s), and b) for this audience(s) to apply what they have learnt?

*As a result of pre-reading (Appendix O) and researcher presentation at the beginning of data collection.

Appendix O Study three participant pre-reading

Athlete	Case Study
Anahera	**Anahera** is a 15-year-old athlete. Since starting year 11, Anahera is making her own decisions at home, school and in social contexts but not in her sport where decisions are made by the coach. After trying many sports and activities, Anahera decided to focus on one sport this year to try and 'make it'. As she made this decision, the performance pressure she experienced increased, particularly as her coach prioritises winning and tells her to be better than her teammates. She knows she won't get to play if she makes mistakes so has started looking for ways to help her improve quickly. Anahera has seen repeated imagery of athletes with supplements on social media and admires how they look. Most of Anahera's peers use supplements so she thinks it is normal for athletes. Anahera believes athletes at her level in NZ are doping, knows of doping in her sport and among people she knows. She also thinks people she knows would think it was fine if she doped.
Wiremu	**Wiremu** is a 16-year-old athlete. He used to play a range of sports but last year decided to focus on one. In his sport he feels pressured to perform but accepts this is part of being an athlete who is dedicated to going further. Wiremu's coach makes decisions for him in his sport and consistently emphasises the importance of winning. His coach identifies, and pays most attention to, the athletes he considers the best. Wiremu wants to be one of the best athletes as he would then get more coaching and game time. Wiremu gains confidence when he wins, outperforms others and when he feels he looks good. This season, Wiremu's coach made him use supplements to enhance his performance. Wiremu trusts and respects his coach so didn't ask any questions before taking them. Most athletes older than him use supplements so Wiremu thought it was normal. Wiremu is aware of doping in his sport and among people he knows. He thinks others at his level in NZ are doping and that people important to him want him to. Wiremu intends to dope this season and would do so soon if he felt forced to do so in sport.
Casey	**Casey** is 13 years old and isn't yet sure if she wants to be an athlete. Instead, Casey participates in different sports and activities (music, drama) to explore what fits best with who she wants to be. Casey's parents make most decisions for her which she is happy about, as the thought of making her own decisions makes her anxious. Casey thinks people have expectations of her and worries about disappointing them which sometimes makes her feel overwhelmed. Casey's coaches want her to "be a winner", but she isn't focused on winning because she doesn't know if sport is what she wants to be good at. Casey thinks others at her level in NZ are doping and is aware of doping in her sport and among people she knows. Casey hasn't started using supplements but thinks it is normal for athletes to do so. Casey thinks people she knows would be ok with her doping and people important/close to her want her to. If Casey does decide to be an athlete, she would consider doping.
Matt	**Matt** is a 17-year-old athlete who plays his sport because he wants to, but in his sporting environment, he can't make decisions like he can elsewhere in his life. Matt feels a lot of pressure to reach performance goals quickly which his coach sees as part of winning. His coach points out the best athletes, telling Matt and his teammates to be better than each other. Matt has been taken out of games for making mistakes. Matt gets confident when he wins while showing he is one of the best. His weight is important to how good he feels, and he likes looking good when he practices the same routines. Matt first used supplements in year 10 when training at a gym and now uses them often. Matt knows athletes who dope and believes doping occurs at his level of competition in NZ.