

What is mental toughness and how does it  
work?

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# TABLE OF CONTENTS

<b>LIST OF FIGURES .....</b>	<b>vi</b>
<b>LIST OF TABLES .....</b>	<b>vii</b>
<b>LIST OF APPENDICES.....</b>	<b>ix</b>
<b>LIST OF ABBREVIATIONS .....</b>	<b>x</b>
<b>NOMENCLATURE.....</b>	<b>xi</b>
<b>LIST OF PUBLICATIONS ARISING FROM DOCTORAL THESIS .....</b>	<b>xii</b>
Papers accepted for publication .....	xii
Papers under review .....	xii
<b>ATTESTATION OF AUTHORSHIP .....</b>	<b>xiii</b>
<b>DEDICATION .....</b>	<b>xiv</b>
<b>ACKNOWLEDGEMENTS.....</b>	<b>xv</b>
<b>PREFACE .....</b>	<b>xvii</b>
<b>ABSTRACT .....</b>	<b>1</b>
<b>CHAPTER 1. INTRODUCTION.....</b>	<b>3</b>
Background.....	3
The benefits of mental toughness.....	4
Current conceptualisations of mental toughness.....	5
Thesis Rationale .....	11
Statement of the problem.....	11
Statement of purpose .....	14
Significance of the research.....	16
Study de-limitations .....	19
Thesis overview .....	21
Thesis organisation.....	21

**CHAPTER 2. CONCEPTUAL CLARIFICATION OF MENTAL**

**TOUGHNESS: A SYSTEMATIC LITERATURE REVIEW AND**

**CONTENT ANALYSIS ..... 24**

Preface ..... 24

Abstract..... 25

Introduction..... 26

Method..... 32

    Data search..... 32

    Inclusion and exclusion criteria ..... 35

    Procedure ..... 35

Results ..... 37

Discussion..... 46

    Study limitations ..... 53

**CHAPTER 3. CONCEPTUAL CLARIFICATION OF MENTAL**

**TOUGHNESS: INSIGHTS FROM EXPERTS AND SURROUNDING**

**NOMOLOGICAL NETWORKS ..... 55**

Preface ..... 55

Abstract..... 56

Introduction..... 57

Method..... 65

    Participants..... 65

    Procedure ..... 65

Results ..... 67

    Centrality of themes to mental toughness..... 67

    Proximities between mental toughness and related constructs ..... 74

    Centrality of themes to the collective group of related constructs..... 75

    Data reliability..... 79

Qualitative Data .....	79
Discussion.....	80
Study limitations .....	84
<b>CHAPTER 4. LAY PERSPECTIVES OF MENTAL TOUGHNESS: A</b>	
<b>    PROTOTYPE ANALYSIS .....</b>	<b>87</b>
Preface .....	87
Abstract.....	88
Introduction.....	89
<b>PART 1: GENERATION OF MENTAL TOUGHNESS ATTRIBUTES .....</b>	<b>95</b>
Method.....	95
Participants.....	95
Procedure .....	96
Results and discussion.....	97
<b>PART 2: CENTRALITY RATINGS OF MENTAL TOUGHNESS</b>	
<b>ATTRIBUTES .....</b>	<b>103</b>
Method.....	104
Participants.....	104
Procedure .....	104
Results and discussion.....	105
Overall discussion .....	106
Limitations .....	110
<b>CHAPTER 5. A SYSTEMS-APPROACH MODEL OF MENTAL</b>	
<b>    TOUGHNESS: UNDERSTANDING INPUTS, PROCESSES AND</b>	
<b>    OUTPUTS .....</b>	<b>112</b>
Preface .....	112
Abstract.....	114
Introduction.....	115
Method.....	117

Participants.....	118
Procedure .....	118
Data analysis .....	119
Results .....	121
Theme 1: Inputs .....	123
Theme 2. Processes .....	125
Theme 3: Outputs.....	130
Discussion.....	131
Aggregation of findings into a systems-approach model of mental toughness .....	136
Study limitations .....	139
<b>CHAPTER 6. DISCUSSION .....</b>	<b>141</b>
Defining mental toughness: What is it? .....	141
Mental toughness as a standalone phenomenon (Objective 1) .....	141
Consolidating and re-defining mental toughness (Objective 2a and 2b)	145
Lay perceptions of mental toughness (Objective 3).....	148
Understanding the mechanisms underlying mental toughness: How does it work? (Objective 4).....	150
General discussion .....	152
Research limitations .....	155
Recommendations for future research.....	157
<b>REFERENCES .....</b>	<b>160</b>

## LIST OF FIGURES

<i>Figure 1-1.</i> A model of mental toughness in Australian Football by Gucciardi et al. (2008).....	7
<i>Figure 1-2.</i> A personal construct psychology model of mental toughness in sport by Gucciardi et al. (2009a).....	8
<i>Figure 1-3.</i> Conceptual overview of concepts, sub-categories, and categories associated with mental toughness according to Australian soccer players, parents and coaches (Coulter et al., 2010) .....	10
<i>Figure 1-4.</i> Mental toughness is mapped closely to Sports Sciences by Rusk and Waters (2013) using bibliographic coupling .....	13
<i>Figure 1-5.</i> Overall approach of this thesis to widening and deepening current understanding of mental toughness .....	14
<i>Figure 1-6.</i> Thesis structure .....	22
<i>Figure 2-1.</i> Article selection and definition extraction process .....	36
<i>Figure 3-1.</i> Proximal distances of constructs based on mean centrality ratings ...	75
<i>Figure 5-1.</i> A systems-approach model of mental toughness derived from thematic analysis of raw data .....	136

## LIST OF TABLES

<i>Table 2-1.</i> Date ordered definitions of mental toughness retrieved from a systematic literature review .....	27
<i>Table 2-2.</i> Definitions of related constructs .....	29
<i>Table 2-3.</i> Definitions of ‘mental’, ‘toughness’ and related applications of toughness.....	31
<i>Table 2-4.</i> Search strategy and article selection statistics .....	33
<i>Table 2-5.</i> Summary of higher-level categories and their constituent features derived from the content analysis of definitions .....	39
<i>Table 2-6.</i> Agreement/disagreement within definitions of mental toughness .....	41
<i>Table 2-7.</i> Mental toughness features shared with other constructs .....	42
<i>Table 2-8.</i> Remaining features not shared between mental toughness and other constructs .....	43
<i>Table 3-1.</i> Definitions of mental toughness identified by Sorensen, Jarden and Schofield (2016) .....	60
<i>Table 3-2.</i> Definitions of conceptual neighbours of mental toughness identified by Sorensen et al. (2016).....	62
<i>Table 3-3.</i> Definitions of conceptual parents and siblings identified by Sorensen et al. (2016) .....	64
<i>Table 3-4.</i> Frequently featured themes that occur in mental toughness definitions, their corresponding mean centrality ratings, and other constructs that include given themes .....	69
<i>Table 3-5.</i> Centrality of features to mental toughness that appear in definitions of related constructs .....	72
<i>Table 3-6.</i> Correlations between mean centrality ratings of constructs .....	74
<i>Table 3-7.</i> Component loadings for constructs onto a one-factor solution .....	76

<i>Table 3-8.</i> Ten most central and ten most peripheral themes of the total dataset (excluding sisu and gender norm toughness) .....	78
<i>Table 4-1.</i> Qualitatively-generated attributes of mental toughness in sporting populations .....	90
<i>Table 4-2.</i> Attributes sorted by Part 1 frequencies* .....	99
<i>Table 4-3.</i> Attributes sorted by Part 2 Mean Centrality Ratings (MCR)* .....	99
<i>Table 5-1.</i> Criteria and themes and sub-themes identified from raw data .....	122

## **LIST OF APPENDICES**

Appendix A. Definitions (in chronological order) of mental toughness and its parent ('mental', 'toughness'), sibling (gender norm toughness, material toughness) and neighbouring terms (resilience, hardiness, grit, psychological flexibility, sisu and mental fitness).....	189
Appendix B. Chapter 4, Part 2 Questionnaire .....	208
Appendix C. Full list of themes obtained from raw data in Chapter 5 .....	215
Appendix D. AUTEK approval for lay prototype analysis of mental toughness (Chapter 4).....	219
Appendix E. Permissions to include copyrighted material .....	220

## LIST OF ABBREVIATIONS

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<b>Abbreviation</b>	<b>Definition</b>
4Cs	Four C's of control, commitment, confidence and challenge; Clough, Earle and Sewell (2002)
ACT	Acceptance Commitment Therapy
CBT	Cognitive Behavioural Therapy
DT	Dictionary definitions of toughness
DTA	Deductive Thematic Analysis
G	Grit
GNT	Gender Norm Toughness
H	Hardiness
ICC	Intraclass Correlation
KMO	Kaiser-Meyer-Olkin measure
MatT	Material Toughness
MCR	Mean Centrality Rating
MF	Mental Fitness
MTQ48	Mental Toughness Questionnaire 48
NZ	New Zealand
PF	Psychological Flexibility
PRISMA	Preferred Reporting Items for Systematic Reviews and Meta- Analyses
R	Resilience
S	Sisu

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## NOMENCLATURE

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<b>Term/symbol</b>	<b>Definition</b>
#	Feature number
e.g.	For example
i.e.	For instance
>	Greater than
$\alpha$	Internal consistency coefficient
<	Less than
n.d.	No date
$n$	Number of cases in a sample
/	or
p.	Page
pp.	Pages
$r$	Pearson correlation coefficient
%	Percentage
$p$	p-value, statistical significance
$SD$	Standard Deviation

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## LIST OF PUBLICATIONS ARISING FROM DOCTORAL THESIS

### Papers accepted for publication

Sorensen, S. H., Schofield, G., & Jarden, A. (2016). A systems-approach model of mental toughness. *Psychology*. Approximate contributions: Sorensen (80%), Jarden (10%), Schofield (10%).

Sorensen, S. H., Jarden, A., & Schofield, G. (2016). Lay perceptions of mental toughness: Understanding conceptual similarities and differences between lay and sporting contexts. *International Journal of Wellbeing*. Approximate contributions: Sorensen (80%), Jarden (10%), Schofield (10%).

### Papers under review

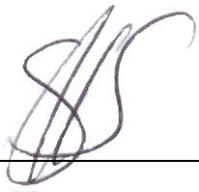
Sorensen, S. H., Jarden, A., & Schofield, G. (2016). Conceptual clarification of mental toughness: A literature review and content analysis. *Stress & Health*. Approximate contributions: Sorensen (80%), Jarden (10%), Schofield (10%).

Sorensen, S. H., Jarden, A., & Schofield, G. (2016). Conceptual clarification of mental toughness: Insights from experts and surrounding nomological networks. *Stress & Health*. Approximate contributions: Sorensen (80%), Jarden (10%), Schofield (10%).



## 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.



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## DEDICATION

"A teacher affects eternity. He can never tell where his influence stops."

- Henry Adams

This thesis is dedicated to the exceptional teachers, tutors, lecturers and mentors, who everyday have the potential to change the trajectory of lives. I am lucky to have a number of exceptional figures who have influenced my life story.

Specifically, to Mum and Dad (Derek and Denise van Rooyen), Mr. Ian Yin and Dr. Aaron Jarden; each of you believed in me when I didn't, and skillfully coerced me to exceed my self-constructed limits. Thank you.



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In particular, I would like to thank all of the participants who took valuable time from their busy schedules to openly share your oftentimes painful life experiences. The information that you have shared has and will continue to significantly extend our ability to foster growth and survival in others going through similar tough experiences.

To the wider staff at Auckland University of Technology (AUT), thank you for your time and effort towards providing world-class resources necessary for completion of such a project. Especially noteworthy are those at the AUT library who processed numerous distance requests for library books that would have been inaccessible to me. Further, my gratitude extends to AUTEK (Auckland University of Technology Ethics Committee), and in particular Kate O’Connor, for your guidance and timely ethics approval necessary for this research (application number 15/148, date 26/05/2015).

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On that note, many thanks go to the staff and students at the Human Potential Centre who took time out of their own journeys to help me on mine. In particular, to Dr. Julie Bhosale who selflessly took time out of her busy schedule to provide me with motivation and support to complete this project before our impending arrival. To Kristen Hamling, whose infectious energy and optimism shone light on some of the hardest moments in my PhD. Other special mentions go to Dr. Lisa Mackay, Kate Prendergast, Dr. Lucy Hone, Johanne Egan and Dee Holdsworth-Perks for your time taken to provide technical advice, support, and organisation behind the scenes.

To my family: Mum (Denise), Dad (Derek), Mandy, Felix, Jess and Scott. Taking risks is easy when you know that you have a solid foundation to fall back on. Without your love and support, I may not have had the courage to extend myself so far. Thank you for always being there with words of wisdom, or no words at all, when I just needed a shoulder or an ear.

Finally, to my husband and best friend, Mark Sorensen. You lived this journey with me and made as many sacrifices as I did. Thank you for unselfishly allowing me to be consumed by this project, which often left little attention, time and energy for you. I know that the commitment, love, respect and compassion that we have for one another is and will be the vital ingredients for weathering life’s storms together.

## PREFACE

Despite six years studying psychology formally, I only noticed Positive Psychology when I stumbled upon Shawn Achor's TED talk: "The happy secret to better work". In between Shawn's witty one-liners, I realised that the underlying principles of Positive Psychology he spoke about aligned with my passions and life experiences. Not satisfied with simply watching others get involved in this exciting new field, I impulsively decided to contact the president of the New Zealand Association of Positive Psychology, Dr. Aaron Jarden, who would go on to become my PhD supervisor and mentor.

Stemming from my childhood experiences, the part of Positive Psychology that really struck a personal chord with me was the study of human strength. I grew up on a farm in Zimbabwe, and due to political reasons, within days we were stripped of everything we had worked for and dreamed of becoming in the future. This loss could only have been magnified for my parents, who in a heartbeat had lost twenty years of hard work and sacrifices with no form of livelihood to support three teenage daughters. Despite the weight of material losses, however, they were far exceeded by the threat to our lives and the loss of friends, family and beloved pets who we had to leave behind in order to start a new life in New Zealand.

During this time, the particular human strength that continues to stand out among others within our family is mental toughness, which subsequently became my primary focus for this PhD. The concept of mental toughness particularly stood out as I watched my parents fight to overcome numerous "no's" to enter New Zealand, eventually succeed and then start over again with nothing but gratitude for opportunities granted by New Zealanders and determination to succeed in a new environment. After a few financially difficult years in New Zealand, dad bravely accepted an international agricultural posting to Afghanistan; equally brave, mum soldiered on in New Zealand without knowledge of dad's safety or whereabouts. As a result of my parent's incredible mental toughness, dad

was able to return to New Zealand and invest in a kiwifruit orchard in Kerikeri. Eventually, now their own piece of land.

This is my own experience of mental toughness, but just as worthy are the experiences told to me by family, friends and participants throughout my PhD journey. My experiences, and those imparted to me by others, have fuelled my passion and faith in human strength to survive adversity. It is my deepest hope that the academic and scientific knowledge presented here and elsewhere in the literature – in a rather abstract and detached way – be translated into real human outcomes of surviving, striving and thriving despite life's twists and turns.

## ABSTRACT

Withstanding inevitable periods of stress and strain is a vital component of human survival. On this basis, fostering invulnerabilities through the study and promotion of individual protective factors needs to be a fundamental and influential aspect of psychology research and practice. One such protective factor is mental toughness. In particular, mental toughness is cited as an influential personal characteristic that promotes positive human functioning in the face of inevitable life stressors. Despite its potential for facilitating human excellence and flourishing, however, the usefulness of mental toughness remains hampered by underlying conceptual and contextual limitations. The purpose of this thesis is to address these limitations in view of engaging ongoing empirical and practical work to disseminate its benefits. Through a series of investigations designed to address these limitations, this work specifically sought to understand what mental toughness is, as well as how it works.

With regard to what mental toughness is, elucidating the meaning of mental toughness was approached from the outside-in. Studies comprising this thesis first sought to understand the relationship between mental toughness and its surrounding conceptual network; followed by consolidation of existing conceptualisations; and finally, a more nuanced understanding of intricate contextual differences in mental toughness meanings. Findings showed that, together with hardiness, psychological flexibility, grit, resilience and mental fitness, mental toughness and its related constructs primarily facilitate a maintenance of psychological wellbeing and functioning. The additional value of mental toughness remained inconclusive. It is argued that mental toughness, as an overarching concept that encompasses its neighbouring constructs, is an explanation for these unexpected findings. Within mental toughness, maintenance of consistency or stability under stressful or pressurised situations is an important and agreed-upon element of mental toughness. However, findings suggested that specifying the specific entity that is

held consistent or stable may remain a context-specific detail. Within specific populations, whereas resilience and determination emerged as a common themes, context-specific differences in the meaning of mental toughness was evident. In particular, laypeople are more likely to identify overarching terms, such as mental strength, and outcomes, such as overcoming obstacles, and achieving/operating under pressure as central to mental toughness, rather than specific psychological processes inherent in existing expert and sporting-focused conceptualisations. Drawing the above findings together into a single definition, mental toughness was reconceptualised as *a resistance to psychological disintegration under stress*.

As well as understanding what mental toughness is, this thesis explored how mental toughness works. Following findings in aforementioned studies that highlighted the contextual nature of mental toughness, knowledge of the underlying system (vis-à-vis content) of mental toughness attributes was required to achieve an understanding of the phenomenon across contexts. To this end, using qualitative statements from laypeople, the final study identified that mental toughness attributes can be allocated to inputs of personal resources and stressors, strength and accommodation processes, and outputs of surviving, thriving and surviving.

Through expanding conceptual knowledge of mental toughness in this way, the studies comprising this thesis further the empirical and practical utility of mental toughness. Specifically, this work adds to existing knowledge required for promoting thriving and preventing mental illness in the face of inevitable life stressors.

## CHAPTER 1. INTRODUCTION

### Background

Psychology is tasked with the function of “apply[ing] the discipline's scientific knowledge to help people, organisations and communities function better” (American Psychology Association, 2016, para 1). To this end, a particularly useful body of scientific knowledge originates from the work of theorists, such as Sigmund Freud, Carl Rogers and Abraham Maslow, who wrote of personal characteristics required for healthy functioning. Specifically, against a backdrop of pathology, weakness and damage, this body of knowledge pertains to protective factors that enables individuals to survive inevitable periods of stress and strain (Levenson, 2008).

Although these protective factors are evident throughout historical and academic literatures, they have recently been formalised into a recognised line of scientific enquiry under the banner of ‘positive psychology’. In particular, positive psychology re-directs psychological science to the study and application of strength (Seligman & Csikszentmihalyi, 2000). On the basis of evidence supporting personal strengths as “the most potent weapon in the arsenal of therapy” (Seligman, 2002, p. 3) that effectively act as buffers against mental illness (Seligman & Csikszentmihalyi, 2000), ongoing research efforts toward extending current theoretical knowledge and practical applications of personal strengths are suitably justified.

Mental toughness may qualify as one such strength of character worthy of ongoing scientific enquiry. For example, mental toughness has been identified as a collection of values, attitudes, cognitions, emotions and behaviours that influence the way an individual responds to stress or pressure (Coulter, Mallett, & Gucciardi, 2010; Gucciardi, Gordon, & Dimmock, 2008; Gucciardi, Gordon, & Dimmock, 2009a; Mallett & Coulter, 2011). The characteristic responses of mental toughness consist of a number of character strengths listed by Peterson and Seligman (2004), which include perseverance (Gucciardi

et al., 2008; Ryba, Stambulova, & Wrisberg, 2009; Weinberg, Butt, & Culp, 2011), bravery (Ryba et al., 2009), judgement (Bull, Shambrook, James, & Brooks, 2005), and self-regulation (Gucciardi et al., 2008; Gucciardi, Hanton, Gordon, Mallett, & Temby, 2015; Thelwell, Weston, & Greenlees, 2005). Finally, with the advent of various measurement tools for distinguishing between degrees of mental toughness, researchers have established the role of mental toughness in facilitating human excellence and flourishing (Gucciardi et al., 2015).

### *The benefits of mental toughness*

Under the umbrella of human excellence and flourishing, mental toughness has been cited by researchers, coaches and athletes as an influential psychological factor for performance in sports (Gould, Hodge, Peterson, & Petlichkoff, 1987; Gould, Dieffenbach, & Moffett, 2002; Slack, Maynard, Butt, & Olusoga, 2013), and education, military and business contexts (Gucciardi et al., 2015; Shen & Comrey, 1997; Marchant, Polman, Clough, Jackson, Levy, & Nicholls, 2009; St. Clair-Thompson, Bugler, Robinson, Clough, McGeown, & Perry, 2015). Along with its performance-enhancing capacity, mental toughness is associated with higher pain tolerance (Burke & Orlick, 2003; Levy, Polman, Clough, Marchant, & Earle, 2006; Tenenbaum et al., 1999), positive motivational states (Gucciardi, 2010), and greater associations with learning, mastery or approach rather than avoidance goals (Gucciardi, 2010; Gucciardi et al., 2015; Hardy, Bell, & Beattie, 2014).

Beyond performance, mental toughness may be conceptualised as a positive psychological characteristic that enables one to withstand stress. For example, Kaiseler, Polman and Nicholls (2009) found that mental toughness was associated with more perceived controllability over stressful events and less experience of stress, which translated to greater problem-focused (seeking instrumental social support, planning,

suppressing competing activities and increasing effort) rather than emotion-focused (seeking social support, humour, venting emotions, self-blame and wishful thinking) or avoidance-focused (denial and behavioural disengagement) coping styles.

In line with greater stress-resistance, a number of studies have associated mental toughness with aspects of wellbeing. In particular, in longitudinal as well as cross-sectional research, Gerber, Brand, et al. (2013) and Gerber, Kalak, et al. (2013) found significant relationships between mental toughness, perceived stress and resilience (operationalised by low depressive symptoms and high life satisfaction) in high school and college students. Similarly, mental toughness has been associated with lower mood disturbances (Hollander & Acevedo, 2000) and greater positive and less negative affect (Gucciardi & Jones, 2012; Gucciardi et al., 2015; Sheard, Golby, & van Wersch, 2009). Stemming from a greater frequency of positive emotions and lower frequency of negative emotions, and a tendency to seek out challenging environments, Crust and Swann (2013) further posit that mental toughness may contribute towards greater experiences of flow.

Despite the potential benefits afforded by mental toughness, however, its usefulness as a human strength has been hampered by a number of conceptual and operational limitations. In particular, reviewers of the mental toughness literature have commented that mental toughness is one of the most used but least understood terms in sport psychology (Jones, Hanton, & Connaughton, 2002). Nonetheless, to add background to these claims, the following section describes the evolution of qualitative mental toughness conceptualisations to-date.

### *Current conceptualisations of mental toughness*

Over seventeen definitions of mental toughness exist (see Appendix A, page 189). Particularly noteworthy are those based on robust qualitative methods because they better reflect perceptions of mental toughness than theoretically-generated definitions

(Sternberg, 1990). On this basis, the following section reviews the evolution of qualitatively-generated mental toughness definitions. This review is important for ascertaining the current landscape and methodologies used to develop mental toughness definitions.

The evolution of qualitatively-generated mental toughness definitions began with Jones et al. (2002) seminal conceptualisation of mental toughness. In this study, Jones et al. (2002) used the framework of Kelly's Personal Construct Theory (Kelly, 1955) to interview international sports performers ( $n = 10$ ) across a variety of sporting disciplines. The resultant definition (see Appendix A, page 189) suggests that mental toughness can be natural or developed, and that it contains generalised (e.g., coping) and specific outcome measures (focus, determination, control and confidence) that are better and more consistent than other competitors. To further identify context-specific meanings of mental toughness, Thelwell et al. (2005) investigated this definition within a single-sporting population of elite soccer players ( $n = 6$  in Study 1;  $n = 43$  in Study 2). Participants supported the definition by Jones et al. (2002), except they suggested that mental toughness involves *always* rather than *generally* coping better than opponents. Although applauded for producing the first empirically-generated definition of mental toughness, the definition by Jones et al. (2002) and Thelwell et al. (2005) have been argued as redundant due to an outcome- and other- focus, with little theoretical integration (Andersen, 2011, Gucciardi et al., 2009a; Middleton, Marsh, Martin, Richards, & Perry, 2004).

On the basis of these weaknesses, Middleton et al. (2004) generated a definition of mental toughness using a grounded theory approach to investigating the perspectives of athletes, sports scientists, coaches, psychologists and managers. As presented in Appendix A (page 189), Middleton et al. (2004) used this data to define mental toughness

as the presence of unshakeable perseverance and conviction in situations of adversity and pressure.

However, on the basis of qualitative data obtained from elite Australian football coaches ( $n = 11$ ), Gucciardi et al. (2008) criticised the definition by Middleton et al. (2004) by suggesting that mental toughness extends beyond perseverance, conviction and negative environments. Gucciardi et al. (2008) subsequently presented a definition that included behavioural, emotional and cognitive aspects of mental toughness in both positively and negatively construed contexts (see Appendix A, page 190). As illustrated in Figure 1-1 below, in addition to their definition, Gucciardi et al. (2008) provided a model of mental toughness that outlines the characteristics (and their opposites), contexts and behaviours involved in mental toughness. As such, their work significantly enhanced researchers' and practitioners' ability to identify typical cases of mental toughness.

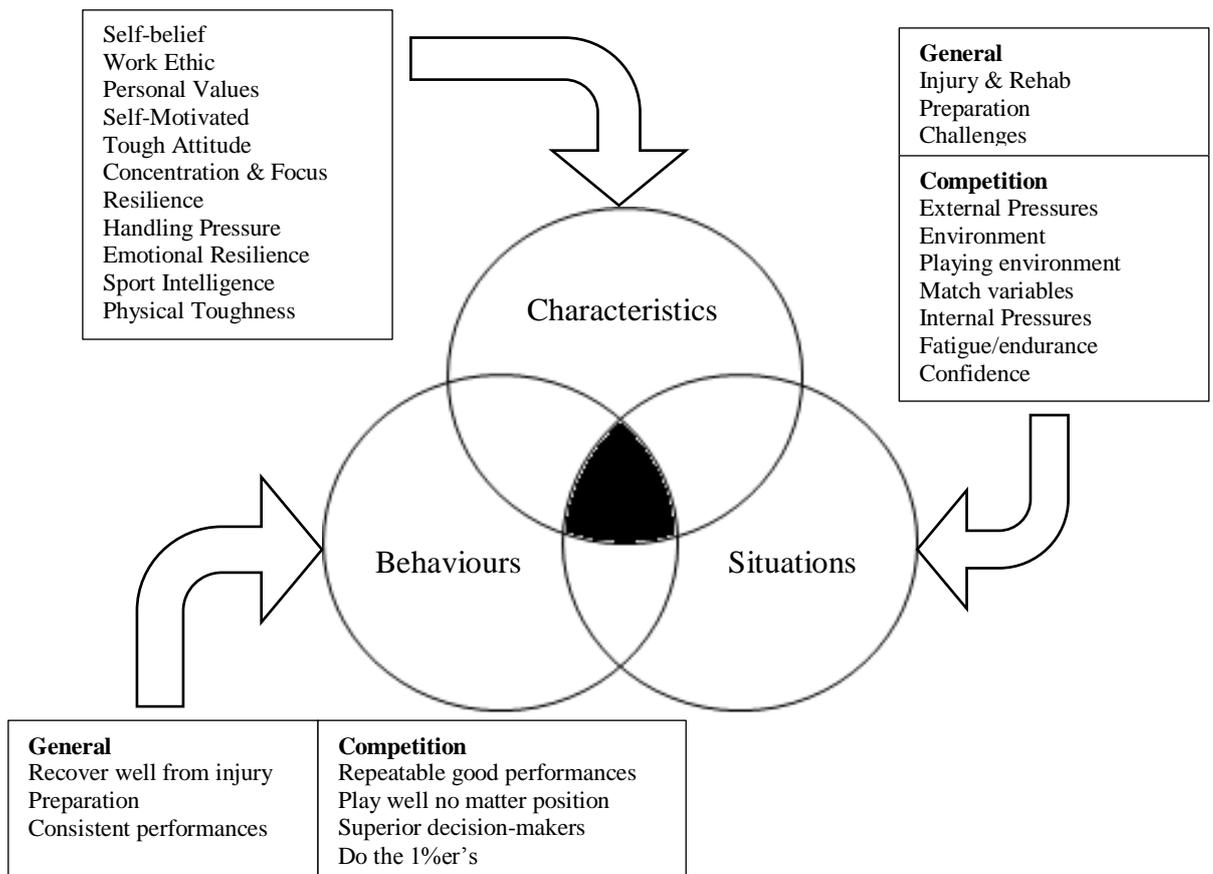


Figure 1-1. A model of mental toughness in Australian Football by Gucciardi et al. (2008)

Based on the merits of this research, Gucciardi et al. (2009a) proposed a theoretically-driven process definition of mental toughness (from Kelly's Personal Construct Theory). This definition described mental toughness as a set of values, attitudes, emotions, and cognitions that influence the way in which an individual approaches, appraises and responds to positive as well as negatively construed pressure (see Appendix A, page 190). Attached to this conceptualisation was the first process model in the mental toughness literature, which is necessary for describing *how* mental toughness is elicited from the attributes, characteristics, behaviours and contexts of mental toughness identified in previous studies. This model is depicted in Figure 1-2 below.

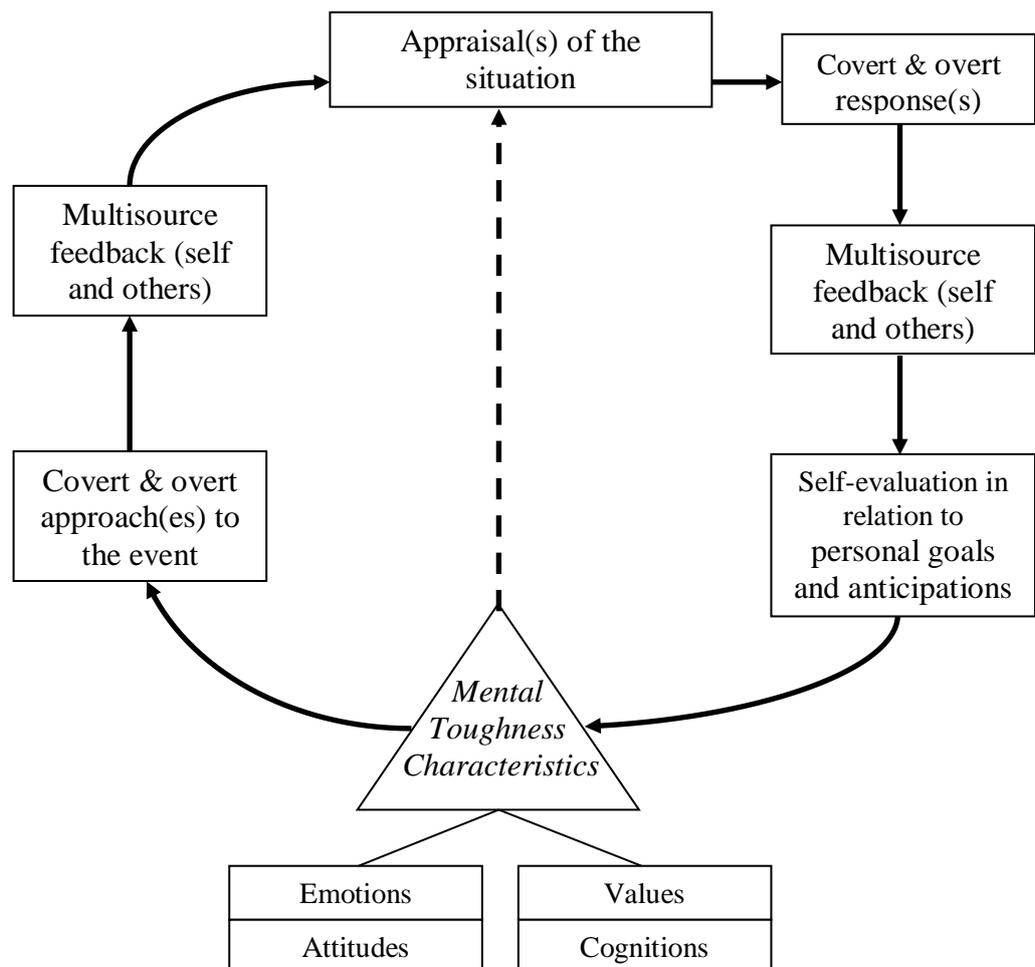
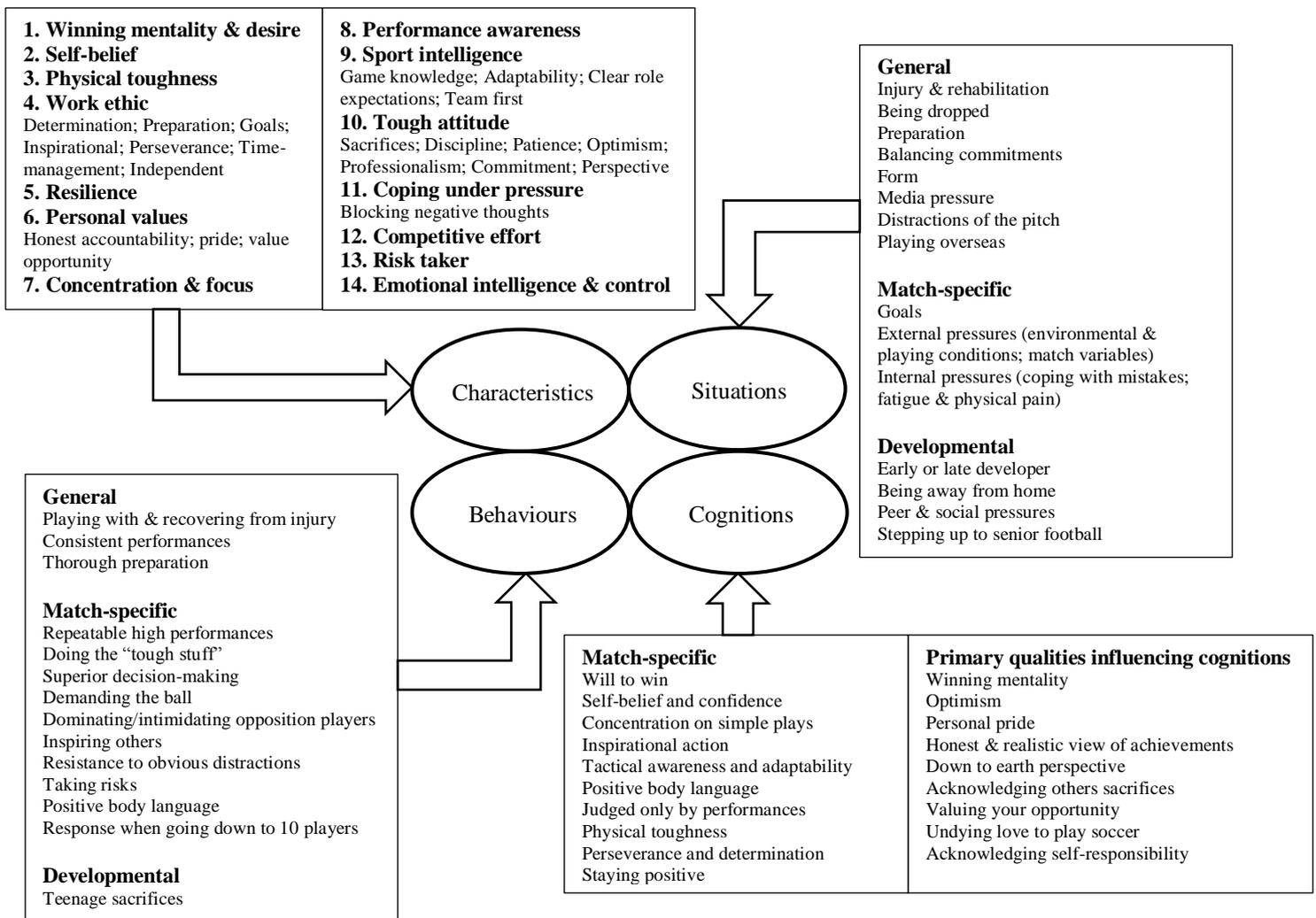


Figure 1-2. A personal construct psychology model of mental toughness in sport by Gucciardi et al. (2009a)

Coulter et al. (2010) later empirically tested the definition by Gucciardi et al. (2009a) by conducting semi-structured interviews with elite soccer players ( $n = 6$ ) and their coaches ( $n = 4$ ), and parents ( $n = 5$ ). The interview data largely supported aspects of Gucciardi et al. (2009a) definition although the authors suggested that mental toughness included *some or the entire* set of attributes, and added *behaviours* as an additional element (as shown in italics in Appendix A, page 190). Beyond the contribution to defining mental toughness, Coulter et al. (2010) also listed cognitive attributes of mental toughness and further elucidated the characteristics, situations and behaviours of mental toughness previously included in the model by Gucciardi et al. (2008; see Figure 1-3 below).



*Figure 1-3.* Conceptual overview of concepts, sub-categories, and categories associated with mental toughness according to Australian soccer players, parents and coaches (Coulter et al., 2010)

In sum, looking across past research efforts, qualitative investigations of mental toughness have driven a significant progression in the mental toughness literature to-date. Specifically, qualitatively-driven conceptualisations have progressed the knowledge of mental toughness from a basic descriptive outline of what mental toughness is (e.g., Jones et al., 2002) to more sophisticated conceptualisations of mental toughness (e.g., Coulter et al., 2010; Gucciardi et al., 2008) that are anchored in qualitative data and theory (i.e., Personal Construct Theory; Kelly, 1955) and describe both what mental toughness is, and

also how mental toughness is elicited. However, despite their significant contributions towards understanding mental toughness, these conceptualisations contain inherent limitations which have impacted understanding of mental toughness and credibility of existing measurement tools (Crust & Swann, 2011; Gucciardi, Mallett, Hanrahan, & Gordon, 2011; Madrigal, Hamill, & Gill, 2013; Middleton, Martin, & Marsh, 2011; Parkes & Mallett, 2011). The next section outlines these conceptual limitations in further detail.

## **Thesis Rationale**

### *Statement of the problem*

The first problem is a relatively limited understanding of how mental toughness is situated within its nomological network; as a discrete standalone phenomenon as well as part of a collective group. Currently, mental toughness has been positioned as a related, yet distinct, construct to similar others (e.g., resilience, hardiness, grit) on the basis of theoretical discussion and/or empirical comparison between test scores of related constructs (Golby & Sheard, 2004; Gucciardi et al., 2015; Gucciardi & Gordon, 2009; Gucciardi et al., 2008; Sheard, 2009). However, neither of these approaches have provided scientific evidence of how and why mental toughness stands apart from – and can be considered a part of – this group of similar constructs. Further to this, connections to its parent terms (i.e., ‘mental’ and ‘toughness’) and related applications of toughness (e.g., gender norm toughness, material toughness) is relatively unexplored (for an exception, see Gucciardi et al., 2015), which overlooks valuable sources of conceptual information for anchoring mental toughness in its constituent terms.

Once the conceptual context around mental toughness is elucidated, the second problem is clarifying current understanding of mental toughness itself. Limitations particularly exist with the diverse definitions of mental toughness that are relatively

confined to sporting or performance contexts. For instance, the vast number of definitions and characteristics associated with mental toughness has left some reviewers to comment that “mental toughness could be just about anything” (Andersen, 2011, p. 72). Further, the disproportionate use of mental toughness in sports psychology (as mapped by Rusk & Waters, 2013; see Figure 1-4 below) has resulted in, or stemmed from, the predominant use of sporting populations to conceptualise mental toughness (e.g., Bull et al., 2005; Coulter et al., 2010; Gucciardi et al., 2008; Gucciardi et al., 2009a; Jones et al., 2002, Jones, Hanton, & Connaughton, 2007; Thelwell et al., 2005). This is despite recognition of mental toughness as applicable beyond sporting contexts (Gould, Griffes, & Carson, 2011; Gucciardi et al., 2015). This almost exclusive sports focus calls into question the validity of empirical evidence that has employed sporting-based measures of mental toughness outside sporting or performance arenas (e.g., Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2015; St. Clair-Thompson et al., 2015).

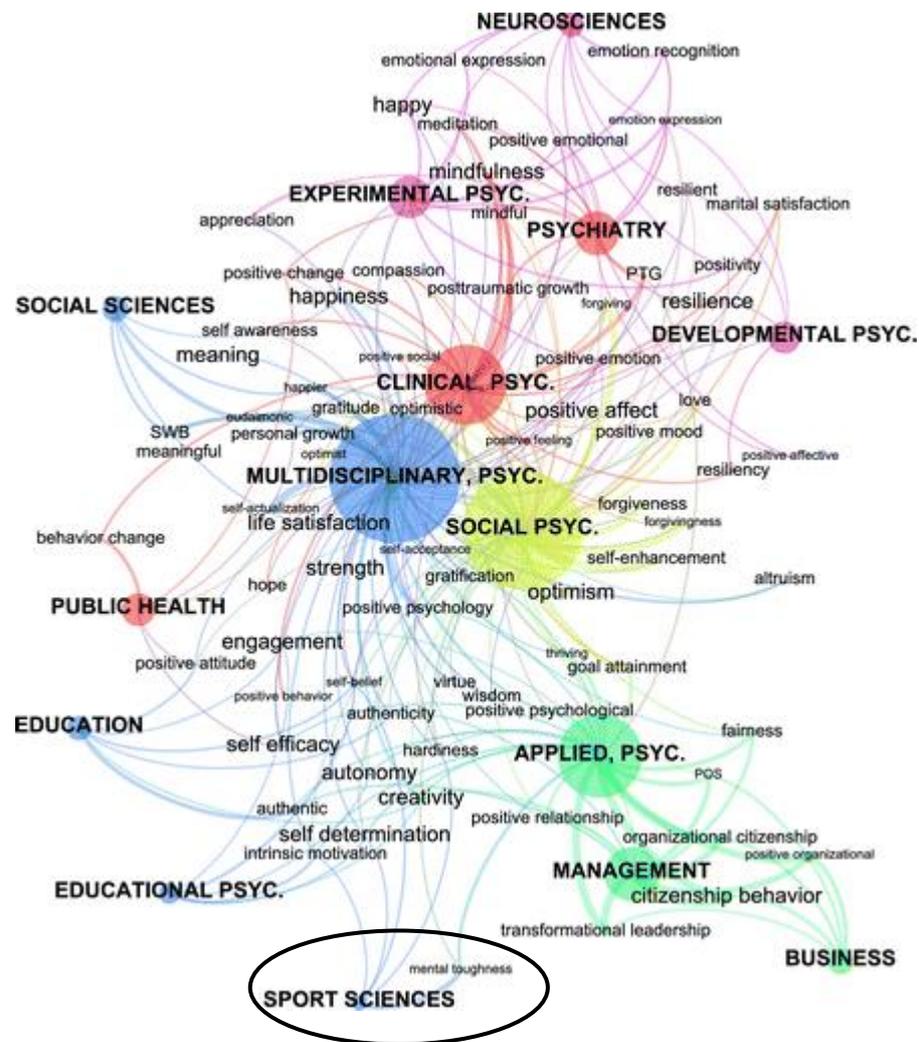
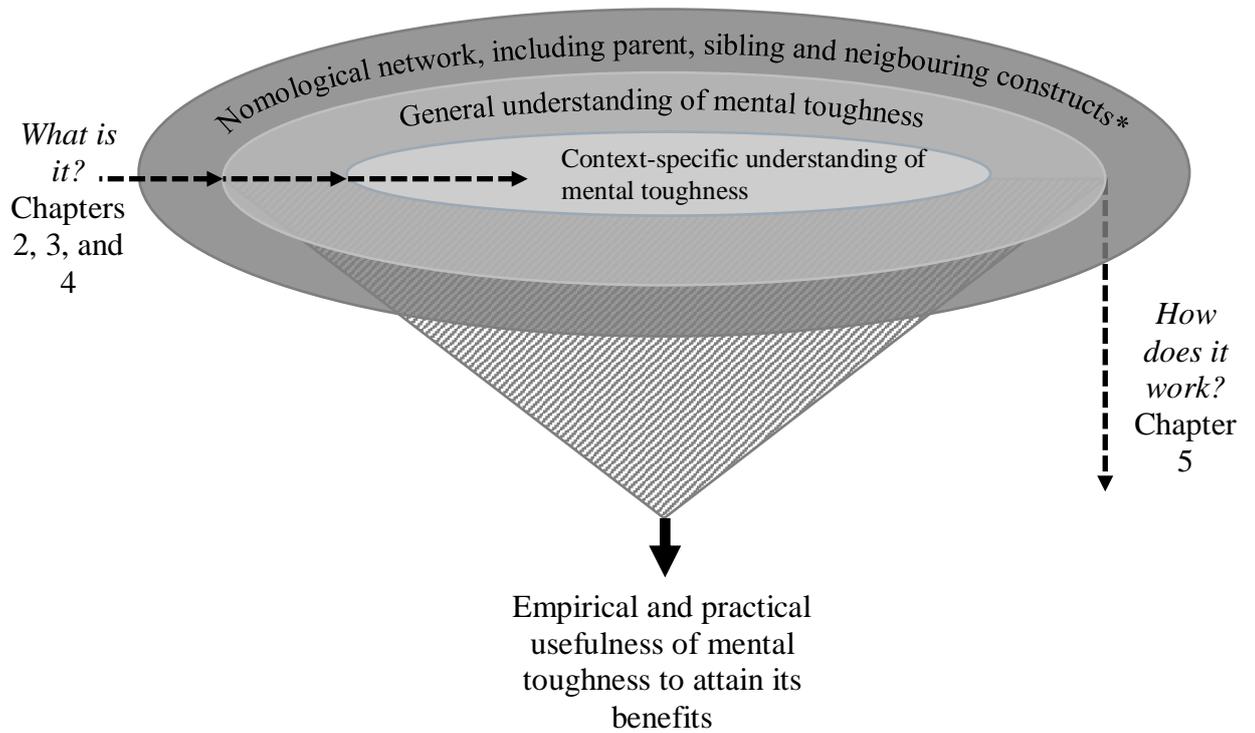


Figure 1-4. Mental toughness is mapped closely to Sports Sciences by Rusk and Waters (2013) using bibliographic coupling

Understanding the ‘surface’ meaning of mental toughness is also accompanied by a limited understanding of the underlying mechanisms of mental toughness; that is, how does it work? Although various underlying processes are addressed by some conceptualisations (e.g., Bull et al., 2005; Coulter et al., 2010; Gucciardi et al., 2008; Gucciardi et al., 2009a), the qualitative methodologies used in conceptualising mental toughness have prevented researchers from differentiating between the entire system of inputs, processes and outputs of mental toughness (Hardy et al., 2014). These components represent a crucial understanding for measuring and developing mental toughness, which will continue to be hindered until these mechanisms are fully understood.

*Statement of purpose*

On the basis of the above issues, as illustrated in Figure 1-5 below, the overall aim of this research is to enhance the empirical and practical usefulness of mental toughness to attain its benefits.



\*Nomological network includes parent terms ('mental' and 'toughness'), sibling constructs (i.e., related applications of toughness such as gender norm toughness and material toughness), and neighbouring constructs (e.g., hardiness, resilience, grit, psychological flexibility, sisu and mental fitness)

*Figure 1-5.* Overall approach of this thesis to widening and deepening current understanding of mental toughness

In particular, enhancing the empirical and practical usefulness of mental toughness is achieved by extending the 'width' as well as 'depth' of mental toughness conceptualisations. First, I aim to extend the *width* of mental toughness knowledge by investigating what mental toughness is, starting from its relationship with the wider nomological network to consolidation of existing conceptualisations within mental toughness and further examination of nuanced conceptual differences between

populations. Second, I aim to extend the *depth* of mental toughness knowledge with identification of the mechanisms underlying mental toughness (i.e., how does it work?).

Thus, to widen and deepen current conceptual understanding of mental toughness, the specific objectives of the research were:

*What is mental toughness? Specifically,*

1. *Within its nomological network:* To investigate mental toughness as a standalone construct within the wider context of similar constructs. Specifically, how is mental toughness similar and/or different to its parent, sibling and neighbouring constructs? (Chapter 2)
2. *Within the field of mental toughness, generally:* To consolidate and re-define mental toughness.

This objective includes:

- a. Identifying conceptual overlap and divergence as well as the most and least important themes within current definitions (Chapters 2 and 3).
  - b. On the basis of analyses in Chapters 2 to 5, to present a new definition of mental toughness that effectively encompasses existing important/agreed-upon attributes and contextual variations of mental toughness (Chapter 5).
3. *Within specific contexts:* To understand lay perspectives of mental toughness that extend beyond academic and/or sporting conceptualisations (Chapter 4).

*How does mental toughness work? Specifically:*

4. To understand the mechanisms underlying mental toughness (Chapter 5).

*Significance of the research*

A plethora of evidence exists to support mental toughness as a positive attribute for withstanding stressors, adversity and other inordinate demands inherent to the human condition (Gucciardi et al., 2015; Rusk & Waters, 2013). On this basis, mental toughness is a psychological construct worthy of consideration and further investigation. However, reviewers have identified mental toughness as one of the most used but least understood terms in sport psychology (Jones et al., 2007). Without a robust and unified conceptualisation of mental toughness on which to base measurement and development tools, researchers are thus limited in their ability to empirically research and practically utilise the construct. On this basis, the series of studies that comprise this thesis significantly contribute towards solidifying conceptual foundations of mental toughness.

This research is the first of its kind to systematically investigate mental toughness as a standalone phenomenon amongst similar and significantly overlapping constructs (e.g., hardiness, resilience, grit, psychological flexibility, *sisu*<sup>1</sup> and mental fitness). Although various discussions and empirical comparisons exist (e.g., Gucciardi & Gordon, 2009; Gucciardi et al., 2008; Gucciardi et al., 2015), scant scientific evidence is available to suggest how and why mental toughness is a unique standalone construct. This evidence is imperative for justifying the ongoing inclusion of mental toughness in psychological literature which may otherwise become littered with conceptual redundancies and independent strands of similar research between related constructs. Further, understanding the unique conceptual contributions of mental toughness is important for knowing when and when not to promote mental toughness over its neighbours.

Although understanding and using each construct in isolation is important, this research provides equally significant knowledge of the underlying features that tie these

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<sup>1</sup> *Sisu* is a Finnish term denoting attributes of perseverance, tenacity, strength of will and determination (Sinkkonen, 2013; Stoller, 1996; See Appendix A, page 210)

constructs together and their relative proximities to each other. An awareness of these features and proximities is paramount for establishing the group's collective function, maintaining coordinated conceptual evolutions as well as gleaned conceptual information from one another. By systematically drawing construct definitions together for the first time, this research particularly provides insights into how and why mental toughness and its neighbours are similar. Despite strong theoretical and empirical links, mental toughness and its conceptual neighbours remain relatively disconnected in theoretical, empirical and practical arenas. Findings will also provide evidence for conceptualisations of mental toughness that are based on similar constructs; for example, Clough et al.'s (2002) 4Cs model of mental toughness (based on the construct of hardiness) which is criticised for a lack of suitable evidence to justify the conceptualisation of mental toughness as a "sport-specific form of hardiness" (Sheard, 2013, p. 61).

Beyond establishing mental toughness as a standalone construct within a wider network, understanding the conceptual roots of mental toughness is vital for communicating the essence of 'mental'/'toughness' and avoiding superfluous features associated with various contextual and theoretical biases. Thus, for the first time, this research investigates the extent to which existing definitions are anchored in its parent terms (i.e., 'mental' and 'toughness') and connected to related applications of toughness (e.g., material toughness and gender norm toughness). The extent of this alignment remains unknown, despite its importance for ensuring the accuracy of existing and future definitions.

Turning now to defining mental toughness, this research is valuable for reconceptualising mental toughness in a way that consolidates, rather than contributes to, conceptual diversity. By pulling independent conceptual threads together, ongoing empirical and practical advances in the field can be compared and jointly used to facilitate

robust and timely progression of mental toughness knowledge. In particular, where previous research has added new definitions or lent weight to existing definitions, the definition presented from findings throughout this thesis is grounded in qualitative data and concurrently consolidates existing definitions. Without consolidation of existing definitions in this way, mental toughness research is likely to remain piecemeal with independent strands of research based on various conceptual bases. For example, due to their reliance on divergent conceptual bases, Crust and Swann, (2011) conclude that mental toughness measures are assessing different aspects of mental toughness and thus their findings have limited comparability.

In addition to consolidating existing definitions, the reconceptualisation of mental toughness presented in this thesis is beneficial for extending mental toughness beyond sporting contexts. Previous reviewers of the mental toughness literature have noted the context-dependent nature of mental toughness; that is, its meaning changes according to the context in which mental toughness is considered (Bull et al., 2005). For the first time, qualitative evidence is provided to support these claims by investigating and contrasting lay perspectives with existing expert/sporting-based conceptualisations of mental toughness. Despite the context-specific nature of mental toughness, however, previous studies have universally applied expert/sporting-based conceptualisations of mental toughness in contexts outside sports, such as education, business and military (e.g., Gucciardi et al., 2015; St. Clair-Thompson et al., 2015). To remedy this gap, and with the context-specific nature of mental toughness in mind, the reconceptualisation of mental toughness in this thesis remains context-general so as to significantly extend the field into cross-contextual applications of mental toughness.

Finally, this research highlights the mechanisms underlying mental toughness (i.e., its inputs, processes and outputs), which have previously remained unexplored (Hardy et al., 2014). Without a robust knowledge of the inner workings of mental toughness,

researchers and practitioners are limited in their ability to measure and develop mental toughness in various cohorts. Further, without an organising framework of inputs, processes and outputs, attributes and models of mental toughness that address one or more inputs, processes and outcomes will remain confusing and disorganised (Andersen, 2011). On these bases, through the identification of how mental toughness works, this thesis significantly extends current avenues for measurement and development of mental toughness and provides an organising framework for existing mental toughness theory.

Although this body of research significantly enhances empirical and practical uses of mental toughness, readers are urged to consider findings in light of a number of de-limitations.

#### *Study de-limitations*

1. Although definitions of mental toughness are major sources of conceptual information, the field of mental toughness has amassed over three decades of theoretical and empirical research. Thus, although the analysis of definitions in this thesis represent an important starting point, due to practical restrictions (such as time and resources), this analysis does not encompass all sources of conceptual knowledge available.
2. On the basis that the meaning of mental toughness is contextually bound, developing a conceptualisation of mental toughness that generalises across groups – and even across individuals, time and cultures – is difficult. Thus, in producing a general definition of mental toughness to accommodate a range of contexts, it is likely that this definition will simultaneously lose nuanced contextual differences. As such, I foresee that the definition will provide a solid conceptual foundation across contexts, but will also need to be specifically tailored to contextual demands.

3. Research comprising this thesis involves a large portion of subjective data analysis (e.g., content analysis, deductive thematic analysis), and relies on expert and laypeople's personal interpretation and centrality rating of themes or attributes. Although measures are taken to limit biases inherent in subjective judgements (e.g., by involving additional researchers and following established guidelines by Braun & Clarke, 2006), it is impossible to completely eliminate or rule out subjective biases.
4. Due to the wide nomological net surrounding mental toughness, the scope of similar constructs were limited to resilience, hardiness, grit, psychological flexibility, sisu and mental fitness. Resilience, hardiness and grit have previously been compared with mental toughness, and as such, were included to clarify and qualify this existing knowledge. Further, positive psychology constructs with theoretical links to mental toughness, such as psychological flexibility, sisu and mental fitness, were deliberately prioritised over a number of other constructs recognised as bordering mental toughness, such as coping (Gucciardi et al., 2015), buoyancy (Strycharczyk & Clough, 2015), self-esteem (Madrigal et al., 2013), optimism (Nicholls, Polman, Levy, & Backhouse, 2008) and flow (Madrigal et al., 2013). Together, these constructs are related to mental toughness because they offer understanding of the way in which individuals perceive, manage and operate under internal and external stressors. For example, based on theoretical arguments, Gucciardi et al. (2015) propose that mental toughness borders coping because mental toughness is likely to preserve core personal resources central to the management of internal and external stressors. However, despite these strong theoretical links, psychological flexibility, sisu and mental fitness was given preference because they have received no attention in the mental toughness literature before, and

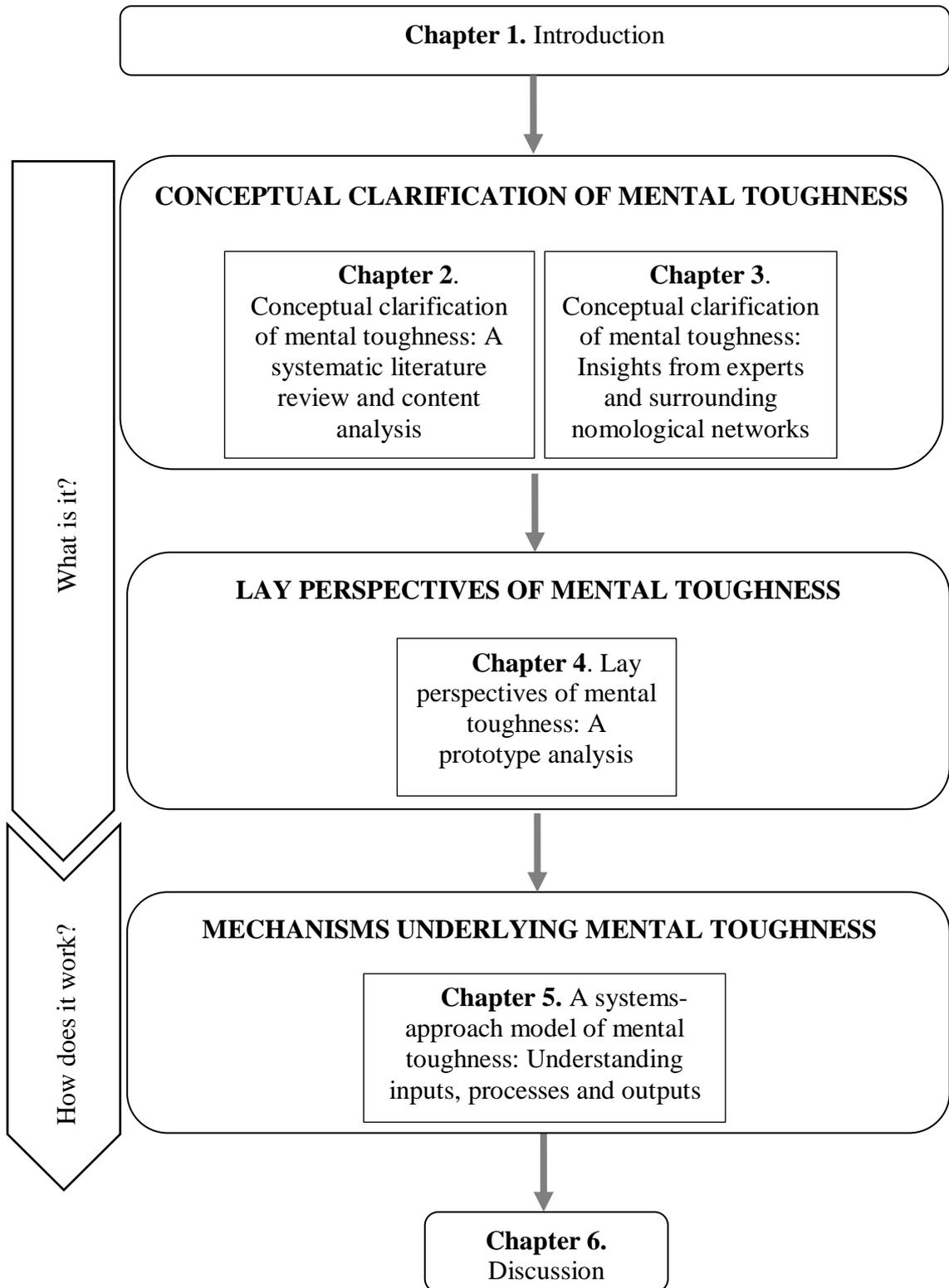
thus offer the greatest scope for new and substantial contributions to our understanding of mental toughness over and above what we already empirically and theoretically know. However, because the scope of similar constructs were limited in this way, findings relating to mental toughness and its nomological network in this work, such as its additional value and their overall functions, are limited to neighbouring constructs of resilience, hardiness, grit, psychological flexibility, *sisu* and mental fitness only.

5. Although allocating attributes of mental toughness into inputs, processes and outputs is valuable for organising and understanding mental toughness theories, attributes of mental toughness invariably possess their own set of inputs, processes and outputs. Thus, although certain attributes are categorically placed into one element (input, process or output) based on qualitative data and the frameworks by Jayawickreme, Forgeard, and Seligman (2012) and Hagerty et al. (2001), attributes may fall into either category depending on their conceptualisation. For example, resilience (which often appears as an attribute of mental toughness) has been conceptualised as a both a process and an outcome (Olsson, Bond, Burns, Vella-Brodrick, & Sawyer, 2003).

## **Thesis overview**

### *Thesis organisation*

As illustrated in Figure 1-6 below, the objectives of this research (see page 15 above) are addressed through a series of investigations (Chapters 2 to 5). Each study is preceded by a preface. To understand their collective contribution towards understanding what mental toughness is and how it works, findings of these studies are consolidated in a final discussion section.



*Figure 1-6. Thesis structure*

The first chapter has introduced mental toughness and outlined the rationale for the ensuing research. Through a systematic literature review and content analysis of

definitions, the second chapter then establishes how mental toughness is currently conceptualised; within the field and also in relation to its surrounding nomological network, including its parent terms ('mental', 'toughness'), sibling (gender norm toughness, material toughness) and neighbouring constructs (hardiness, resilience, grit, psychological flexibility, *sisu* and mental fitness). The themes obtained from the second chapter are then rated in the third chapter by experts for their centrality (or importance) to mental toughness and its related constructs to further understand how these constructs are perceived and integrated with one another. Insofar, these chapters provide a 'snapshot' of how mental toughness is perceived within the field and in relation to its nomological network. Chapter 4 thus follows these investigations by conducting a context-specific prototype analysis of lay perceptions of mental toughness. The qualitative data from Chapter 4 is further organised in Chapter 5 into a systems-approach model, and on the basis of the above findings, a new definition of mental toughness is offered. Chapters 2 to 5 have been prepared for publication in peer-review journals, and as such, some duplication of information occurs. Prefaces to these chapters present the logic and decision-making behind the order of chapter presentation. As outlined in the final discussion section (Chapter 6), when taken together, these series of studies significantly contribute towards elucidating understanding of mental toughness: what it is and how it works. The discussion section also presents the contributions of the research to the wider field of psychology while also noting limitations and suggestions for future research.

## **CHAPTER 2. CONCEPTUAL CLARIFICATION OF MENTAL TOUGHNESS: A SYSTEMATIC LITERATURE REVIEW AND CONTENT ANALYSIS**

### **Preface**

In order to advance the understanding of mental toughness, this chapter examines the conceptual landscape within and surrounding mental toughness, as it currently stands. Specifically, through a systematic literature review and content analysis, I compared definitions of mental toughness with each other to identify their areas of overlap and divergence. As well as this, I compared mental toughness definitions with those of related terms and constructs to assess mental toughness as a standalone phenomenon within a wider yet interconnected network. By using the novel approach of systematically identifying and deconstructing definitions, this chapter offers a number of significant and original contributions to the literature. For the first time, I systematically pinpoint areas of consensus and areas of disagreement in our understanding of what mental toughness is. This new knowledge will highlight core features of mental toughness that can be used to consolidate conceptual understanding of mental toughness between various research bodies and thus advance unified progression of knowledge. By including the nomological network around mental toughness in this analysis, for the first time, I also isolate the features that render mental toughness a standalone construct (i.e., features that are unique to mental toughness definitions), as well as those ‘common threads’ that run throughout the collective group of related constructs (i.e., features that are common to all or most constructs).

## Abstract

The purpose of the research was to establish common features between mental toughness definitions and assess its standing as a discrete phenomenon among a wider network of similar constructs. From a systematic literature review and content analysis, *maintaining stability or consistency in challenging and demanding situations*, and in particular, when *performing under pressure* were common themes among mental toughness definitions. However, the object of stability or consistency remains unclear. Second, mental toughness was compared to similar concepts of resilience, hardiness, grit, psychological flexibility, sisu and mental fitness, to identify their collective function and understand the additional value of mental toughness as a standalone construct. Common themes among constructs were an *ability, skill or competence to maintain behaviour and effort towards goals and values*, whereas mental toughness provided additional value in the context of *performing under pressure*. An unexpected finding was that mental toughness did not share the largely endorsed feature of *adaptation* with its related constructs. Last, mental toughness was compared with its constituent terms ('mental' and 'toughness') and related applications of toughness (material toughness and gender norm toughness). From this comparison, *group and/or pattern of emotions*, and *group and/or pattern of cognitions* was inherited from 'mental'; and *ability, skill or competence to maintain behaviour and effort towards goals and values* as well as *determination and maintenance of determination under stressful and challenging situations* was inherited from 'toughness' and gender norm toughness. The major feature omitted by mental toughness definitions, but concurrently endorsed by both groups of similar constructs, was *endurance, discomfort tolerance and stress tolerance*.

## **Introduction**

Suffering and dealing with stressors, adversity and other inordinate demands are part of the human condition (Sheard et al., 2009). From the tenets of positive psychology, however, certain human strengths may transcend these demands to facilitate growth and thriving (Seligman & Csikszentmihalyi, 2000). Mental toughness may be one such strength. Despite consensus on its benefits, ‘mental toughness’ is one of the most used but least understood terms in sport psychology (Jones et al., 2002) and is noted for its relative disagreement between researchers and overall lack of conceptual clarity (Connaughton, Hanton, Jones & Wadey, 2008; Sheard, 2013). The aim of this investigation is to address some of these areas of confusion by drawing various sources of conceptual information together in one place for the first time.

First, the diverse academic definitions that conceptualise mental toughness are drawn together and compared (See Table 2-1 below). Previously, although researchers have employed robust qualitative methodologies for conceptualising mental toughness (e.g., Coulter et al., 2010; Gucciardi et al., 2008; Jones et al., 2002; Middleton et al., 2004; Thelwell et al. 2005), they have rarely been systematically compared. In particular, studies have developed new definitions or supported pre-selected existing ones, rather than identify and consolidate common themes into a single definition. Given this need for conceptual consolidation, the first aim of this study is to systematically review the academic conceptualisations of mental toughness and identify major areas of agreement and disagreement.

Table 2-1.

*Date ordered definitions of mental toughness retrieved from a systematic literature review*

<b>Author</b>	<b>Definition</b>
Loehr (1994, p. 5)	“Toughness is the ability to consistently perform toward the upper range of your talent and skill regardless of competitive circumstances.”
Jones et al. (2002, p. 209)	“Having the natural or developed psychological edge that enables you to, generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer and, specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.”
Clough et al. (2002, p. 38)	“Mentally tough individuals tend to be sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity.”
Fletcher (2005, p. 158)	“An individual's propensity to manage the demands of environmental stressors, ranging from an absolute resilience to extreme vulnerability.”
Thelwell et al. (2005, pp. 328–329)	“Mental toughness is having the natural or developed psychological edge that enables you to always cope better than your opponents with the many demands (competition, training, and lifestyle) that soccer places on the performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.”
Gucciardi et al. (2008, p. 278)	“Mental toughness in Australian Football is a collection of values, attitudes, behaviours, and emotions that enable you to persevere and overcome any obstacle, adversity, or pressure experienced, but also to maintain concentration and motivation when things are going well to consistently achieve your goals.”
Gucciardi et al. (2009a, p. 67)	“Mental toughness is a collection of experientially developed and inherent sport-specific and sport-general values, attitudes, emotions, and cognitions that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities to consistently achieve his or her goals.”
Coulter et al. (2010, p. 715)	“Mental toughness is the presence of some or the entire collection of experientially developed and inherent values, attitudes, emotions, cognitions and behaviours that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges and adversities to consistently achieve his or her goals.”
Mallett and Coulter (2011, p. 191)	“Mental toughness is associated with the pursuit of goals in achievement contexts, and in that quest, particular values, attitudes, emotions, cognitions, and behaviours seem to influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities.”
Clough and Strycharczyk (2012, p. 1)	“The quality which determines in large part how people deal effectively with challenge, stressors and pressure... irrespective of prevailing circumstances.”
Mahoney, Gucciardi, Mallett, and Ntoumanis (2014, p. 234)	“A collection of personal characteristics (i.e., forces, resources, and demands, discussed later) that allow individuals to regularly perform to or around the best of their abilities regardless of circumstances faced.”

Table 2-1 Continued

Hardy et al. (2014, p. 70)	“The ability to achieve personal goals in the face of pressure from a wide range of different stressors.”
Gucciardi et al. (2015, p. 28)	“A personal capacity to produce consistently high levels of subjective (e.g., personal goal achievement) or objective (e.g., race times) performance despite everyday challenges and stressors as well as significant adversities.”

Note: Definitions were obtained through a systematic literature review process (see Figure 2-1, page 36 below for further details).

Second, mental toughness will be drawn together with its related constructs. For the purposes of this research, the conceptual neighbours reviewed here are selected on the basis of a number of empirical and theoretical links with mental toughness (as shown in Table 2-2 below). First, psychological constructs that have previously been empirically tested alongside mental toughness were selected. In particular, these constructs include hardiness, grit and resilience. Second, psychological constructs that have not previously been empirically tested alongside mental toughness and are not cited as substrates of mental toughness, but contain a number of theoretical links with mental toughness, were selected.

Given the strength of these links, ‘fuzzy’ boundaries exist between mental toughness and related constructs. As a result, it is important to understand the collective function of this group as well as the additional value of mental toughness (Gucciardi et al., 2015). Although these issues have been briefly discussed before (e.g., resilience and hardiness; Gucciardi & Gordon, 2009; Gucciardi et al., 2008; Gucciardi et al., 2015), a systematic and comprehensive evaluation of their similarities and differences have not yet been conducted. On this basis, the additional or secondary aim of this paper is to systematically identify the conceptual overlap and divergence between mental toughness and its related constructs.

Table 2-2.

*Definitions of related constructs*

<b>Related construct</b>	<b>Definitions</b>	<b>Evidence of relationship with mental toughness</b>
Resilience	<p>a) “Protective factors which modify, ameliorate or alter a person's response to some environmental hazard that predisposes to a maladaptive outcome.” (Rutter, 1987, p. 316; 6060 citations)</p> <p>b) “The process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of stress – such as family and relationship problems, serious health problems, or workplace and financial stressors. It means ‘bouncing back’ from difficult experiences.” (American Psychological Association, 2015)</p>	Moderate correlations ( $r = .35 - .54; p < .01$ ; Gucciardi & Gordon, 2009)
Hardiness	<p>a) “Persons who experience high degrees of stress without falling ill have a personality structure differentiating them from persons who become sick under stress. This personality difference is best characterised by the term hardiness.” (Kobasa, 1979, p. 3; 3768 citations)</p> <p>b) “A personality trait that is indicative of individuals' resilience and success in managing stressful circumstances.” (Golubovich, Chang, &amp; Eatough, May 2014, p. 757)</p>	Weak to moderate correlations ( $r = .34 - .38; p < .05$ ; Golby & Sheard, 2004; Sheard, 2009).
Grit	<p>a) “Perseverance and passion for long term goals” (Duckworth, Peterson, Matthews, &amp; Kelly, 2007, p. 1087; 996 citations).</p> <p>b) “The ability to strenuously pursue long-term goals despite obstacles and adversity” (Anestis &amp; Selby, January 2015, p. 212)</p>	Moderate correlations ( $r = .42, p < .01$ ; Joseph, 2009).
Psychological flexibility	<p>a) “The ability to fully contact the present moment and the thoughts and feelings it contains without needless defence.” (Bond et al., 2011, p. 678; 718 citations)</p> <p>b) “The ability to persist with and/or change behaviour that is consistent with personal values while allowing difficult thoughts or feelings to occur.” (Whiting, Deane, Ciarrochi, McLeod, &amp; Simpson, June 2015, p. 415)</p>	No direct comparisons. Conceptual similarities may exist along shared features of ‘emotional control’ (Clough et al., 2002; Jones et al., 2002), ‘emotion regulation’ (Gucciardi et al., 2015) and ‘emotional flexibility’ (Loehr, 1994).
Sisu	<p>a) “Sisu (SIH-soo or SEE-soo): (1) inner determination; (2) courage, tenacity, stubborn determination, energy and a will and an ability to get things done (Kolehmainen, 1957, p. ix).” (Lucas &amp; Buzzanell, 2004, p. 273; 39 citations)</p> <p>b) “The Finnish word “sisu” is very dear to us. It is untranslatable, but it means approximately strength of will, determination, and perseverance. We want to see ourselves as modest, hard-working, no-nonsense people who do not bow or resign to anyone.” (Sinkkonen, March 2013, pp. 49-50)</p>	No direct comparisons. Conceptual similarities may exist along shared features of ‘determination’ and ‘courage’ (Bull et al., 2005; Gucciardi et al., 2008; Jones et al., 2002; Lahti, 2013; Lucas & Buzzanell, 2004; Ryba et al., 2009)
Mental fitness	<p>a) and b) “Mental fitness is the changeable capacity to utilise resources and skills to psychologically adapt to environmental challenges or advantages to meet psychological needs.” (Robinson, Oades, &amp; Caputi, 2015, p. 56)</p>	No direct comparisons. Conceptual similarities may exist along shared features of ‘personal resources’ (Gucciardi et al., 2015; Robinson et al., 2015), ‘strength’ (Pickering, Hammermeister, Ohlson, Holliday, & Ulmer, 2010; Robinson et al., 2015; Tenenbaum et al., 1999), ‘flexibility’ (Loehr, 1994; Robinson et al., 2015) and ‘endurance’ (Crust & Clough, 2005; Robinson et al., 2015).

*Note.* a) most cited and b) most recent source. Definitions in a) and b) were obtained through a systematic literature review process (see Figure 2-1, page 36 below for further details)

Third, mental toughness will be compared with its constituent terms (i.e., ‘mental’ and ‘toughness’) and related applications of toughness (e.g., material toughness and gender norm toughness (gender-specific expectations typically ascribed to men for behaving in a tough manner); see Table 2-3 below). As a compound word, it is expected that definitions of mental toughness retain the original meaning of its components (i.e., ‘mental’ and ‘toughness’; Grammarly, 2013). However, according to Gucciardi et al. (2015), features central to definitions of mental toughness, such as performance and goal attainment, are not supported by English-language definitions of either constituent terms. Similarly, it is also expected that mental toughness definitions somewhat semantically link the construct to alternative extensions of ‘toughness’ (e.g., material toughness, gender norm toughness). Given that this comparison with constituent terms and related applications can provide a useful avenue for identifying the fundamental as well as superfluous features of mental toughness, the final aim of this review is to systematically identify conceptual overlap and divergence between mental toughness, its constituent terms and related applications of toughness.

Table 2-3.

*Definitions of 'mental', 'toughness' and related applications of toughness*

<b>Related construct</b>	<b>Definition(s)</b>
Mental	“Of or relating to the mind; <i>specifically</i> of or relating to the total emotional and intellectual response of an individual to external reality <mental health>; of or relating to intellectual as contrasted with emotional activity; of, relating to, or being intellectual as contrasted with overt physical activity; occurring or experienced in the mind <mental anguish>; relating to the mind, its activity, or its products as an object of study; relating to spirit or idea as opposed to matter” (“Mental”, n.d.).
Toughness	“Strong or firm in texture but flexible and not brittle; Not easily chewed <tough meat>; Characterised by severity or uncompromising determination <tough laws> <tough discipline>; Capable of enduring strain, hardship, or severe labour <tough soldiers>; Very hard to influence, stubborn <a tough negotiator>; Difficult to accomplish, resolve, endure, or deal with <a tough question> <tough luck>; Stubbornly fought <a tough contest>; Unruly, rowdyish <a tough gang>; Marked by absence of softness or sentimentality <a tough critic>” (“Toughness”, n.d.).
Material toughness <sup>1</sup>	b) “A mechanical characteristic that may be expressed in three contexts: (1) the measure of a material's resistance to fracture when a crack (or other stress-concentrating defect) is present, (2) the ability of a material to absorb energy and plastically deform before fracturing, (3) The total area under the material's tensile engineering stress-strain curve taken to fracture.” (Callister, & Rethwisch, 2014, p. 932)
Gender norm toughness <sup>2</sup>	a) “Physical prowess, evidenced both by demonstrated possession of strength and endurance and by athletic skill; "masculinity", symbolised by a distinctive complex of acts and avoidances (bodily tattooing, absence of sentimentality, non-concern with "art", "literature", conceptualisation of women as conquest objects, etc.); and bravery in the face of physical threat.” (Miller, 1958, p. 9; 2131 citations) b) “Toughness, which reflects men's belief that they must appear aggressive and physically and emotionally strong.” (Lisco, Leone, Gallagher, & Parrott, July 2015, p. 59)

Note: a) most cited and b) most recent source. <sup>1</sup>Citation information unavailable. See methods section (page 32 below) for further details of the definition extraction process.

In sum, to facilitate a robust and valid progression of the mental toughness literature, the above sources of conceptual information need to be drawn together. To this end, the constructs included in Table 2-1 (page 27 above) to Table 2-3 (above) were systematically identified and compared. Similar approaches have been utilised within mental toughness (e.g., Gucciardi et al., 2015) and elsewhere (e.g., ecological stability; Grimm & Wissel, 1997) for dispelling conceptual confusion, and on this basis, is proposed as the most viable method for abetting the current aims.

## **Method**

### *Data search*

A systematic literature search was conducted between May 2015 to July 2015 in accordance with PRISMA recommendations (Moher, Liberati, Tetzlaff, Altman, & the PRISMA Group, 2009)<sup>2</sup>. A librarian at Auckland University of Technology with extensive database search experience was also consulted to ensure suitable databases and search terms were used. On these bases, articles for psychological constructs (mental toughness, resilience, hardiness, grit, psychological flexibility, *sisu*, mental fitness and gender norm toughness) that were published in the past 200 years prior to 7<sup>th</sup> July 2015 were retrieved from the following databases in order: 1) PsycINFO, 2) EbscoHealth (Medline, CINAHL, SportDISCUS), and finally, 3) Google Scholar (see Table 2-4 below for the search terms that were entered into the databases). Search terms differed between constructs according to the number of results returned and degree of saturation reached in extracted definitions. Auckland University of Technology's library (course reserve department) was manually searched for textbook definitions of material toughness and online library dictionaries were used to ascertain definitions of 'mental' and 'toughness'.

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<sup>2</sup> The PRISMA recommendations by Moher et al. (2009) present best-practice guidelines for conducting and reporting systematic literature reviews.

Table 2-4.

*Search strategy and article selection statistics*

Search one: PsycINFO			Search two: EbscoHealth		Search three: Google Scholar		Total results returned	Total articles that met inclusion criteria	Total definitions extracted
Construct	Search Terms	Results returned	Search terms	Results returned	Search terms	Results returned			
Mental fitness	"mental* fit*" (keyword) AND concept* OR model OR defin* OR construct OR perce* OR understand* OR mean* (keyword)	3	"mental* fit*" (title) AND Concept* OR model OR defin* OR construct OR perce* OR understand* OR mean* (all text) NOT periodical (all text)	15	"mental* fit* " (in title) AND concept conceptualising model definition defining construct perception understanding meaning (with at least one of the words)	3	21	1	1
Mental toughness	"mental* tough*" (keyword)	192	"mental* tough*" (keyword) AND "concept* or model* or defin* or construct* or perce* or underst* or mean* (all text)	148			340	10	13
Resilience	resilience (title) AND concept* OR model* OR defin* OR construct* OR perce* OR underst* OR mean* (title) AND review OR overview (title)	15	resilience (title) AND concept* OR model* OR defin* OR construct* OR perce* OR underst* OR mean* (all text) AND review OR overview (title)	31			46	6	35
Hardiness	hardy OR hardiness OR existential courage OR "hard* person*" (title) AND concept* OR model* OR defin* OR construct* OR perce* OR underst* OR mean* OR what OR criti* OR review OR overview (title)	97	hardy OR hardiness OR existential courage OR "hard* person*" (title) AND concept* OR model* OR defin* OR construct* OR perce* OR underst* OR mean* OR what OR criti* OR review OR overview (title)	126			223	27	31
Sisu	sisu (keyword)	3	Sisu (keyword) OR sisu (title) OR sisu (subject terms) OR sisu (abstract) AND psyc* OR person* (all text) NOT sisu (author) OR periodical (all text)	12			15	3	3
Grit	grit (title)	44					44	13	13

Table 2-4 Continued

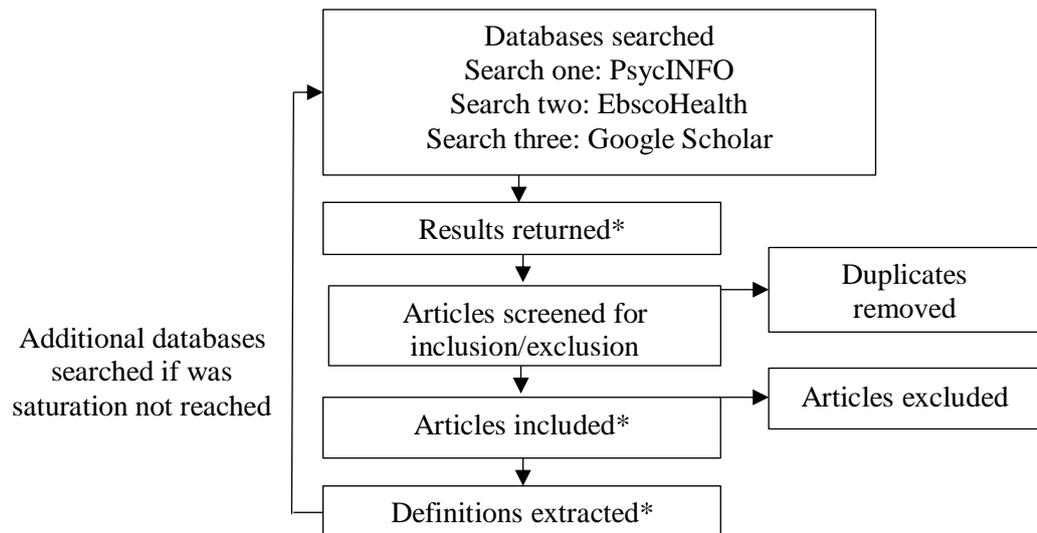
Search one: PsycINFO			Search two: EbscoHealth		Search three: Google Scholar		Total results returned	Total articles that met inclusion criteria	Total definitions extracted
Construct	Search Terms	Results returned	Search terms	Results returned	Search terms	Results returned			
Psychological flexibility	“psychological* flexib*” (title) AND concept* OR model* OR defin* OR construct* OR perce* OR underst* OR mean* OR what OR criti* OR review OR overview (keyword)	52					52	23	23
Gender norm toughness	tough* AND gender OR norm* OR masculin* OR male (title)	94					94	15	15

*Inclusion and exclusion criteria*

The inclusion and exclusion criteria for this study enabled a systematic identification of the most popular definitions of constructs that had been endorsed by researchers and their peers within each field of enquiry. In particular, these criteria included a) full-text and peer-reviewed articles published in an English journal were considered for psychological constructs; hard copy text-books were considered for definitions of material toughness; and online dictionaries were considered for ‘mental’ and ‘toughness’ definitions; b) sources were included if they contained a new definition that had not been featured in articles previously reviewed in the search procedure. These definitions were required to be original, directly quoted and/or paraphrased with citations; c) articles and their definitions were included if they were directly quoted by a secondary source (i.e., literature review or study introduction section) even if the full-text version of the original source was unavailable or contained in a source other than a peer-reviewed journal article (e.g., a book).

*Procedure*

**Literature review.** An overview of the literature search procedure is presented in Figure 2-1 below.



\*Due to the iterative and idiosyncratic nature of the literature search for each construct, numbers of articles identified at each stage are presented in Table 2-4 above rather than in Figure 2-1.

*Figure 2-1. Article selection and definition extraction process*

Search terms were first entered into PsycINFO. Once duplicate articles were removed, the articles were screened for eligibility status by first examining titles and abstracts and then sections of full-text for further information. Full-text, peer-reviewed articles that contained new definitions that were original, quoted or paraphrased were identified and retained for final inclusion. This procedure was repeated through EbscoHealth (Medline, CINAHL, SportDISCUS), and finally, Google Scholar until no new definitions were being offered in subsequent articles. Search strategies differed between constructs due to differences in the magnitude and diversity of definitions offered in each field (see Table 2-4, page 33 above).

**Content analysis of definitions.** Definitions obtained from the systematic literature review were then content analysed to extract their constituent features. Initially, definitions from each construct were colour-coded to ensure traceability back to their original source.

Elements of definitions were then broken into higher-level categories for data manageability purposes. Within these higher-level categories, following Fehr's (1988) prototype analysis coding procedure, elements were further broken down to ascertain

more specific features. In attaining specific features, some words were readily identified as a single linguistic unit (e.g., courage), whereas phrases were separated into more than one linguistic unit if they represented more than one feature (e.g., “persisting or changing behaviour” was separated into two units: “persisting behaviour” and “changing behaviour”). To maintain nuances and richness of data, a conservative approach was taken when allocating units to feature categories, for example, “achieve personal goals” was not attributed to the same category as “thriving and success”; similarly, “enhance health” was separated from “maintain health”.

The results of the content analysis was confirmed by second and third raters who are Psychologists with experience in emergency and trauma, and thus had previous working knowledge of a majority of the psychological constructs involved in this study. In this confirmation process, the second rater was presented with the raw data and the final higher-level categories and features for review and confirmation. Where the second rater disagreed with any coding of the data, the third rater was available to provide a resolution<sup>3</sup>. Once the coding was confirmed by the second and third raters, each definition and its associated features were plotted in a series of tables (Table 2-6, page 41 below to Table 2-8, page 43 below) to visually identify conceptual areas of overlap and divergence according to the aims of the study.

## Results

Excluding dictionary definitions of ‘mental’ and ‘toughness’, a total of 143 definitions were systematically extracted. These comprised of resilience ( $n = 35$ ), hardiness ( $n = 31$ ), psychological flexibility ( $n = 23$ ), gender norm toughness ( $n = 15$ ), mental toughness ( $n = 13$ ), grit ( $n = 13$ ), material toughness ( $n = 9$ ), *sisu* ( $n = 3$ ) and

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<sup>3</sup> Due to a post-analysis decision to include the term ‘mental’ for providing further conceptual clarity, the definition for the term ‘mental’ (see Table 2-3, page 31 above for the definition used in this analysis) was content analysed by the lead author and allocated to existing features where possible (i.e., no new features were added from the term ‘mental’).

mental fitness ( $n = 1$ ). From content analysis of these definitions, five higher-level categories were identified: a descriptor (which identifies the nature of the construct, e.g., personality trait, state etc.), which was proceeded with one or more personal characteristics (the intrinsic qualities of the individual, e.g., self-belief, confidence etc.), the behaviour of these characteristics under stress (which describes what happens to these qualities when the individual is under stress or pressure, e.g., maintenance of confidence under stress and pressure etc.), their specific contexts (the environments involved, e.g., situations that are challenging and demanding etc.) and subsequent outcomes (the resultant product associated with the constructs, e.g., enhances performance etc.). For example, the definition by Jones et al. (2002; see Table 2-1, page 27 above) was allocated to higher-level categories of *descriptor* (“the natural or developed psychological edge”), *context* (“many demands [competition, training, lifestyle]”), *personal characteristics* (“cope better than your opponents”), *cognitions, behaviours and emotions under given contexts* (“be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure”).

From these higher-level categories, 84 features were extracted (see Table 2-5 below) from a total of 695 linguistic units (i.e., words or phrases).

Table 2-5.

*Summary of higher-level categories and their constituent features derived from the content analysis of definitions*

Theme 1: Descriptor		Theme 2: Contexts		Theme 3: Personal characteristics		Theme 4: Cognitions, behaviours and emotions under given contexts		Theme 5: Outcomes	
#	Feature name	#	Feature name	#	Feature name	#	Feature name	#	Feature name
1	Capacity, measure or amount	19	Facing	30	Courage	51	Maintains consistency or stability under stressful or pressurised situations	67	Achieves personal goals
2	Personality trait, characteristic or tendency	20	opposition/competition	31	Competitiveness	52	Maintains consistency in behaviour or effort towards goals and values, e.g.	68	Generative experiences
3	State	21	Performing under pressure	32	Low anxiety and/or calmness		persistence, under stressful or pressurised situations	69	Thriving and success
4	Expectation or norm	21	Situations that are challenging and/or demanding	33	Openness and curiosity	53	Maintains determination under stressful or pressurised situations	70	Additional protective or coping skills
5	Resistance resource, buffer and/or mediator of stress	22	Experiencing adversities, tragedies and trauma	34	Passion for long-term goals	54	Maintains focus and concentration under stressful or pressurised situations	71	Positive emotions
6	Resource	23	Facing risks	35	Self-belief and confidence	55	Maintains confidence under stressful or pressurised situations	72	Improved or enhanced health status
7	Force or demand	24	Experiencing stressors or stress	36	Aggressiveness	56	Maintains control under stressful or pressurised situations	73	Educational attainment
8	A process	25	Pursuing goals or values/within achievement contexts	37	Hardness/absence of softness or sentimentality	57	Maintains views and opinions under stressful or pressurised situations	74	Vocational success
9	A regulation process	26	Experiencing disruptive events	38	Determination	58	Maintains coping under stressful or pressurised situations	75	Completed or carried out plans
10	Ability, skill or competence	27	Experiencing significant change	39	Stoicism or emotionally detached	59	Maintains meaning or purpose under stressful or pressurised situations	76	Creation of opportunities
11	Psychological edge or strength	28	Experiencing unwanted psychological influences or events, i.e., difficult thoughts, feelings, sensations, images or memories	40	Skill or competence	60	Maintains interest and passion for goals under stressful or pressurised situations	77	Facilitates search for meaning
12	Group and/or pattern of behaviours	29	Faced with situational prospects or potential opportunities	41	Difficult to influence/stubborn	61	Maintains emotions and mood under stressful or pressurised situations, for example, can remain calm	78	Enhances performance
13	Value, ideal or belief			42	Commitment	62	Maintains motivation under stressful or pressurised situations	79	Meets psychological needs
14	Group and/or pattern of emotions			43	Perceptions of control	63	Adapts to stressful or pressurised situations	80	Maintenance of psychological wellbeing and functioning
15	Group and/or pattern of attitudes			44	Effective coping/appraisals	64	Behavioural flexibility: Modifies behavioural responses under/to stressful or pressurised situations	81	Maintenance of physiological wellbeing and functioning
16	Group and/or pattern of cognitions			45	Perceptions of challenge	65	Cognitive flexibility: Cognitively re-appraises stressful or pressurised situations	82	Overcomes obstacles
17	Learned or developed			46	Mindfulness/acceptance	66	Reconstructs meaning of stressful or pressurised situations	83	Avoidance of maladaptive outcomes and negative trajectories
18	Intrinsic or inherent			47	Physical and emotional strength			84	Recovery, or ability to return to a prior state and continue on
				48	Independence from others				
				49	Masking emotions: invulnerability and concealing pain				
				50	Endurance, discomfort tolerance and stress tolerance				

Overall, definitions of mental toughness included the most number of features ( $n = 37$  features), followed by definitions of hardiness ( $n = 34$  features), resilience ( $n = 32$  features), gender norm toughness ( $n = 20$  features), psychological flexibility ( $n = 16$  features), grit ( $n = 10$  features), sisu ( $n = 9$  features), mental fitness ( $n = 5$  features) and material toughness ( $n = 5$  features).

These features were then plotted in Table 2-6 (page 41 below) to Table 2-8 (page 43 below). Table 2-6 (page 41 below) compares mental toughness definitions according to the number of times a feature was mentioned by definitions (i.e., feature frequencies). Table 2-7 (page 42 below) and Table 2-8 (page 43 below) compares mental toughness with its related constructs (resilience, hardiness, grit, psychological flexibility, sisu and mental fitness), its constituent terms ('mental' and 'toughness') and related applications of toughness (material toughness and gender norm toughness) according to feature frequencies as well as the total number of constructs that mentioned a feature.



Table 2-7.

*Mental toughness features shared with other constructs*

Construct	52	10	1	2	21	11	24	25	43	53	13	22	38	44	7	14	15	16	17	31	35	51	56	61	78	82	6	12	18	19	20	32	54	55	58	62	67	Total			
Resilience	x	X	X	x	x		X		x			X		X	x								X	X	X		X													14	
Hardiness	x	X	x	X	x	x	x	x	X		X			X		X			x							x															14
Grit	X	x		X		x		X				x																													6
Psychological flexibility	X	X	X			x		X																																	5
Sisu	X	X		X		X				X																															5
Mental fitness			X	X																																				2	
<b>Total</b>	5	5	4	4	4	3	2	3	2	1	1	2	0	2	1	0	1	0	1	0	0	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Gender norm toughness	X	x							x	x	X		x							x	x																				8
'Toughness'	X									x			x																												3
Material toughness		X	X	X			X																																		4
'Mental'															x		X																								2
<b>Total</b>	2	2	1	1	0	0	1	0	1	2	1	0	2	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
<b>Total (all constructs)</b>	7	7	5	5	4	3	3	3	3	3	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0

*Note.* Size of 'x' denotes the % frequency of the feature in the corresponding construct definitions. For example, feature 52 was mentioned by a greater percentage of grit than resilience definitions, and thus, the size of 'x' for grit is larger than that of resilience. Similarly, the size of the feature number corresponds to the % frequency of the feature in definitions of mental toughness. For example, more definitions of mental toughness mention feature 21 than feature 52. **Features** (numbering corresponds to Table 2-5, page 39 above): **52** = maintains consistency in behaviour or effort towards goals and values, e.g. persistence, under stressful or pressurised situations; **10** = ability, skill or competence; **1** = Capacity, measure or amount; **2** = personality trait, characteristic or tendency; **21** = situations that are challenging and/or demanding; **11** = psychological edge or strength; **24** = experiencing stressors or stress; **25** = pursuing goals or values/within achievement contexts; **43** = perceptions of control; **53** = maintains determination under stressful or pressurised situations; **13** = value, ideal or belief; **22** = experiencing adversities, tragedies and trauma; **38** = determination; **44** = effective coping/appraisals; **7** = force or demand; **14** = group and/or pattern of emotions; **15** = group and/or pattern of attitudes; **16** = group and/or pattern of cognitions; **17** = learned or developed; **31** = competitiveness; **35** = self-belief and confidence; **51** = maintains consistency or stability under stressful or pressurised situations; **56** = maintains control under stressful or pressurised situations; **61** = maintains emotions and mood under stressful or pressurised situations, for example, can remain calm; **78** = enhances performance; **82** = overcomes obstacles; **6** = resource; **12** = group and/or pattern of behaviours; **18** = intrinsic or inherent; **19** = facing opposition/competition; **20** = performing under pressure; **32** = low anxiety and/or calmness; **54** = maintains focus and concentration under stressful or pressurised situations; **55** = maintains confidence under stressful or pressurised situations; **58** = maintains coping under stressful or pressurised situations; **62** = maintains motivation under stressful or pressurised situations; **67** = achieves personal goals.



This analysis identified a number of areas of agreement and disagreement within mental toughness. As shown in Table 2-6 (page 41 above), the majority of definitions agree that mental toughness is associated with *stability or consistency in challenging and demanding situations*, and in particular, when *performing under pressure*; however, researchers disagree on the specific psychological aspect or outcome that is held consistent under stressful or pressurised situations (e.g., *behaviour/effort, confidence, coping, emotions/mood, motivation or determination*). Low frequencies were also found for various descriptors of mental toughness (e.g., *capacity, measure or amount, psychological edge or strength*), the personal characteristics of mentally tough people (e.g., *competitiveness, self-belief/confidence, low anxiety/calmness*) and the outcome of *overcomes obstacles*.

Next mental toughness is delineated from its conceptual neighbours by investigating the conceptual overlap (i.e., shared features) and divergence (i.e., unique features) between mental toughness and its related constructs. As illustrated in Table 2-7 (page 42 above) and Table 2-8 (page 43 above), although the neighbouring constructs possessed a large number of features outside of mental toughness, in general, they overlapped with mental toughness on their most frequently-mentioned features. In particular, with the exception of mental fitness, the biggest area of overlap occurred along the feature of *maintains consistency in behaviour or effort towards goals and values* (e.g., endurance, persistence, perseverance and continuing to move on). This feature was common in definitions of *sisu* (100% of definitions), *grit* (92% of definitions) and *psychological flexibility* (65% of definitions), with lower endorsements by definitions of mental toughness (7% of definitions), *hardiness* (6% of definitions) and *resilience* (3% of definitions). To a lesser extent, *ability, skill or competence* was also another main source of overlap.

Conceptual differences between mental toughness and its related constructs were also identified. From Table 2-7 (page 42 above), the first source of divergence were the features that were unique to mental toughness ( $n = 16$ ). In particular, *performing under pressure* was frequently noted in mental toughness definitions but was not included by any of its conceptual neighbours. From Table 2-8 (page 43 above), the second source of conceptual differences were those features that were unique to the group of related constructs that were not included in definitions of mental toughness. Here the most highly endorsed feature excluded from mental toughness was *adaptation to stressful or pressurised situations* (e.g., adapting well to a variety of stressors, flexibility in behaviour and an ability to shift perspective), which was followed by *endurance, discomfort tolerance and stress tolerance*.

Given that sufficient grounding in its constituent terms of ‘mental’ and ‘toughness’ is also helpful for clarification of mental toughness, the present review considered mental toughness alongside its semantic roots and related applications of toughness. As above, *maintains consistency in behaviour or effort towards goals and values* and *ability, skill or competence* represented common conceptual ground. Pertaining specifically to its constituent terms, mental toughness shared *group and/or pattern of emotions*, and *group and/or pattern of cognitions* with ‘mental’; and *maintains consistency in behaviour or effort towards goals and values, maintains determination under stressful or pressurised situations* and *determination* with ‘toughness’.

Although these sources of conceptual inheritance were identified, disconnect between these terms were found along features that were unique to mental toughness ( $n = 23$ ), and also, unique to ‘toughness’, gender norm toughness and material toughness ( $n = 14$ ). Due to their high frequency of mention, the major areas that were unique to mental toughness were *situations that are challenging and/or demanding, maintains consistency or stability under stressful or pressurised situations and performing under pressure*. On the other

hand, *endurance, discomfort tolerance and stress tolerance, physical and emotional strength, aggressiveness, hardness/absence of softness or sentimentality and maintains views and opinions under stressful or pressurised situations* were features unique to ‘toughness’ and gender norm toughness. In addition, *resistance resource, buffer and/or mediator of stress* was unique to ‘toughness’ and material toughness. The only feature endorsed solely by ‘toughness’ without concurrent support from gender norm toughness or material toughness was the feature of *difficult to influence/stubborn*.

## **Discussion**

Although researchers agree on the benefits of mental toughness (e.g., Crust, 2007; Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2015), conceptual understanding of the construct remains problematic (Connaughton, Hanton, et al., 2008; Sheard, 2013). This confusion may stem from the numerous disparate definitions of mental toughness, ‘fuzzy’ conceptual borders with related constructs and a degree of disconnect with its constituent terms. This review aimed to elucidate these areas of confusion by systematically drawing together conceptual information from mental toughness, related constructs (see Table 2-2, page 29 above), its constituent terms (i.e., ‘mental’ and ‘toughness’) and its related applications (e.g., material toughness and gender norm toughness; see Table 2-3 page 31 above). Because the progression of empirical and practical knowledge relies on solid conceptual foundations, addressing these areas of conceptual confusion represents a valuable step towards understanding mental toughness.

Although conceptual confusion within mental toughness may be primarily attributed to the number of divergent conceptualisations of mental toughness (Andersen, 2011; Connaughton, Hanton et al., 2008; Jones et al., 2002; Gucciardi et al., 2015; Sheard, 2013), until now, these divergent strands of knowledge had yet to be systematically consolidated. From our systematic analysis, findings showed that agreement largely

occurs along features of *maintaining stability or consistency in challenging and demanding situations*, and in particular, when *performing under pressure*. These findings suggest that, similar to resilience, mental toughness may “reflect an ability to maintain a stable equilibrium” (Bonanno, 2004, p. 20) or avoidance of “the negative trajectories associated with risks” (Fergus & Zimmerman, 2005, p. 399).

Within the feature of *maintaining stability or consistency*, however, the specific internal states (e.g., Jones et al., 2002; Thelwell et al., 2005) or external outcomes (e.g., Coulter et al., 2010; Gucciardi et al., 2009a; Gucciardi et al., 2015; Loehr, 1994), or both (e.g., Gucciardi et al., 2008), that are held stable or consistent represent a large source of disagreement between definitions. A plausible explanation for this disagreement is the context-specific nature of mental toughness (Andersen 2011; Bull, et al., 2005; Fawcett, 2011). For example, maintenance of focus and concentration may be required for a “final putt” in golf, whereas maintenance of determination and motivation may be more pertinent for endurance sports (Bull et al., 2005, Ryba et al., 2009). Similarly, consistency in external outcomes, such as performance and goal attainment, may not apply to all contexts requiring mental toughness, such as those that may threaten one’s normal functioning (e.g., serious injury, death of a loved one, failing a course; Gucciardi et al., 2015). In conjunction with the observations of the present review, therefore, the key psychological aspect that is kept stable or consistent may be difficult or even impossible to specify without reference to specific contexts and/or on a case-by-case basis. Nonetheless, ‘consistency’ is a good place to start (Andersen, 2011) and although future research is warranted to specify and succinctly encapsulate the object(s) of stability or consistency, this finding represents an important foundation for further conceptual development of mental toughness.

Beyond these features, further disagreement was found along various descriptors (*capacity, measure or amount, psychological edge or strength*), personal characteristics

(*competitiveness, self-belief/confidence, low anxiety/calmness*) and the outcome of *overcomes obstacles*. Although the diversity of these features among definitions likely reflects the complex nature of mental toughness (Connaughton, Thelwell, & Hanton, 2011), admittance of only the most fundamental and inclusive elements is necessary for ensuring robust empirical progression. To this end, future research may minimise conceptual diversity by delineating these features along their centrality or importance to mental toughness, and in doing so, researchers may be better equipped to identify those features to include or exclude from future definitions.

Another conceptual issue addressed in the present review is the relationship between mental toughness and its related constructs (see Table 2-2, page 29 above). With strong theoretical links, it is important that their common function as well as the additional value of mental toughness within this group is understood (Gucciardi et al., 2015). To the best of our knowledge, the nature of this relationship had yet to be systematically addressed. Our findings suggested that the common function of this group was an *ability, skill or competence to maintain behaviour and effort towards goals and values*. Although mostly characterised by persistence or endurance, this feature also represented continued efforts to move on with one's life after difficulties or setbacks (e.g., [of resilience] "continue to move on in a positive manner"; Jackson, Firtko, & Edenborough, 2007, p. 3). Although other psychological or behavioural processes are likely to be involved, a maintenance of behaviour and effort may contribute towards the core purpose of these constructs: that is, surviving and thriving despite adversity, difficulties or failures (Gucciardi et al., 2015; Jackson et al., 2007; Maddi, 2012; Duckworth, Kirby, Tsukayama, Berstein, & Ericsson, 2010).

On the other hand, *performing under pressure* was a major source of conceptual uniqueness for mental toughness. This finding aligns with its major role in performance (Connaughton, Hanton, et al., 2008; Denison, 2007; Gould et al., 1987; Holland,

Woodcock, Cumming, & Duda, 2010), and subsequently, the primary use of mental toughness in sporting contexts. However, beyond their definitions, high levels of performance under pressure is not exclusive to mental toughness (e.g., hardiness; Raab, Lobinger, Hoffmann, Pizzera, & Labourde, 2015; psychological flexibility; Gardner & Moore, 2007) and given that researchers have predominantly used athlete populations to develop definitions of mental toughness (e.g., Gucciardi et al., 2008; Gucciardi et al., 2009a; Jones et al., 2002; Coulter et al., 2010), this unique performance-related feature may instead reflect a conceptual bias towards performance contexts. On this basis, future investigation of lay perceptions of mental toughness (where performance is not the primary focus) is required to confirm this feature as a source of additional value.

An unexpected finding from this comparison between mental toughness and its related constructs was that *adaptation* is not included in mental toughness definitions, which is otherwise endorsed by a number of its related constructs. Although a number of researchers have suggested that adaptation may be an attribute or outcome of mental toughness (e.g., Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2008), based on current definitions of mental toughness, these findings suggest that adaptation may not be a central feature. As such, future research is required to confirm the role or centrality of *adaptation* in current understanding of mental toughness.

The final conceptual issue addressed was the connection between definitions of mental toughness, its constituent terms and related applications (see Table 2-3, page 31 above). Given that this alignment had not been systematically addressed before, these findings provide an original contribution for highlighting existing features that retain the core meaning of its constituent terms, as well as those that may be superfluous or omitted from current definitions of mental toughness.

First, with respect to conceptual inheritance from ‘mental’, Gucciardi et al. (2015) suggested that both terms imply “a quality that resides within an individual” (2014, p.

28). Specifically, from systematic analysis of these definitions, mental toughness intersected with ‘mental’ along *cognitions*, and to a lesser extent, *emotions*. These findings show that mental toughness may infer the qualities of toughness to predominantly thinking but also feeling. Although ‘tough feeling’ is not included, findings align with the model of mental toughness by Bull et al. (2005), which involves ‘tough thinking’ as the necessary process for making use of one’s skills and abilities at crucial moments in a competitive environment. The authors suggest that ‘tough thinking’ is “captured in the term ‘self-awareness’” (Bull et al., 2005, p. 223), and according to their model, ‘tough thinking’ involves two noteworthy branches of cognition: robust self-confidence (overcoming self-doubts, feeding off physical condition and maintain self-focus) and thinking clearly (good decision-making, keeping perspective and honest self-appraisal). ‘Tough thinking’ also extends to a number of cognitive attributes of mental toughness, such as remaining fully focused, regaining psychological control, not being adversely affected by others, and accepting competition anxiety (Bull et al., 2005; Jones et al., 2002). Thus, drawing from the meaning inherent in ‘mental’, these findings may assist future research in delineating and defining the core of mental toughness (i.e., ‘tough thinking’ or self-awareness) and its subsequent causes, processes and outcomes (Hardy et al., 2014).

Turning to the other half of its label, Gucciardi et al. (2015) also suggested that mental toughness may intersect with ‘toughness’ along “the notion of being able to withstand or endure challenging or adverse situations” (2015, p. 28). From systematic analyses, however, findings showed that mental toughness aligned with ‘toughness’ along *ability, skill or competence to maintain behaviour and effort towards goals and values* as well as *determination and maintenance of determination under stressful and challenging situations*. Alongside concurrent alignment with gender norm toughness (see Table 2-7, page 42 above), and strong existing physiological (Dienstbier, 1989, 2015; Kirby,

Morrow, & Yih, 2014) and theoretical (e.g., “challenge”; Clough et al., 2002) evidence, these findings suggest that “uncompromising determination” (Toughness, n.d.), which subsequently aids in maintaining behaviour and effort, is likely to be a major component of mental toughness that has been inherited from its parent term ‘toughness’.

Although these findings do not support those by Gucciardi et al. (2015), however, their conclusions may still be warranted. In particular, although *endurance, discomfort tolerance and stress tolerance* was not explicitly featured in mental toughness definitions, the suggestion that mental toughness includes “the notion of being able to withstand or endure challenging or adverse situations” (Gucciardi et al., 2015, p. 28) dovetails with endorsement of this feature from the majority of its conceptual relations (see Table 2-8, page 43 above) and qualitative and empirical links between mental toughness and greater endurance and discomfort tolerance (e.g., Burke & Orlick, 2003; Crust & Clough, 2005). On this basis, it is suggested that current definitions of mental toughness may have omitted *endurance, discomfort tolerance and stress tolerance* as an important feature. Further research would do well to further investigate this feature as a main component of mental toughness.

On the other hand, mental toughness definitions may contain superfluous features that are not justified by its constituent terms. Previously, these features have been noted as high performance and/or goal attainment (Gucciardi et al., 2015). In line with these suggestions, *performing under pressure* and a number of other performance-related outcomes (e.g., *achieves personal goals*) were features of mental toughness that were not aligned with ‘toughness’ or its applications. These findings align with previous criticisms of an excessive focus on outcomes in mental toughness definitions (Gucciardi et al., 2009a) and empirical findings that fail to establish significant correlations between mental toughness and performance (Dennis, 1978; Hardy et al., 2013; Joseph, 2009; Madrigal, Hamill, & Gill, 2013; Nicholls, Polman, Levy, & Backhouse, 2009; Simpson,

Gray, & Florida-James, 2006). Other sources of conceptual uniqueness include *maintains consistency or stability under stressful or pressurised situations* and *situations that are challenging and/or demanding*; however, these features may be semantic variations vis-à-vis conceptual deviations from ‘toughness’ and its applications. For example, *maintains consistency or stability under stressful or pressurised situations* may underpin the ‘toughness’ feature of *difficult to influence/stubborn*; and “strain, hardship, or severe labour” (Toughness, n.d.) may be classified within challenging and demanding contexts of mental toughness.

To conclude, these findings offered several original and important insights into the conceptualisation of mental toughness. In particular, mental toughness may primarily involve *maintaining stability or consistency in challenging and demanding situations*, and in particular, when *performing under pressure*. When compared with its conceptual neighbours, *maintenance of behaviour and effort* may represent common conceptual ground. Within this group, however, mental toughness may provide additional value in the context of *performance under pressure*, although performance-related features in current definitions may represent previous contextual biases towards sports. However, mental toughness may not include the process of *adaptation*, which is a feature commonly endorsed by related constructs. When compared with its constituent terms and related applications, mental toughness may primarily involve qualities of toughness in thinking and/or feeling, and in particular, maintenance of determination and subsequent maintenance of behaviour and effort towards goals or values. Findings also suggested that *endurance, discomfort tolerance and stress tolerance* may be an important feature previously omitted by mental toughness definitions.

*Study limitations*

As with any form of qualitative data, the present research involved researchers' subjective opinions in content analysing definitions. By extracting definitions exactly as they appeared in research articles, as well as using two experienced raters (with a third to make judgments on any disagreements), the present research endeavoured to mitigate this limitation. However, we acknowledge that biases and differences in conceptual understanding may still exist. As an alternative approach, future studies may consider using computerised linguistic analysis vis-à-vis human ratings of content.

A number of additional uses of 'toughness' are available (e.g., physiological toughness) and multiple constructs are related to mental toughness (e.g., self-efficacy). However, due to practical and time constraints, I was not able to include the complete network in the present review. Further, due to a large number of constructs included in the systematic literature search, search terms were also limited to titles in the literature search of large fields (e.g., resilience). Thus, future research would do well to expand on this research by widening and deepening the literature search to include more constructs and a greater in-depth extraction of definitions from the literature.

From the present literature review, uneven numbers of definitions were extracted for each construct. These uneven numbers may have impacted the amount of features endorsed by constructs and their corresponding feature frequencies. As the extent of overlap and/or divergence with mental toughness was evaluated along these criteria, it may be necessary for future studies to control and/or compensate for the uneven size of research fields.

Finally, the present review solely relied on conceptual information from definitions. Although the use of definitions was necessary to draw parameters around the amount and content of information considered here, additional conceptual information from these bodies of literature (e.g., models and empirical evidence) may have provided further

conceptual insight. Thus, future research may expand on the present study by considering a number of sources of conceptual information beyond construct definitions.

## **CHAPTER 3. CONCEPTUAL CLARIFICATION OF MENTAL TOUGHNESS: INSIGHTS FROM EXPERTS AND SURROUNDING NOMOLOGICAL NETWORKS**

### **Preface**

Based on published definitions, the previous chapter identified common and divergent elements in mental toughness definitions as well as unique and shared features between mental toughness and its wider nomological network. However, although published definitions provided a valuable starting point for elucidating current understanding mental toughness, they omit peripheral sources of conceptual information, such as empirical work and insights from surrounding constructs. Including these peripheral sources was thus a necessary next step toward further elucidating the meaning of mental toughness. In this study, however, rather than conduct a resource intensive literature search for conceptual information beyond definitions, I chose to ask experts about their understanding of constructs.

This approach provides a significant contribution to the literature because, based on their extensive research and practical experience with constructs, for the first time this study uses experts as agents to simultaneously and efficiently pull conceptual information together from a range of sources, including empirical work and neighbouring concepts. Beyond accessing a wider range of conceptual information, this study was the first of its kind to draw independent mental toughness experts and related bodies of research together in the same place at the same time.

## Abstract

Despite decades of conceptual investigations, experts continue to debate the meaning of mental toughness, and how it fits within the wider nomological framework. On this basis, the purpose of the research is to draw conceptual information together to understand important elements of mental toughness and uncover the nature of its relationship with similar constructs. To this end, 22 experts from a range of psychology-related fields (including mental toughness, resilience, hardiness, grit, psychological flexibility, *sisu* and mental fitness) took part in a prototype analysis (Fehr, 1988) where they were asked to rate the importance of conceptual themes (extracted from definitions of mental toughness and related constructs) *to their particular field of expertise*. From its definitions, mental toughness experts identified a number of central (e.g., *maintaining focus and concentration under stress*) and peripheral (e.g., *effective coping/appraisals*) themes. Further, a number of central themes to mental toughness were found in definitions of related constructs instead (e.g., *behavioural flexibility, cognitive reappraisals*). Taken together, these findings suggest that current definitions contain central features but also include excess peripheral features that muddy conceptual understanding of mental toughness. On the other hand, mental toughness definitions omit important features associated with its wider conceptual framework. Considering expert ratings from all fields, mental toughness was identified as conceptually closest to hardiness, grit and psychological flexibility, and furthest from *sisu* and gender norm toughness. Collectively, with the exception of *sisu* and gender norm toughness, experts also suggested that mental toughness and its related constructs may act together as a resistance resource or mediator of stress to facilitate the maintenance of psychological wellbeing and functioning.

## **Introduction**

Since early identification of mental toughness as instrumental for sporting performance (e.g., Gould et al., 1987; Loehr, 1986), numerous efforts have been directed towards understanding mental toughness (see Table 3-1, page 60 below for examples). These efforts have evolved over time from early anecdotal and empirically unsubstantiated texts (Connaughton & Hanton, 2009) to more rigorous scientific enquiries. Later scientific developments consisted of two main methodologies, which continue to be utilised in recent literatures (Connaughton et al., 2011). One approach employed qualitative research programs (e.g., Coulter et al., 2010; Gucciardi et al., 2008; Jones et al., 2002; Jones et al., 2007; Middleton et al., 2004; Thelwell et al., 2005), whereas the other adopted theoretical perspectives from neighbouring disciplines and constructs (e.g., hardiness, Clough et al., 2002; and resilience, Gucciardi et al., 2015).

Although both approaches have provided valuable insights to understanding mental toughness, they remain fraught with difficulties and the concept's meaning remains vague (Andersen, 2011). While qualitative approaches produced an understanding of mental toughness grounded in perspectives of athletes, coaches, parents, and sports psychologists, there is currently little consensus between the resultant definitions (Andersen, 2011; Connaughton & Hanton, 2009; Crust, 2007). On the other hand, adopted theoretical perspectives from neighbouring constructs are criticised for lacking scientific rigour (Connaughton & Hanton, 2009; Gucciardi, Gordon, & Dimmock, 2009b). Specifically, although a number of constructs such as resilience and hardiness are theoretically and empirically posited as related yet distinct (Golby & Sheard, 2004; Gucciardi & Gordon, 2009a; Gucciardi et al., 2008; Gucciardi et al., 2015; Sheard, 2009), and as such may hold valuable conceptual 'clues' for understanding mental toughness, the models lack supporting explorative research. For example, Clough et al's (2002) model of mental toughness is based on the existing theoretical frameworks of hardiness

on the basis of a hypothesised relationship, but is accompanied by little qualitative research to confirm its validity for understanding mental toughness (Gucciardi et al., 2009a). Despite these shortcomings, Gucciardi et al. (2009a) recognised the value in combining approaches: that is, drawing on both established psychological theory as well as explorative mental toughness data. On the basis of Gucciardi et al.'s (2009a) recommendation, this research aims to clarify understanding of mental toughness using information from the multitude of mental toughness definitions in conjunction with conceptual information inherent in definitions of neighbouring constructs.

In particular, the first aim is to establish how important given themes are to mental toughness that occur a) within definitions of mental toughness, and b) within definitions of related constructs. This will aid in 'trimming excess conceptual fat' with guidelines for retaining or omitting given themes in existing definitions, as well as highlighting previously overlooked components of mental toughness that reside in definitions of neighbouring constructs. Second, the inter-concept proximities are investigated to identify those constructs that are most and least similar to mental toughness. Attaining a nuanced map of conceptual distances in this way is important for identifying further opportunities for eliciting a wide range of conceptual information and maintaining coordinated conceptual developments between constructs. The final aim is to investigate the nature of the collective group of related constructs by identifying the most and least important themes overall. Understanding the features that tie these constructs together will for the first time define this collective group of constructs in the hopes of promoting ongoing collaboration between these fields.

To achieve these aims, the current study employed 'Part 2' of a prototype analysis, which has been previously used to ascertain central and peripheral features of various psychological constructs (e.g., love and commitment, Fehr, 1988; respect in close relationships, Frei & Shaver, 2002; wellbeing, Hone, Schofield, & Jarden, 2016;

forgiveness, Kearns & Fincham, 2004; and infidelity, Weiser, Lalasz, Weigel, & Evans, 2014). ‘Part 2’ of a prototype analysis typically asks participants to rank the importance of a list of previously-generated attributes to the construct in question (Fehr, 1988).

This study attains attributes from an aggregated pool of themes extracted from definitions of mental toughness and its related constructs (identified by Sorensen et al., 2016; see Table 2-5, page 39 above)<sup>4</sup>. In particular, themes are extracted from definitions of mental toughness (see Table 3-1 below), as well as from two conceptual families associated with mental toughness (henceforth referred to as ‘related constructs’). In line with Sorensen et al. (2016), these conceptual families include 1) conceptual neighbours of mental toughness (hardiness, resilience, psychological flexibility, grit, sisu and mental fitness, and 2) parent and sibling terms; that is, constituent terms of mental toughness (i.e., ‘mental’ and ‘toughness’) and related applications of toughness (gender norm toughness and material toughness). Definitions of these terms or constructs are presented Table 3-2 below and Table 3-3, page 64 below (see Appendix A, page 189 for a full list of definitions).

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<sup>4</sup> We retain themes extracted from dictionary definitions and non-psychological terms (i.e., “mental”, “toughness” and material toughness); however, as experts in these fields are likely to be unfamiliar with a range of psychological principles, centrality ratings are limited to experts of psychological constructs only (i.e., mental toughness, gender norm toughness, resilience, hardiness, grit, psychological flexibility, sisu and mental fitness).

Table 3-1.

*Definitions of mental toughness identified by Sorensen, Jarden and Schofield (2016; see Chapter 2, page 24 above)*

<b>Author</b>	<b>Definition</b>
Loehr (1994, p. 5)	“Toughness is the ability to consistently perform toward the upper range of your talent and skill regardless of competitive circumstances”
Jones et al. (2002, p. 209)	“Having the natural or developed psychological edge that enables you to, generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer and, specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.”
Clough et al. (2002, p. 38)	“Mentally tough individuals tend to be sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity.”
Fletcher (2005, p. 158)	“An individual's propensity to manage the demands of environmental stressors, ranging from an absolute resilience to extreme vulnerability.”
Thelwell et al. (2005, pp. 328–329)	“Mental toughness is having the natural or developed psychological edge that enables you to always cope better than your opponents with the many demands (competition, training, and lifestyle) that soccer places on the performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.”
Gucciardi, et al. (2008, p. 278)	“Mental toughness in Australian Football is a collection of values, attitudes, behaviours, and emotions that enable you to persevere and overcome any obstacle, adversity, or pressure experienced, but also to maintain concentration and motivation when things are going well to consistently achieve your goals.”
Gucciardi et al. (2009a, p. 67)	“Mental toughness is a collection of experientially developed and inherent sport-specific and sport-general values, attitudes, emotions, and cognitions that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities to consistently achieve his or her goals.”
Coulter et al. (2010, p. 715)	“Mental toughness is the presence of some or the entire collection of experientially developed and inherent values, attitudes, emotions, cognitions and behaviours that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges and adversities to consistently achieve his or her goals.”
Mallett and Coulter (2011, p. 191)	“Mental toughness is associated with the pursuit of goals in achievement contexts, and in that quest, particular values, attitudes, emotions, cognitions, and behaviours seem to influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities.”
Clough and Strycharczyk (2012, p. 1)	“The quality which determines in large part how people deal effectively with challenge, stressors and pressure... irrespective of prevailing circumstances.”
Hardy et al. (2014, p. 70)	“The ability to achieve personal goals in the face of pressure from a wide range of different stressors.”

Table 3-1 Continued

<b>Author</b>	<b>Definition</b>
Mahoney et al. (2014, p. 234)	“A collection of personal characteristics (i.e., forces, resources, and demands, discussed later) that allow individuals to regularly perform to or around the best of their abilities regardless of circumstances faced.”
Gucciardi et al. (2015, p. 28)	“A personal capacity to produce consistently high levels of subjective (e.g., personal goal achievement) or objective (e.g., race times) performance despite everyday challenges and stressors as well as significant adversities.”

Table 3-2.

*Definitions of conceptual neighbours of mental toughness identified by Sorensen et al. (2016; see Chapter 2, page 24 above)*

Related construct	Definition	Evidence of relationship with mental toughness
Resilience	<p>a) “Protective factors which modify, ameliorate or alter a person’s response to some environmental hazard that predisposes to a maladaptive outcome.” (Rutter, 1987, p. 316; 6060 citations)</p> <p>b) “The process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of stress – such as family and relationship problems, serious health problems, or workplace and financial stressors. It means ‘bouncing back’ from difficult experiences.” (American Psychological Association, 2015)</p>	Moderate correlations ( $r = .35 - .54$ ; $p < .01$ ; Gucciardi & Gordon, 2009)
Hardiness	<p>a) “Persons who experience high degrees of stress without falling ill have a personality structure differentiating them from persons who become sick under stress. This personality difference is best characterised by the term hardiness.” (Kobasa, 1979, p. 3; 3768 citations)</p> <p>b) “A personality trait that is indicative of individuals’ resilience and success in managing stressful circumstances.” (Golubovich, et al., May 2014, p. 757)</p>	Weak to moderate correlations ( $r = .34 - .38$ ; $p < .05$ ; Golby & Sheard, 2004; Sheard, 2009).
Grit	<p>a) “Perseverance and passion for long term goals” (Duckworth et al., 2007, p. 1087; 996 citations).</p> <p>b) “The ability to strenuously pursue long-term goals despite obstacles and adversity” (Anestis &amp; Selby, January 2015, p. 212)</p>	Moderate correlations ( $r = .42$ , $p < .01$ ; Joseph, 2009).
Psychological flexibility	<p>a) “The ability to fully contact the present moment and the thoughts and feelings it contains without needless defence.” (Bond et al., 2011, p. 678; 718 citations)</p> <p>b) “The ability to persist with and/or change behaviour that is consistent with personal values while allowing difficult thoughts or feelings to occur.” (Whiting et al., June 2015, p. 415)</p>	No direct comparisons. Conceptual similarities may exist along shared features of ‘emotional control’ (Clough et al., 2002; Jones et al., 2002), ‘emotion regulation’ (Gucciardi et al., 2015) and ‘emotional flexibility’ (Loehr, 1994).
Sisu	<p>a) “Sisu (SIH-soo or SEE-soo): (1) inner determination; (2) courage, tenacity, stubborn determination, energy and a will and an ability to get things done (Kolehmainen, 1957, p. ix).” (Lucas &amp; Buzzanell, 2004, p. 273; 39 citations)</p> <p>b) “The Finnish word “sisu” is very dear to us. It is untranslatable, but it means approximately strength of will, determination, and perseverance. We want to see ourselves as modest, hard-working, no-nonsense people who do not bow or resign to anyone.” (Sinkkonen, March 2013, pp. 49-50)</p>	No direct comparisons. Conceptual similarities may exist along shared features of ‘determination’ and ‘courage’ (Bull et al., 2005; Gucciardi et al., 2008; Jones et al., 2002; Lahti, 2013; Lucas & Buzzanell, 2004; Ryba et al., 2009)

Table 3-2 Continued

<b>Related construct</b>	<b>Definition</b>	<b>Evidence of relationship with mental toughness</b>
Mental fitness	a) and b) “Mental fitness is the changeable capacity to utilise resources and skills to psychologically adapt to environmental challenges or advantages to meet psychological needs.” (Robinson et al., 2015, p. 56)	No direct comparisons. Conceptual similarities may exist along shared features of ‘personal resources’ (Gucciardi et al., 2015; Robinson et al., 2015), ‘strength’ (Pickering, Hammermeister, Ohlson, Holliday, & Ulmer, 2010; Robinson et al., 2015; Tenenbaum et al., 1999), ‘flexibility’ (Loehr, 1994; Robinson et al., 2015) and ‘endurance’ (Crust & Clough, 2005; Robinson et al., 2015).

*Note.* a) most cited and b) most recent source. Definitions in a) and b) were obtained through a systematic literature review process (see Figure 2-1, page 36 above for further details).

Table 3-3.

*Definitions of conceptual parents and siblings identified by Sorensen et al. (2016; see Chapter 2, page 24 above)*

<b>Related construct</b>	<b>Definition(s)</b>
Mental	“Of or relating to the mind; <i>specifically</i> of or relating to the total emotional and intellectual response of an individual to external reality <mental health>; of or relating to intellectual as contrasted with emotional activity; of, relating to, or being intellectual as contrasted with overt physical activity; occurring or experienced in the mind <mental anguish>; relating to the mind, its activity, or its products as an object of study; relating to spirit or idea as opposed to matter” (“Mental”, n.d.).
Toughness	“Strong or firm in texture but flexible and not brittle; Not easily chewed <tough meat>; Characterised by severity or uncompromising determination <tough laws> <tough discipline>; Capable of enduring strain, hardship, or severe labour <tough soldiers>; Very hard to influence, stubborn <a tough negotiator>; Difficult to accomplish, resolve, endure, or deal with <a tough question> <tough luck>; Stubbornly fought <a tough contest>; Unruly, rowdyish <a tough gang>; Marked by absence of softness or sentimentality <a tough critic>” (“Toughness”, n.d.).
Material toughness <sup>1</sup>	b) “A mechanical characteristic that may be expressed in three contexts: (1) the measure of a material's resistance to fracture when a crack (or other stress-concentrating defect) is present, (2) the ability of a material to absorb energy and plastically deform before fracturing, (3) The total area under the material's tensile engineering stress-strain curve taken to fracture.” (Callister, & Rethwisch, 2014, p. 932)
Gender norm toughness <sup>2</sup>	a) “Physical prowess, evidenced both by demonstrated possession of strength and endurance and by athletic skill; "masculinity", symbolised by a distinctive complex of acts and avoidances (bodily tattooing, absence of sentimentality, non-concern with "art", "literature", conceptualisation of women as conquest objects, etc.); and bravery in the face of physical threat.” (Miller, 1958, p. 9; 2131 citations) b) “Toughness, which reflects men's belief that they must appear aggressive and physically and emotionally strong.” (Lisco, Leone, Gallagher, & Parrott, July 2015, p. 59)

*Note:* a) most cited and b) most recent source. <sup>1</sup> Citation information unavailable. See methods section of Chapter 2 (page 32 above) for further details of the definition extraction process.

Because experts are key stakeholders in any conceptual debates or developments, this work draws from academic populations (specifically, authors and co-authors of definitions identified by Sorensen et al. (2016); see Table 3-1, page 60 above). These experts were presented with the list of themes identified by Sorensen et al. (2016; see Table 2-5, page 39 above) and were asked to rate the centrality of the themes to their construct of expertise.

## Method

### *Participants*

Authors and co-authors of the definitions identified by Sorensen et al. (2016) were contacted via email with a request to participate in August 2015. Where an author had contributed to a number of construct definitions, their primary field of research was selected. Initial and reminder emails were sent to a total of 184 experts which resulted in 22 completed surveys (a response rate of 12%). Experts who chose to participate originated from the research fields of psychological flexibility ( $n = 6$ ), mental toughness ( $n = 5$ ), hardiness ( $n = 5$ ), resilience ( $n = 4$ ), gender norm toughness ( $n = 2$ ), grit ( $n = 1$ ), sisu ( $n = 1$ ) and mental fitness ( $n = 1$ ).

### *Procedure*

The initial email invitation provided experts with a link to an online survey using Google Forms, which they could complete and submit at any time (online questionnaires were left open for three months between August and October 2015). Experts were sent a follow-up reminder email one week after the initial study invitation. Both email invitations contained links to the survey, and once clicked, experts were presented with the following instructions:

*We are conducting a study investigating the conceptual similarities and differences between various constructs in Psychology. In particular, the constructs we are interested in include mental toughness, resilience, hardiness, grit, sisu, psychological flexibility, mental fitness and toughness as a gender norm.*

*In a previous study, we content analysed definitions of a number of psychological constructs (including mental toughness, resilience, hardiness, grit, sisu, psychological flexibility, mental fitness and toughness as a gender norm). From this analysis, we identified a group of features that appeared in the definitions; some of these features appeared across definitions of more than one construct*

*and some features were unique to certain constructs. Regardless, we have grouped the features together and they are presented in the questionnaire below.*

*Study instructions:*

- 1. In each section, please read each of the features.*
- 2. After you have read each one, please rate how central or important you think each feature is to the concept of [insert name of expert's construct]. Please note that although we are interested in a number of psychological constructs, in this study we are only asking you about how these features relate to [insert name of expert's construct].*

The survey subsequently presented the 84 features in sections according to their higher-level categories identified by Sorensen et al. (2016; see Table 2-5, page 39 above). These included the nature or descriptor of the construct (e.g., a state); situations or contexts (e.g., facing opposition or competition); personal characteristics (e.g., courage); emotions, behaviours and/or cognitions under stressful or pressurised situations (e.g., maintains consistency or stability under stressful or pressurised situations); and outcomes (e.g., achieves personal goals). In line with previous prototype research (e.g., Fehr, 1988; Kearns & Fincham, 2004), experts were asked to rate each feature's centrality to their construct on a Likert scale from 1 (not at all central or important) to 8 (extremely central or important). After each section, experts were provided with a free-response text box to enter in any themes that they felt were not included in the questionnaire.

## Results

### *Centrality of themes to mental toughness*

Following prototype analysis procedures (e.g., Fehr, 1988), a central median split was computed at 6.4, which identified all themes with a MCR above 6.4 as central ( $n = 43$ ), and all themes with a MCR below 6.4 ( $n = 41$ ) as peripheral<sup>5</sup>.

The first aim was to investigate the centrality of themes to mental toughness that appear a) in definitions of mental toughness (Table 3-4 below), and b) within definitions of related constructs (Table 3-5, page 72 below). From Table 3-4 below, although only mentioned in 23% definitions, the most central theme in existing mental toughness definitions is an ability to maintain focus and concentration under stress (MCR = 7.2). Other themes rated as central but appearing relatively infrequently include mental toughness as a group and/or pattern of behaviour and maintenance of determination and behaviour under stress. On the other hand, effective coping/appraisals appear frequently in mental toughness definitions (46%) but are identified as peripheral to mental toughness. Other relatively frequently-mentioned (31%) but peripheral themes includes mental toughness as an intrinsic or inherent construct that involves groups and/or patterns of attitudes and emotions in the context of facing opposition/competition.

However, despite these mismatches between frequency and MCRs, in general, experts significantly rated popular themes as more central to mental toughness ( $r = .27, p < .05$ ). For instance, a variety of situations (challenging, demanding, performing under pressure, adversity and stress) and a general ability to maintain stability and consistency under stress are mentioned both frequently and assigned high centrality ratings. Similarly, themes that describe the nature of mental toughness (capacity, measure, and amount), personal characteristics (forces, demands, resources, low anxiety/calmness,

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<sup>5</sup> We acknowledge, however, that the dichotomous nature of this approach somewhat conflicts with the continuous nature of feature centrality.

competitiveness) and aspects of psychological stability under stress (e.g., maintaining confidence and emotions/mood under stress) were infrequently mentioned in definitions, as well as assigned low centrality ratings.

Table 3-4.

*Frequently featured themes that occur in mental toughness definitions, their corresponding mean centrality ratings, and other constructs that include given themes*

<b>Feature name</b>	<b>%*</b>	<b>MCR</b>	<b>SD</b>	<b>Related constructs that also include theme (% frequency)</b>
Is able to maintain focus and concentration under stressful or pressurised situations	23%	7.20	0.84	-
Situations are challenging and/or demanding	62%	7.00	1.73	G (8%), H (7%), R (3%)
Performing under pressure	54%	7.00	1.73	-
Is able to maintain consistency or stability under stressful or pressurised situations	54%	7.00	0.71	R (9%)
Experiencing adversities, tragedies and trauma	46%	7.00	1.73	R (60%), G (8%)
Experiencing stressors or stress	31%	7.00	1.73	H (89%), MatT (56%), R (29%)
Group and/or pattern of behaviours	15%	7.00	1.22	R (3%)
Is able to maintain determination under stressful or pressurised situations	15%	7.00	1.73	S (33%), DT (10%), GNT (7%)
Is able to maintain consistency in behaviour or effort towards goals and values, e.g. persistence, under stressful or pressurised situations	8%	7.00	0.71	S (100%), G (92%), PF (65%), DT (33%), GNT (13%), H (6%), R (3%)
Learned or developed	31%	6.80	0.84	H (3%)
Perceptions of control	23%	6.80	1.64	H (39%), GNT (7%), R (3%)
Is able to maintain control under stressful or pressurised situations	23%	6.80	1.64	R (3%)
Is able to maintain coping under stressful or pressurised situations	8%	6.80	1.64	-
Is able to maintain motivation under stressful or pressurised situations	8%	6.80	1.64	-
Pursuing goals or values/within achievement contexts	46%	6.60	1.67	G (92%), PF (91%), H (3%)
Enhances performance	23%	6.60	1.67	H (10%)
Self-belief and confidence	15%	6.60	1.67	GNT (7%)
Determination	15%	6.60	1.67	S (100%), GNT (7%), DT (5%),
Overcomes obstacles	8%	6.60	1.67	R (11%)
Achieves personal goals	38%	6.40	1.67	-
Group and/or pattern of attitudes	31%	6.40	0.89	H (26%)

Table 3-4 Continued

<b>Feature name</b>	<b>%*</b>	<b>MCR</b>	<b>SD</b>	<b>Related constructs that also include theme (% frequency)</b>
Effective coping/appraisals	46%	6.20	1.64	H (29%), R (14%)
Intrinsic or inherent	31%	6.20	1.92	-
Is able to maintain confidence under stressful or pressurised situations	8%	6.20	2.39	-
Is able to maintain emotions and mood under stressful or pressurised situations, for example, can remain calm	8%	6.20	1.64	R (3%)
Facing opposition/competition	31%	6.00	1.58	DT (5%)
Personality trait, characteristic or tendency	23%	6.00	1.58	H (45%), G (46%), S (33%), MatT (22%), GNT (7%), R (3%)
Competitiveness	8%	5.80	1.64	GNT (7%)
Group and/or pattern of cognitions	23%	5.60	2.70	-
Psychological capacity, measure or amount	8%	5.60	2.70	MF (100%), MatT (67%), PF (22%), R (20%), H (6%)
Resource	8%	5.60	2.51	-
Value, ideal or belief	31%	5.40	2.70	GNT (20%), H (13%)
Psychological edge or strength	15%	5.40	2.70	S (33%), G (8%), H (3%)
Group and/or pattern of emotions	31%	5.20	2.59	-
Low anxiety and/or calmness	8%	5.20	1.64	-
Ability, skill or competence	23%	5.00	2.92	PF (48%), MatT (33%), S (33%), H (19%), G (8%), R (17%), GNT (7%)
Force or demand	8%	4.80	2.39	R (3%)

*Note.* \*Data obtained from Sorensen et al. (2016; Chapter 2, page 24 above). In order of appearance in table: G = grit, H = hardiness, R = resilience, MatT = material toughness, S = sisu, PF = psychological flexibility, DT = dictionary definitions of toughness, GNT = gender norm toughness, MF = mental fitness.

On the other hand, Table 3-5 below shows the MCRs of themes that appear in definitions of related constructs. As shown in Table 3-5 below, some themes central to mental toughness originated from neighbouring rather than mental toughness definitions. In particular, behavioural flexibility and cognitive appraisals are highly central themes of mental toughness found in definitions of hardiness, psychological flexibility and resilience. Other central themes missing from mental toughness definitions include various external stressors (risks, disruptive events and change), internal strain (unwanted psychological influences or events) and outcomes (e.g., adaptation and recovery). On the other hand, the least central themes originate from definitions of gender norm toughness, such as aggressiveness, masking emotions, independence from others, hardness/absence of softness or sentimentality, stoicism or emotionally detached and difficult to influence/stubborn.

Table 3-5.

*Centrality of features to mental toughness that appear in definitions of related constructs*

<b>Feature name</b>	<b>MCR</b>	<b>SD</b>	<b>Original construct (% frequency)</b>
Behavioural flexibility: Is able to modify behavioural responses under/to stressful or pressurised situations	7.20	1.79	PF (83%), H (3%), R (3%)
Is able to cognitively re-appraise stressful or pressurised situations	7.20	1.79	PF (9%), H (6%)
Facing risks	7.00	1.73	R (17%)
Experiencing disruptive events	7.00	1.73	R (6%)
Experiencing significant change	7.00	1.73	H (10%), R (3%)
Experiencing unwanted psychological influences or events, i.e., difficult thoughts, feelings, sensations, images or memories	7.00	1.73	PF (17%)
Is able to adapt to stressful or pressurised situations	7.00	1.73	MF (100%), R (35%), DT (10%), PF (9%), H (7%)
Recovery, or ability to return to a prior state and continue on	7.00	1.73	R (26%)
Resistance resource, buffer and/or mediator of stress	6.80	1.64	MatT (56%), H (35%), R (20%), DT (5%)
Faced with situational prospects or potential opportunities	6.80	1.79	MF (100%), PF (9%)
Commitment	6.80	1.64	H (35%)
Physical and emotional strength	6.80	1.64	S (33%), GNT (33%), DT (10%), H (3%)
Endurance, discomfort tolerance and stress tolerance	6.60	1.52	H (45%), S (33%), PF (31%), GNT (27%), DT (24%), G (15%)
Thriving and success	6.60	1.67	R (17%), H (10%), G (8%)
Additional protective or coping skills	6.60	1.52	R (3%)
Maintenance of psychological wellbeing and functioning	6.60	1.52	R (6%)
Maintenance of physiological wellbeing and functioning	6.60	1.52	R (14%), H (10%)
Perceptions of challenge	6.40	1.82	H (35%)
Is able to maintain meaning or purpose under stressful or pressurised situations	6.40	1.52	H (3%), R (3%)
Is able to maintain interest and passion for goals under stressful or pressurised situations	6.40	1.52	G (15%)
Is able to reconstruct meaning of stressful or pressurised situations	6.40	1.82	H (3%)
Vocational success	6.40	1.52	R (3%)
Expectation or norm	6.20	1.79	GNT (40%)

Table 3-5 Continued

<b>Feature name</b>	<b>MCR</b>	<b>SD</b>	<b>Original construct (% frequency)</b>
Completed or carried out plans	6.20	1.48	S (33%), H (3%)
Courage	6.00	1.58	S (66%), GNT (20%), H (13%)
Mindfulness/acceptance	6.00	1.58	PF (83%)
Creation of opportunities	6.00	1.58	H (23%)
A regulation process	5.80	2.68	PF (9%)
Generative experiences	5.80	1.48	H (13%), R (6%)
Educational attainment	5.80	2.28	R (3%)
A process	5.60	3.29	R (43%), PF (13%)
Skill or competence	5.60	2.07	GNT (14%)
Facilitates search for meaning	5.60	1.82	H (13%)
Meets psychological needs	5.60	2.51	MF (100%)
Openness and curiosity	5.40	2.07	PF (17%)
Passion for long-term goals	5.40	2.07	G (77%)
Is able to maintain views and opinions under stressful or pressurised situations	5.40	2.41	DT (29%), GNT (7%)
Improved or enhanced health status	5.20	2.17	H (13%)
Avoidance of maladaptive outcomes and negative trajectories	5.00	2.83	R (3%)
State	4.60	2.51	GNT (7%)
Positive emotions	4.60	2.41	H (3%), R (3%)
Hardness/absence of softness or sentimentality	3.80	1.48	S (33%), GNT (13%), DT (14%)
Stoicism or emotionally detached	3.80	1.79	GNT (33%)
Difficult to influence/stubborn	3.60	1.14	DT (29%), GNT (7%)
Independence from others	3.60	1.67	GNT (27%)
Masking emotions: invulnerability and concealing pain	3.60	2.70	GNT (40%)
Aggressiveness	3.00	1.58	GNT (40%), DT (29%)

*Note.* \*Data obtained from Sorensen et al. (2016; Chapter 2, page 24 above). In order of appearance in table: PF = psychological flexibility, H = hardiness, R = resilience, MF = mental fitness, DT = dictionary definitions of toughness, MatT = material toughness, S = sisu, GNT = gender norm toughness, G = grit.

*Proximities between mental toughness and related constructs*

The second aim was to understand conceptual proximities between mental toughness and its related constructs. To do so, correlations between MCRs of constructs were computed, as shown in Table 3-6 below. With the exception of sisu and gender norm toughness, the remaining constructs were all significantly correlated with each other (from  $r = .73$  to  $r = .26$ ). In particular, mental toughness was most highly correlated with hardiness ( $r = .73, p < .01$ ), psychological flexibility ( $r = .68, p < .01$ ) and grit ( $r = .65, p < .01$ ) and least correlated with gender norm toughness ( $r = .38, p < .01$ ) and sisu ( $r = .23, p > .05$ ).

Table 3-6.

*Correlations between mean centrality ratings of constructs*

	<b>MT</b>	<b>GNT</b>	<b>R</b>	<b>H</b>	<b>PF</b>	<b>G</b>	<b>S</b>	<b>MF</b>
MT	1	.38**	.47**	.73**	.68**	.65**	0.23	.46**
GNT	-	1	.15	.35**	.12	.35**	.12	-.01
R	-	-	1	.51**	.42**	.47**	-0.87	.49**
H	-	-	-	1	.67**	.69**	.04	.53**
PF	-	-	-	-	1	.57**	-.027	.62**
G	-	-	-	-	-	1	.22*	.26*
S	-	-	-	-	-	-	1	-.14
MF	-	-	-	-	-	-	-	1

Note: \* $p < .05$ , \*\* $p < .01$ . GNT = Gender Norm Toughness; MT = Mental Toughness; R = Resilience; H = Hardiness, PF = Psychological Flexibility; G = Grit; S = Sisuu; MF = Mental Fitness

These conceptual distances are illustrated using multidimensional scaling (in SPSS: Meyers, Gamst, & Guarino, 2013), shown in Figure 3-1 below.

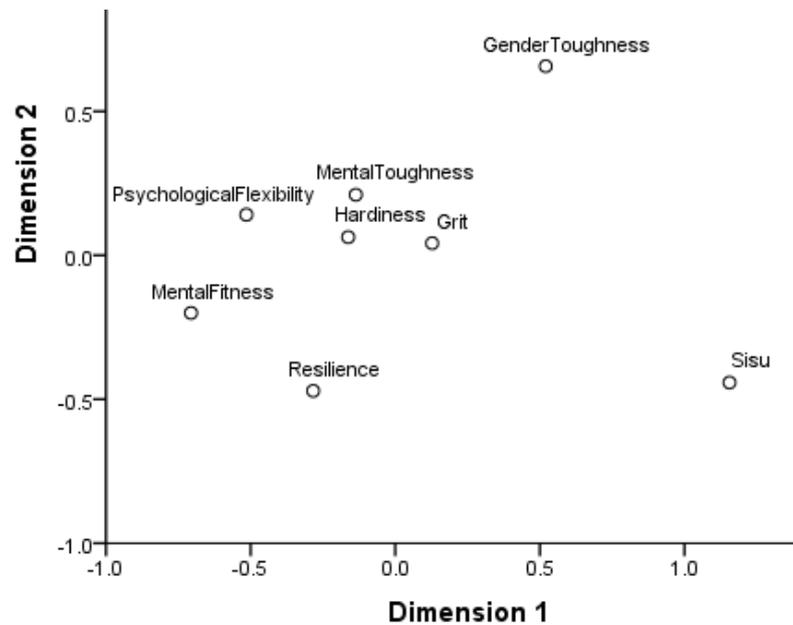


Figure 3-1. Proximal distances of constructs based on mean centrality ratings

Multidimensional scaling is a method of graphically configuring points by mapping each data point in two (or three) multidimensional space (Kruskal, 1978; Meyers et al., 2013). By doing so, the distance between data points represent the degree of similarity between constructs<sup>6</sup>.

#### *Centrality of themes to the collective group of related constructs*

The final aim was to examine the collective nature of mental toughness and its related constructs. At the outset, due to weak relationships between mental toughness, sisu and gender norm toughness (see Table 3-6 above), it was necessary to ensure a homogenous collection of constructs before attempting to understand their collective nature. To this end, an exploratory factor analysis was conducted which is a useful data reduction technique (Pallant, 2010). By treating the constructs as variables ( $n = 8$ ) and the mean centrality ratings of features as cases ( $n = 84$ ), two factors were extracted on the basis of

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<sup>6</sup> Due to low participant numbers from gender norm toughness ( $n = 2$ ), grit ( $n = 1$ ), sisu ( $n = 1$ ) and mental fitness ( $n = 1$ ), findings involving these constructs ought to be interpreted with caution until such research can be replicated with higher participant numbers.

their Eigenvalues exceeding 1, collectively accounting for 65.46% of the total variance (Table 3-7 below).

Table 3-7.

*Component loadings for constructs onto a one-factor solution*

Construct	Factor loading	
	Factor 1	Factor 2
Hardiness	<b>.888</b>	.595
Mental Toughness	<b>.863</b>	.109
Psychological Flexibility	<b>.825</b>	-.246
Grit	<b>.791</b>	.064
Resilience	<b>.676</b>	.342
Mental Fitness	<b>.660</b>	-.206
Gender Toughness	.387	<b>.706</b>
Sisu	.035	<b>-.515</b>
Eigenvalue	3.882	1.354
Percentage of total variance	43.38%	16.93%

In particular, hardiness, psychological flexibility, grit, resilience and mental fitness loaded onto the same factor as mental toughness, and thus may be considered similar<sup>6</sup> (page 75 above). On the other hand, sisu and gender norm toughness loaded onto the second factor, and as such may be considered different to mental toughness<sup>6</sup> (page 75 above). An examination of the Kaiser-Meyer-Olkin measure of sampling adequacy indicated that the dataset was factorable (KMO = .833) and the Bartlett's Test of Sphericity was significant ( $p < .01$ ). On the basis of this analysis, gender norm toughness and sisu were excluded from the group.

To examine the collective nature of remaining constructs (i.e., mental toughness, resilience, hardiness, psychological flexibility, grit and mental fitness), the overall MCRs were calculated to identify important themes to the group as a whole. As above, central and peripheral features were identified using the central median split, which was

calculated to be 5.79. Table 3-8 below displays the ten most central ( $> 6.72$ ) and ten most peripheral ( $< 3.87$ ) themes for the overall dataset<sup>7</sup>

As shown in Table 3-8 below, although only mentioned in 2% definitions, the most central theme to the group was a maintenance of psychological wellbeing and functioning. This was followed by an identification of the nature of the group as a resistance resource, buffer and/or mediator of stress, involving internal and behavioural states or processes (e.g., cognitive reappraisals, modifying behavioural responses and maintenance of meaning, purpose and coping) and outcomes (adaptation and overcomes obstacles). Out of the themes rated as central, situations such as adversity and stress, were noticeably mentioned more frequently than other categories. Regarding peripheral themes, themes rated as peripheral overall were mostly generated from definitions of gender norm toughness and *sisu*. These themes included a number of negatively-geared attributes including aggressiveness, hardness, masking emotions, emotional detachment and stubbornness. In all, with the exception of a few anomalies (e.g., maintenance of psychological wellbeing and functioning), most frequently featured themes in definitions were generally rated as more central overall ( $r = .33^{**}$ ,  $p < .01$ ).

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<sup>7</sup> Due to space constraints, Table 3-8 above does not display the entire range of central and peripheral themes.

Table 3-8.

*Ten most central and ten most peripheral themes of the total dataset (excluding sisu and gender norm toughness)*

Theme	Sorensen et al (2016)		Present study	
	Frequency (total dataset)	% of all definitions	Mean Centrality Rating	SD
<b>Central themes</b>				
Maintenance of psychological wellbeing and functioning	2	2%	7.16	1.24
Resistance resource, buffer and/or mediator of stress	18	16%	7.06	1.63
Is able to cognitively re-appraise stressful or pressurised situations	4	3%	7.02	1.85
Is able to maintain meaning or purpose under stressful or pressurised situations	2	2%	6.84	1.45
Is able to adapt to stressful or pressurised situations	18	16%	6.84	1.41
Experiencing adversities, tragedies and trauma	28	24%	6.78	1.63
Overcomes obstacles	5	4%	6.78	1.16
Is able to maintain coping under stressful or pressurised situations	1	1%	6.77	1.57
Behavioural flexibility: Is able to modify behavioural responses under/to stressful or pressurised situations	21	18%	6.76	1.56
Experiencing stressors or stress	40	34%	6.72	1.35
<b>Peripheral themes</b>				
Intrinsic or inherent	4	3%	3.87	1.95
Expectation or norm	0	0%	3.70	2.10
Competitiveness	1	1%	3.06	2.03
Independence from others	0	0%	3.00	1.99
Force or demand	2	2%	2.89	1.87
Difficult to influence/stubborn	0	0%	2.42	1.86
Stoicism or emotionally detached	0	0%	2.40	1.94
Masking emotions: invulnerability and concealing pain	0	0%	2.33	2.13
Hardness/absence of softness or sentimentality	0	0%	2.23	1.97
Aggressiveness	0	0%	2.13	1.57

### *Data reliability*

Because of the small sample sizes for each construct (i.e.,  $< 15$ ), intra-class correlation coefficients (ICC) were chosen to assess inter-rater reliabilities (Garson, 2009). Based on guidelines by Shrout and Fleiss (1979), ICCs were computed using a two-way random model (all judges rate all items; judges are a sample of all possible experts) on the basis of absolute agreement. Findings showed acceptable inter-rater reliability for mental toughness (ICC = .426,  $p < .01$ ), resilience (ICC = .424,  $p < .01$ ), hardiness (ICC = .794,  $p < .01$ ), psychological flexibility (ICC = .835,  $p < .01$ ) and the total dataset (ICC = .886,  $p < .01$ ); but not for gender norm toughness (ICC = 8.057,  $p > .05$ ). Inter-rater reliabilities could not be established for grit, mental fitness and sisu due to only one rater for each construct.

### *Qualitative Data*

Extra contextual and personal characteristic features were added by mental toughness and resilience experts using the free-response text box in the questionnaire. For contextual features, a mental toughness expert added: “opportunities for learning, experiencing emotions of others that are connected with you and experiencing challenge to your beliefs or prepositions”. A resilience expert further expanded the contextual features by noting “for resilience to occur, the 'press' has to be significant enough that you could assume it would lead to an adverse outcome. e.g., a bit of day to day hassle is probably not a predisposing factor, living with a degenerative health condition is”. In relation to the personal characteristics of constructs, a mental toughness expert added “prepared to do what it takes to achieve” and “sees things positively - everything is a possibility”.

Beyond these extra features, mental toughness, resilience and hardiness experts added general comments that provided insight into the challenges of conceptualising mental

toughness and resilience. For example, a mental toughness expert suggested “mental toughness is socially constructed to be whatever we want it to be” and:

On many occasions, I have sat on the fence. This may not be to the researcher teams liking, but, I have to admit, I struggled to complete this questionnaire. This is not a criticism of the work per se, more my ambiguity regarding my ability to objectively consider mental toughness (which, of course, is impossible) or to answer the questions in light of what the literature already tells us mental toughness is/is not... my feeling is that scholars (and practitioners) have become preoccupied with searching for some definable ‘truth’ about what mental toughness is. The truth, perhaps, is that mental toughness is always up for debate and varies depending on the assumptions and biases people associate with the term.

Echoing the conceptual difficulties of mental toughness, a resilience expert noted the age-dependent nature of the features: “I study resilience in later life, so some of these are not appropriate to that age group, but probably are appropriate to a younger population”. Finally, regarding the questionnaire in general, a hardiness researcher suggested “keep in mind that some of the words/phrases you offer can be construed in a couple of ways, for example, resource. Does this mean the person has resources? Is resourceful?”

## **Discussion**

Mental toughness has been characterised as one of the most used but least understood terms in psychology (Jones et al., 2007). In particular, mental toughness has been conceptualised by a number of diverse definitions that closely border various related phenomena. To facilitate greater conceptual understanding, therefore, expert insight was utilised to draw together conceptual information from mental toughness and its related concepts. This aim was approached by attaining expert centrality ratings for themes found within definitions of mental toughness as well as for those extracted from definitions of related constructs.

In the first instance, expert centrality ratings for themes found within mental toughness definitions were surprisingly divergent from existing literature. For instance, experts rated a maintenance of focus and concentration under stressful or pressurised situations as one of the most important attributes of mental toughness despite its relative absence from existing definitions and past importance rankings for this attribute ranging only from fourth equal to eleventh (Jones et al., 2002; Thelwell et al., 2005). By the same token, previously highly-rated attributes of mental toughness (such as effective coping and maintenance of self-belief; Bull et al., 2005; Coulter et al., 2010; Jones et al., 2002; Gucciardi et al., 2008; Slack et al., 2013) were rated as peripheral to mental toughness in the current study. On the other hand, central themes of maintenance of determination and behaviour have been assigned relatively similar importance ratings in the past (e.g., Bull et al., 2005; Jones et al., 2002; Gucciardi et al., 2008). Nonetheless, although some experts indicated that it might be difficult or even impossible to conceptualise mental toughness, these findings indicate that future definitions would do well to retain or elevate central themes (such as maintenance of focus and concentration); and conversely, omit or avoid peripheral themes (such as coping and maintenance of self-belief).

By including attributes from similar constructs, an unexpected finding was that some attributes of related constructs were more central to mental toughness than those found in definitions of mental toughness. In particular, behavioural flexibility and cognitive re-appraisals under stressful or pressurised situations did not appear in any mental toughness definitions yet were rated as most central to mental toughness out of all attributes. These attributes were extracted mainly from definitions of hardiness and psychological flexibility, which coincide with findings that these constructs are most similar to mental toughness. Although scant research is available, Fawcett (2011) found evidence of behavioural flexibility within narratives about mental toughness, for example, “it comes down to weighing the situation up make your judgements and carrying on or turning

back” (2011, p. 16). To the best of our knowledge, cognitive re-appraisal has not been researched in conjunction with mental toughness; although its role as an emotion regulation strategy (Gross, 2015) provides justification for its inclusion in mental toughness frameworks (e.g., emotional intelligence, Gucciardi et al., 2008; emotional control; Thelwell et al., 2005). On this basis, future research would do well to attend to these themes, as well as other central aspects missing from mental toughness definitions, such as certain contexts (risks, disruptive events, change), the involvement of internal strain (i.e., unwanted psychological influences or events) and outcomes (e.g., adaptation and recovery).

The second and third aims involved understanding the conceptual distances between mental toughness and its related constructs, as well as the conceptual core that ties these similar constructs together. Regarding conceptual distances, findings showed that mental toughness may be considered most similar to hardiness, psychological flexibility and grit<sup>6</sup> (page 75 above). In comparison with previous studies, importance ratings of attributes for mental toughness, hardiness and grit were more highly correlated here (hardiness:  $r = .730, p < .01$ ; grit:  $r = .645, p < .01$ <sup>6</sup> (page 75 above)) than previous correlations between test scores (hardiness:  $r = 0.34 - 0.384; p < .05$ ; Golby & Sheard, 2004; Sheard, 2009; and grit:  $r = .424, p < .01$ ; Joseph, 2009). Thus, current findings suggested closer conceptual distances between these constructs than previously thought and lends support to the 4C’s model of mental toughness (Clough et al., 2002), which incorporates theoretical elements from hardiness. The strong correlations between mental toughness and psychological flexibility ( $r = .680, p < .01$ ) and moderate correlations between mental toughness and mental fitness ( $r = .459, p < .01$ <sup>6</sup> (page 75 above)) to the best of our knowledge has not been previously investigated. Due to close conceptual proximities with these fields, future research would do well to collaborate and coordinate with theoretical and empirical research in these adjacent fields to further inform mental toughness theory.

Although relationships between mental toughness, hardiness, grit and psychological flexibility were stronger than expected, findings align with previous test score correlations between mental toughness and resilience ( $r = .54$ ;  $p < .01$ ; Gucciardi & Gordon, 2009). Also in line with expectations, findings showed that mental toughness was located furthest from gender norm toughness<sup>6</sup> (page 75 above). In particular, a large number of gender norm toughness themes were rated as peripheral to mental toughness by mental toughness experts, including negatively valenced attributes such as aggressiveness and emotionally detached, which may justify previous conceptualisations of mental toughness as a positive construct fit for investigation within frameworks of positive psychology (Gucciardi et al., 2015; Sheard, 2013).

Finally, in examining the collective conceptual nature of mental toughness and its related constructs (excluding *sisu* and gender norm toughness), findings suggested that the two most important attributes to the overall group were maintenance of psychological wellbeing and functioning and resistance resource, buffer and/or mediator of stress. Despite mention in only 2% of definitions, the collective role of these constructs in maintaining wellbeing under stress is supported by empirical findings (Bond et al., 2011; De Terte, Becker, & Stephens, 2009; Gucciardi et al., 2015; Maddi, Khoshaba, Perisco, Lu, Harvey and Bleecker, 2002; Robinson et al., 2015; Singh & Jha, 2008), models of wellbeing (e.g., Five Domains of Positive Functioning; Rusk & Waters, 2015) and the inclusion of these constructs, in particular mental toughness and resilience, in the research field of positive psychology (Rusk & Waters, 2013; see Figure 1-4, page 13 above). When considered in conjunction with the second-most central theme of “resistance resource, buffer and/or mediator of stress”, the present study suggests that the primary function of mental toughness and its related constructs is to buffer (i.e., maintain) wellbeing and functioning from external and/or internal stressors. Subsequent central themes may also provide insight into the common underlying mechanisms by which maintenance is

achieved (e.g., cognitive reappraisals, behavioural flexibility and maintenance of meaning, purpose and coping) and the outcomes that may result (adaptation and overcomes obstacles). Finally, as certain situational themes were centrally-rated as well as most frequently mentioned in definitions (e.g., adversity and stress), this group of constructs may be further tied together by their relevance to these common contexts. In all, although each member deserves credit as a stand-alone construct, future research may investigate the advantages of considering these constructs as a unified higher-order group in order to attain collective benefits and minimise conceptual redundancies.

In sum, with the help of expert input, important and unimportant themes within definitions of mental toughness and within definitions of related constructs were systematically identified. Narrowing in on these important themes in the future will facilitate conceptual specificity and assist in reducing the large number of features included in current definitions of mental toughness. When considered together, findings suggest that mental toughness is most similar to hardiness, psychological flexibility and grit, moderately similar to resilience and mental fitness, but least similar to sisu and gender norm toughness<sup>6</sup> (page 75 above). Ongoing efforts to glean conceptual information from similar constructs (i.e., hardiness, psychological flexibility, grit, resilience and mental fitness) may provide valuable insights into furthering the understanding of mental toughness. Finally, considering mental toughness and its related constructs as a collective group may provide valuable inroads to facilitating wellbeing and functioning in individuals experiencing stress or adversity.

### *Study limitations*

A number of limitations were noted for the present research, including 1) small participant numbers, 2) the ambiguous nature of features, 3) subjective opinions involved in the research, 4) the use of authors of definitions as experts and 5) the sole reliance on

definitions to attain features. What follows is a discussion of each limitation and ways in which they can be mitigated in future research.

As previously identified in footnote 6 (page 75 above), as a product of small research fields or new academic lines of enquiry, the first limitation was the low number of experts for each construct. This limitation particularly applied to gender norm toughness ( $n = 2$ ), grit ( $n = 1$ ), *sisu* ( $n = 1$ ) and mental fitness ( $n = 1$ ). Small sample sizes prevented computation of reliability metrics for grit, *sisu* and mental fitness and may have contributed towards poor inter-rater reliabilities for gender norm toughness. Subsequently, findings involving these constructs ought to be interpreted with caution until such research can be replicated with higher participant numbers.

In light of valid comments made by an expert, another limitation of the research is the variety of ways a feature could be construed from the questionnaire. Although it may be equally incorrect to assume authors' intended meanings of themes, a greater analysis or investigation of each theme's meaning and subsequent communication of this information in the questionnaire would have reduced ambiguity.

Centrality ratings of themes also involved experts' subjective opinions based on their own unique experience in the field. While experts were purposefully selected for their notable experience with constructs, the present study did not delineate between the extent and type of experience with constructs, for example, academic, practical or both. Although it is highly likely that experts included in this study were adequately qualified, these findings may differ from other equally-experienced populations, such as consulting practitioners and lay populations. On this basis, future research would benefit from the use of a range of experts in different facets of the field (e.g., academics and practitioners) as well as lay populations for informing conceptual developments.

In line with the above limitation, the present study selected authors of definitions as experts. Beyond limiting the participant pool, the use of authors as experts presented a

possibility of circular error; that is, logically the definitions of constructs are highly likely to reflect the author's understanding of constructs. In light of this limitation, a recommendation for future research is to, again, use a wide range of experts from various areas of the construct fields rather than just authors of definitions.

Finally, the present study only used definitions to attain features of constructs. As shown by other prototype analyses (e.g., Kearns & Fincham, 2004), when issued with an open-response questionnaire, participants tend to arrive at a number of features not included in traditional conceptualisations of constructs. Although free-response text-boxes were provided for this reason, experts may have not been adequately prompted to enter in additional information compared to previous prototype analyses.

## **CHAPTER 4. LAY PERSPECTIVES OF MENTAL TOUGHNESS: A PROTOTYPE ANALYSIS**

### **Preface**

As highlighted in the previous study, a range of populations can be used to help us understand what mental toughness is (e.g., academic, practitioner and lay populations). Despite this knowledge, definitions are predominantly attained from academic and expert sporting perspectives. A considerable gap thus lies in a relatively unexplored understanding of mental toughness from a layperson's perspective. To address this gap in knowledge, for the first time in the mental toughness literature, the following work investigated how laypeople understand mental toughness. In doing so, this work represents the first step towards extending mental toughness from sporting/expert focused conceptualisations to encompass a wider portion of general societal perspectives. Beyond understanding lay conceptualisations of mental toughness, this investigation was equally important for establishing that mental toughness is a positively-construed construct that is applicable to situations beyond traditional sporting contexts.

**Abstract**

The predominant focus on sporting populations has limited our conceptual understanding of mental toughness in lay contexts. On the basis of its wider benefits beyond sports, the central and peripheral attributes of mental toughness from a layperson's perspective was explored. To this end, a prototype analysis was employed, which consisted of two parts. In Part 1, a list of attributes of mental toughness was generated. In Part 2, these attributes were ranked for their centrality to mental toughness. Part 1 was an open-format questionnaire, where 138 laypeople generated a final list of 75 attributes of mental toughness. The most frequently mentioned attributes were self-belief, determination, perseverance, resilience and focus, which largely supported important attributes identified by athletes in existing mental toughness literature. Part 2 surveyed 136 laypeople, who identified mental strength, overcomes obstacles, achieves/operates under pressure, determination and resilience/recovery as the most central attributes to mental toughness. Although determination and resilience aligned with existing sporting accounts of mental toughness, the remaining attributes reflect differences in perception of mental toughness between sporting and lay contexts. Examination of peripherally-rated attributes provides insights into mental toughness as an enduring form of suffering. Overall, determination and resilience emerged as frequently mentioned, as well as highly central, and, as such, represent the foundation for a universal (i.e., not context-specific) understanding of mental toughness.

## **Introduction**

Although sport has been a predominant focus, empirical research suggests that the benefits of mental toughness extend to a variety of non-sporting populations (Crust, 2007; Gerber et al., 2012; Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi & Jones, 2012; Gucciardi et al., 2015; St. Clair-Thompson et al., 2015). However, work that has been done across non-sporting fields has been done so from theoretical and expert perspectives, without knowledge of how laypeople understand the concept. The present study thus aims to re-align knowledge towards lay or non-sporting populations to improve empirical and practical utility of mental toughness in lay contexts. Because mental toughness has often been cited by researchers, coaches and athletes as an influential psychological factor in sporting success (Connaughton, Hanton, et al., 2008; Denison, 2007; Holland et al., 2010; Gould et al., 1987), sports psychologists and researchers have collected sizeable literatures to understand, measure and develop mental toughness. From these efforts, a plethora of attributes has been generated by sportspeople to characterise mental toughness (see Table 4-1 below).

Table 4-1.

*Qualitatively-generated attributes of mental toughness in sporting populations*

<b>Source</b>	<b>Method</b>	<b>Attributes</b>
Jones et al. (2002)	Interviews with international performers ( $n = 10$ ) from mixed sporting disciplines. Participants generated attributes of mental toughness and then rank-ordered their importance.	<b>[In order of importance]</b> Having an unshakable self-belief in one's ability to achieve goals; recovering from set-backs and having increased determination to succeed; having an unshakable self-belief that one has qualities and abilities greater than opponents; having an insatiable desire and internal motivation to succeed; being fully-focused on the task in the face of competition-specific distractions; regaining psychological control following unexpected events and uncontrollable events; overcoming physical and emotional pain while maintaining technique and effort; accepting and coping with competition anxiety; thriving on the pressure of competition; not being adversely affected by others' good and bad performances; remaining fully focused in the face of personal life distractions; and the ability to switch a sport focus on and off.
Bull et al. (2005)	Interviews with international cricket players ( $n = 12$ ).	<b>[Ordering not specified by authors]</b> Parental influence, childhood background, exposure to foreign cricket, opportunities to survive early setbacks, needing to "earn" success (environmental influences); independence, self-reflection, competitiveness with self as well as others, resilient confidence (tough character); exploiting learning opportunities, belief in quality preparation, self-set challenging targets, "never say die" mindset, "go the extra mile" mindset, determination to make most of ability, belief in making the difference, thrive on competition, willing to take risks (tough attitude); robust self-confidence (overcoming self-doubts, feeding-off physical condition, maintaining self-focus) and thinking clearly (good decision-making, keeping perspective, honest self-appraisal) (tough thinking).

Table 4-1 Continued

Source	Method	Attributes
Thelwell et al. (2005)	Interviews with professional soccer players ( $n = 6$ ) to generate attributes of mental toughness. Attributes were then rank-ordered for their importance to mental toughness by an additional sample of professional soccer players ( $n = 43$ ).	<b>[In order of importance]</b> Having total self-belief at all times that you will achieve success; having the ability to react to situations positively; having the ability to hang on and be calm under pressure; having the ability to ignore distractions and remain focused; wanting the ball/wanting to be involved at all times; knowing what it takes to grind yourself out of trouble; controlling emotions throughout performance; having a presence that affects opponents; having everything outside of the game in control; enjoying the pressure associated with performance.
Jones et al. (2007)	Interviews with athletes ( $n = 8$ ), coaches ( $n = 3$ ) and sports psychologists ( $n = 4$ ). Participants generated attributes of mental toughness and then rank-ordered their importance.	<b>[In order of importance within each theme]</b> <i>Attitude/mindset</i> : belief and focus; <i>Training</i> : using long-term goals as the source of motivation, controlling the environment, pushing yourself to the limit; <i>Competition</i> : belief, staying focused, regulating performance, handling pressure, awareness and control of thoughts and feelings, controlling the environment; <i>Post-competition</i> : handling failure, handling success.

Table 4-1 Continued

Source	Method	Attributes
Gucciardi et al. (2008)	Interviews with Australian football coaches ( $n = 11$ ). Participants generated attributes of mental toughness and then rank-ordered their importance.	<b>[In order of importance]</b> Self-belief, work ethic (determination, perseverance, goals, meticulous preparation, time management, inspirational), personal values (honesty, pride in performance, accountability), self-motivated (competitive desire, team success, vision), tough attitude (discipline, commitment, positivity, professionalism, sacrifices), concentration and focus, resilience, handling pressure (overriding negative thoughts), emotional intelligence (self-awareness), sport intelligence (team role responsibility, understanding the game), physical toughness.
Coulter et al. (2010)	Semi-structured interviews with soccer players ( $n = 6$ ), coaches ( $n = 4$ ) and parents ( $n = 5$ ). Attribute importance identified by the number of participants that cited a particular theme.	<b>[In order of importance]</b> Winning mentality and desire, self-belief, physical toughness, work ethic, resilience, personal values, concentration and focus, performance awareness, sport intelligence, tough attitude, coping under pressure, competitive effort, risk-taking, emotional intelligence and control.

Table 4-1 Continued

Source	Method	Attributes
Weinberg et al. (2011)	Interviews with head coaches ( $n = 10$ ) from a variety of sports.	<b>[Ordering not specified by authors]</b> Psychological skills (focus, confidence, knowledge and mental planning), motivation to succeed (motivation to work hard, persistence) and resilience (rebound from setbacks, handling and performing under pressure).
Driska, Kamphoff and Armentrout (2012)	Semi-structured interviews with elite swimming coaches ( $n = 13$ ) to confirm or modify the framework by Jones et al. (2007).	<b>[Ordering not specified by authors]</b> Attitude/mindset: belief, focus and coachability*; Training: using long-term goals as the source of motivation, controlling the environment, pushing yourself to the limit and retaining psychological control on poor training days*; Competition: belief, staying focused, regulating performance, handling pressure, awareness and control of thoughts and feelings**, controlling the environment**; Post-competition: handling failure, handling success. *Proposed new sub-component , **Did not receive support as a sub-component of mental toughness
Slack et al. (2013)	Semi-structured interviews with Premier English League Referees ( $n = 15$ ).	<b>[Ordering not specified by authors]</b> Coping with pressure, resilience, robust self-belief, tough attitude, achievement striving, strong work-ethic and sport intelligence.

However, none of these conceptualisations include perspectives of laypeople, which is particularly important considering that “different people explain mental toughness differently depending on their personal experience and interactions within their own social world” (Fawcett, 2011, p. 9). Because experiences of athletes and academics are likely to differ from those of laypeople, it is important that a comparison between these perspectives be made.

A between-context comparison is useful for a number of reasons. First, researchers need to ensure that “mental toughness” means the same thing when examining mental toughness in non-sporting contexts. Specifically, Fehr and Russell (1991) suggest lay perspectives are important for “freeing researchers from hidden assumptions and confusion” (1991, p. 436). As mental toughness is typically measured through self-report scales that are developed from theoretical or sporting-based conceptualisations, it is important for researchers to understand how these tools correspond to participants’ ideas of the concept. Second, as the meaning of mental toughness is likely to be contextually bound (Bull et al., 2005; Fawcett, 2011; Madrigal et al., 2013), lay theories may highlight previously overlooked components of mental toughness (Harasymchuk & Fehr, 2013). Finally, understanding lay perceptions of mental toughness may contribute to promoting further recognition and understanding of the benefits that can be attained by mental toughness beyond sporting and achievement-related contexts.

To this end, a prototype analysis (Rosch, 1975) was employed based on its usefulness for elucidating lay perceptions of “fuzzy” psychological phenomena elsewhere (e.g., love and commitment, Fehr, 1988; respect in close relationships; Frei & Shaver, 2002; wellbeing, Hone et al., 2016; forgiveness, Kearns & Fincham, 2004; and infidelity, Weiser et al., 2014). A prototype perspective suggests that attributes are organised in a hierarchical, rather than linear, fashion according to their centrality (or importance) to the phenomenon (Rosch, 1975). Based on their “proximity,” the presence or absence of these

attributes renders given cases as more or less typical of the phenomenon. For example, an animal is more likely to be classified as a bird if it contains prototypical features of a bird (e.g., clearly visible feathers, flying), such as a sparrow, than a case that does not contain these central features, such as a penguin (Kearns & Fincham, 2004).

The prototype analysis is employed here in two parts. At the outset, a first group of participants are asked to freely generate typical attributes of mental toughness (Part 1). These attributes are then collected into a list so that a second group of participants can rank them for their centrality or importance to mental toughness (Part 2). Findings are discussed for their relevance to current and future directions of mental toughness research.

## **PART 1: GENERATION OF MENTAL TOUGHNESS ATTRIBUTES**

The purpose of Part 1 was to encourage participants to generate attributes of mental toughness using a free-response format. This approach to collecting mental toughness attributes aligned with previous prototype analyses and was beneficial for attaining a cross-section of opinions from a large sample size.

### **Method**

#### *Participants*

One hundred and thirty eight laypeople participated in the current research. Due to an accidental omission of demographic questions from the original questionnaire, demographic information was collected retrospectively from participants at the same time that study findings were communicated. Fifty-one (37%) participants responded to the retrospective demographic questionnaire. These respondents consisted of females (57%) and males (43%), who ranged in age between 18 and 64+ years, with the biggest age groups being 50-64 years old (35%) and 35-49 years old (33%). The majority of participants were European/NZ European (92%), with remaining ethnicities being Māori

(2%), Indian (2%) and other (4%). Participants worked across a range of industries in entry and managerial-level positions.

### *Procedure*

Lay participants from various community, occupational and vocational groups, as well as friends and family, were invited to participate in the first stage of research in July 2015. Where possible, the invitation included presentation of the research aims and data collection in person. Due to time or location restrictions, some participants requested that study materials be sent via email and returned at their convenience.

Once participants had read the information sheet and signed the consent form, the questionnaire invited participants to take 15 minutes to freely produce all features associated with mental toughness, according to the following instructions (adapted from Fehr & Russell, 1984, Study 6):

*This is a study on the attributes that people think of when they think of the word mental toughness in everyday situations. For example, if you were asked to list the attributes of a person experiencing fear, you might write possible danger occurs, attention is focused on the threat, heart beats wildly, the person runs as fast as they can. In the current study, we are not interested in attributes of fear but in attributes of mental toughness in everyday situations. Imagine that you are explaining the word mental toughness to someone who has no experience of mental toughness. Include the obvious. However, try not to just free-associate. We're interested in what is common to instances of mental toughness. Remember that these attributes can be positive or negative.*

These instructions were followed by a statement to re-clarify the question and prompt participants:

*What, in your opinion, are the key attributes of mental toughness? Please list as many as you can below.*

Participants were provided with 15 blank lines to enter their responses, and were encouraged to take as much time as needed to generate as many attributes of mental toughness as possible. Once participants had completed and submitted the questionnaire, snowball sampling was encouraged by asking participants if they were affiliated with other community or occupational groups who may appreciate the opportunity to participate in this research. This process was repeated until a sufficient sample size was obtained.

### **Results and discussion**

For the purposes of data manageability, the first and second authors first allocated raw entries into one of five categories: social, motivational, emotional, psychological or other. Once data had been organised into these five categories, in line with the procedure used by Fehr (1988), the next step involved the extraction of linguistic units. Using this procedure, monolexic items (e.g., “determination”) were first identified and extracted. Where phrases were used, judgements were made to determine whether the phrase referred to a single linguistic unit (e.g., “ability to stay focused on the job at hand” was coded as “focus”) or split into multiple linguistic units (e.g., “to be brave and determined to achieve goals when situations are hard” was split into “bravery” and “determination”). The 138 participants generated an average of 8.14 linguistic units each, yielding a total of 1124 units from this analysis.

Upon extraction, linguistic units were allocated to existing groups if they were similar in meaning or if they formed different grammatical versions of the same word. If linguistic units did not fall into existing attribute categories based on this criteria, new attribute categories were created. Any ambiguous words or phrases were left until the end of the analysis and placed in an “unsure” category if their meaning could not be

ascertained by the researchers. A total number of 44 units were placed in the “unsure” category (e.g., “inner self”) and subsequently excluded from further analysis.

In the process of grouping linguistic units, words or phrases that were similar yet slightly different (e.g., “objective thinking” and “rational”) were first allocated to separate attribute categories to retain conceptual richness. Initially, the linguistic units formed 101 feature categories. However, to reduce participant burden in Part 2, similar categories were combined (e.g., “objective thinking” and “rational” were judged as similar enough to be combined into one category group), and categories mentioned by less than 2% of the sample were excluded from the final list of attributes. In all, 75 final attribute categories were identified, which are displayed in Table 4-2 below.

Table 4-2.

*Attributes sorted by Part 1 frequencies\**

Attributes	*Part 1		Part 2	
	Frequency	%	MCR	SD
Self-belief/confidence/sense of competence	54	31%	5.42	1.19
Grit/perseverance	53	30%	5.59	1.33
Determination	50	30%	5.95	1.06
Focus/concentrate	48	29%	5.57	1.32
Resilience/recovery	47	30%	5.9	1.09
Social relationships/openness/receiving help	44	22%	4.64	1.69
Rational/analytical	42	20%	5	1.60
Calm and in control	41	22%	5.08	1.38
Purpose/goal focused	33	20%	5.5	1.34
Good decision maker	33	15%	4.31	1.26
Absorb/cope/deal with stress and pressure	30	18%	5.78	1.27
Optimism/positive expectations	30	20%	5.08	1.43
Emotional stability/strength/intelligence	29	17%	5.31	1.42
Accept failure/negative situation as a part of life	28	12%	5.13	1.62
Stubborn	25	14%	4.72	1.64
Desire/driven/motivated	24	14%	5.61	1.29
Self-discipline <sup>8</sup> (page 102 below)	24	14%	-	-
Stand up for oneself/assertiveness	23	12%	5.52	1.23
Achieve/operate under pressure	22	13%	6.04	1.11

Table 4-3.

*Attributes sorted by Part 2 Mean Centrality Ratings (MCR)\**

Attributes	Part 1		*Part 2	
	Frequency	%	MCR	SD
Mental strength	8	4%	6.2	1.01
Overcomes obstacles	14	9%	6.05	1.09
Achieve/operate under pressure	22	13%	6.04	1.11
Determination	50	30%	5.95	1.06
Resilience/recovery	47	30%	5.9	1.09
Absorb/cope/deal with stress and pressure	30	18%	5.78	1.27
Taking responsibility	5	4%	5.78	1.30
Able to take criticism	4	3%	5.75	1.29
Commitment	4	3%	5.67	1.13
Not feel inferior/not being undermined	5	4%	5.66	1.26
Independence	13	8%	5.64	1.25
Desire/driven/motivated	24	14%	5.61	1.29
Reflection and growth/learning	15	9%	5.6	1.38
Grit/perseverance	53	30%	5.59	1.33
Put things in perspective	15	10%	5.59	1.26
Focus/concentrate	48	29%	5.57	1.32
Adaptable	10	7%	5.57	1.42
Stand up for oneself/assertiveness	23	12%	5.52	1.23
Purpose/goal focused	33	20%	5.5	1.34
Trust/respect yourself	6	4%	5.45	1.34
Strength - general	15	8%	5.44	1.32
Self-belief/confidence/sense of competence	54	31%	5.42	1.19

Table 4-2 Continued

Attributes	*Part 1		Part 2	
	Frequency	%	MCR	SD
Self-awareness	22	12%	5.08	1.44
Compartmentalise/dissociate	18	12%	5.23	1.30
Positive emotions (happy)	17	9%	4.22	1.43
Problem-solving ability	16	11%	5.39	1.24
One step at a time	16	9%	5.18	1.19
History and experience	16	11%	4.64	1.50
Reflection and growth/learning	15	9%	5.6	1.38
Put things in perspective	15	10%	5.59	1.26
Strength - general	15	8%	5.44	1.32
Resistant to influence	15	8%	4.97	1.41
Overcomes obstacles	14	9%	6.05	1.09
Courage	14	8%	5.23	1.21
Independence	13	8%	5.64	1.25
Clear thinking	12	9%	5.26	1.20
Proactive	12	9%	5.21	1.35
Open-minded/no prior judgements	12	8%	4.93	1.50
Effective interpersonal skills	12	6%	4.78	1.42
Empathy/compassion/kindness	12	7%	4.4	1.34
Wellbeing	11	7%	4.19	1.49
Adaptable	10	7%	5.57	1.42
Be prepared	10	7%	5.05	1.40
Knowledgeable	10	7%	4.83	1.24
Patience and tolerance	10	6%	4.62	1.42
Thought control/independence from thought	9	4%	5.21	1.33
Honesty/trustworthiness	9	5%	4.73	1.38

Table 4-3 Continued

Attributes	Part 1		*Part 2	
	Frequency	%	MCR	SD
Positive self-talk	6	4%	5.4	1.36
Problem-solving ability	16	11%	5.39	1.24
Authenticity	8	6%	5.35	1.25
Focus on controllables/positives	7	4%	5.32	1.18
Challenge (vs threat)	5	4%	5.32	1.36
Emotional stability/strength/intelligence	29	17%	5.31	1.42
Sense of agency	5	4%	5.3	1.25
Not taking things personally	5	3%	5.29	1.41
Clear thinking	12	9%	5.26	1.20
Compartmentalise/dissociate	18	12%	5.23	1.30
Courage	14	8%	5.23	1.21
Proactive	12	9%	5.21	1.35
Thought control/independence from thought	9	4%	5.21	1.33
One step at a time	16	9%	5.18	1.19
Realistic	5	3%	5.18	1.34
Accept failure/negative situation as a part of life	28	12%	5.13	1.62
Calm and in control	41	22%	5.08	1.38
Optimism/positive expectations	30	20%	5.08	1.43
Self-awareness	22	12%	5.08	1.44
Be prepared	10	7%	5.05	1.40
Prioritise	7	4%	5.05	1.32
Consistency	4	3%	5.05	1.46
Mindfulness	7	5%	5.03	1.34
Strategic thinking	5	4%	5.02	1.36

Table 4-2 Continued

Attributes	*Part 1		Part 2	
	Frequency	%	MCR	SD
Mental strength	8	4%	6.2	1.01
Authenticity	8	6%	5.35	1.25
Clear moral code	8	4%	5	1.34
Planning	8	6%	4.99	1.41
Humour	8	5%	4.68	1.45
Focus on controllables/positives	7	4%	5.32	1.18
Prioritise	7	4%	5.05	1.32
Mindfulness	7	5%	5.03	1.34
Altruism	7	4%	4.55	1.31
Trust/respect yourself	6	4%	5.45	1.34
Positive self-talk	6	4%	5.4	1.36
Leadership/taking control	6	4%	4.71	1.42
Quick thinking	6	3%	4.55	1.33
Emotional openness	6	4%	4.14	1.45
Mental recovery/escape	6	3%	4.04	1.59
Selfishness	6	4%	3.37	1.50
Religious faith	6	4%	2.65	1.50
Taking responsibility	5	4%	5.78	1.30
Not feel inferior/not being undermined	5	4%	5.66	1.26
Challenge (vs threat)	5	4%	5.32	1.36
Sense of agency	5	4%	5.3	1.25
Not taking things personally	5	3%	5.29	1.41
Realistic	5	3%	5.18	1.34
Strategic thinking	5	4%	5.02	1.36
Flexible	5	4%	4.86	1.48

Table 4-3 Continued

Attributes	Part 1		*Part 2	
	Frequency	%	MCR	SD
Rational/analytical	42	20%	5	1.60
Clear moral code	8	4%	5	1.34
Planning	8	6%	4.99	1.41
Resistant to influence	15	8%	4.97	1.41
Open-minded/no prior judgements	12	8%	4.93	1.50
Flexible	5	4%	4.86	1.48
Knowledgeable	10	7%	4.83	1.24
Effective interpersonal skills	12	6%	4.78	1.42
Honesty/trustworthiness	9	5%	4.73	1.38
Stubborn	25	14%	4.72	1.64
Leadership/taking control	6	4%	4.71	1.42
Humour	8	5%	4.68	1.45
Social relationships/openness/receiving help	44	22%	4.64	1.69
History and experience	16	11%	4.64	1.50
Gratitude	5	3%	4.64	1.43
Patience and tolerance	10	6%	4.62	1.42
Altruism	7	4%	4.55	1.31
Quick thinking	6	3%	4.55	1.33
Empathy/compassion/kindness	12	7%	4.4	1.34
Good decision maker	33	15%	4.31	1.26
Humble	5	3%	4.27	1.51
Tough because no choice/necessity	4	3%	4.24	1.69
Positive emotions (happy)	17	9%	4.22	1.43

Table 4-2 Continued

Attributes	*Part 1		Part 2	
	Frequency	%	MCR	SD
Gratitude	5	3%	4.64	1.43
Humble	5	3%	4.27	1.51
Able to take criticism	4	3%	5.75	1.29
Commitment	4	3%	5.67	1.13
Consistency	4	3%	5.05	1.46
Tough because no choice/necessity	4	3%	4.24	1.69

Table 4-3 Continued

Attributes	Part 1		*Part 2	
	Frequency	%	MCR	SD
Wellbeing	11	7%	4.19	1.49
Mental recovery/escape	6	3%	4.04	1.59
Selfishness	6	4%	3.37	1.50
Religious faith	6	4%	2.65	1.50
Self-discipline <sup>8</sup>	24	14%	-	-

<sup>8</sup> Due to an administrative error, the attribute of self-discipline was omitted from importance rankings in Study 2. As discipline appears in the list of attributes presented by Gucciardi et al. (2008) and may be related to the attribute of work ethic (Coulter et al., 2010; Gucciardi et al., 2008; Slack et al., 2013), it is speculated that self-discipline may have been considered a central attribute of mental toughness. Future research may elucidate these inconclusive findings.

As shown in Table 4-2 above, the most popular features were self-belief (mentioned by 31% of participants), followed by determination, perseverance, resilience (mentioned by 30% of participants), and focus (mentioned by 29% of participants). Based on what is already known about mental toughness in sporting contexts (see Table 4-1, page 90 above), the frequent occurrence of these attributes is unsurprising. However, lay participants more frequently identified social attributes of mental toughness than their sporting counterparts. These social attributes included social openness and seeking out help from others (e.g., “the ability to talk through an issue out loud”), as well as resisting unfavourable social pressures (e.g., “not getting influenced by people around you”) and asserting one’s opinion or needs when necessary (e.g., “being able to stand up for something despite your own hardships”). Positive virtues oriented towards others, such as empathy, compassion and kindness, were also included, which builds on the attribute of personal values (e.g., honesty and integrity) identified by Gucciardi et al. (2008) and Coulter et al. (2010).

## **PART 2: CENTRALITY RATINGS OF MENTAL TOUGHNESS ATTRIBUTES**

The purpose of part two was to gain centrality or importance ratings of the attributes generated in the previous study. The methodology in this part aligns with steps taken by previous researchers to organise attributes in order of their importance to mental toughness (e.g., Gucciardi et al., 2008; Jones et al., 2002; Jones et al., 2007; Thelwell et al., 2005). With comparison between previous and current centrality ratings, therefore, findings from this part will indicate differences or similarities between sporting and lay perceptions of “typical” characteristics of mental toughness.

## Method

### *Participants*

One hundred and thirty six laypeople participated in the current research. As with Part 1 above, due to an omission of demographic questions from the original questionnaire, demographic information was collected retrospectively from participants at the same time that study findings were communicated. Thirty-one participants (24%) responded to the demographic questions. These participants consisted of females (82%) and males (18%) who ranged from 18-64 years old, with the largest groups being 25-34 year olds (36%) and 50-64 year olds (33%). The majority were European/NZ European (88%), with other ethnicities being Māori (3%) and other (9%). Participants worked across a range of industries in entry and managerial-level positions. Overall, participant demographics in Part 2 were similar to those in Part 1.

### *Procedure*

Similar participant recruitment and data collection procedures to Part 1 were followed in Part 2 to obtain a new sample. Once participants had read the information sheet and signed the consent form, the questionnaire (see Appendix B, page 208) provided participants with the following instructions:

*In a previous study, we asked people to tell us their views of mental toughness. Specifically, we asked them to “list the characteristics or attributes of mental toughness that come to mind.” Below are some of the responses we got. We now want to find out how important each attribute is to mental toughness. In other words...*

*Typically, a mentally tough person is someone who is...*

The questionnaire was divided into five sections, following the higher-level categories developed Part 1: social aspects, motivational aspects, emotional aspects, psychological

aspects and other. Under each heading, participants were provided with further instructions:

*Please read through the entire list and then rate how typical each attribute is by circling a number between 1 (not at all typical) and 7 (extremely typical).*

The features were then presented to participants in each section, sorted by alphabetical order. Features were reworded to suit the questionnaire instructions, and simplified if necessary, to enhance comprehension (e.g., “altruism” was reworded to “willing to make personal sacrifices for others”).

## **Results and discussion**

Mean Centrality Ratings (MCR) for the 75 attributes are presented in Table 4-3 (page 99 above). The most centrally-rated attributes of mental toughness include mental strength, overcomes obstacles, achieve/operate under pressure, determination, and resilience/recovery. Two indices were computed to establish the reliability of these mean centrality ratings. First, the intra-class correlation coefficient (ICC; equivalent to the average of all possible split-half correlations of the 136 judges with respect to the 75 attributes) reached significance ( $ICC = .941; p < .01$ ) thus indicating excellent inter-rater agreement. Second, based on a flipped data matrix that treats the 75 features as cases and the 136 judges as items, the internal consistency of the dataset was exceptionally high ( $\alpha = .95$ ).

Central from peripheral attributes of mental toughness were demarcated by calculating a central median split of mean centrality ratings. On this basis, all attributes with a mean centrality rating above 5.08 were considered central ( $n = 41$ ) and all attributes below ( $n = 33$ ) were considered peripheral<sup>9</sup>. In particular, participants considered mental

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<sup>9</sup> We acknowledge, however, that the dichotomous nature of this approach somewhat conflicts with the continuous nature of feature centrality.

strength, overcomes obstacles, achieve/operate under pressure, determination and resilience/recovery as central attributes of mental toughness. In comparison with existing knowledge, the high centrality ratings assigned to determination and resilience converge with findings by Bull et al. (2005), Coulter et al. (2010), Gucciardi et al., 2008, Jones et al. (2002), Slack et al., (2013) and Weinberg et al. (2011), and the remaining central attributes represent unique components of mental toughness in lay contexts. On the other hand, positive emotions (happy), wellbeing, emotional openness, mental recovery/escape, selfishness and religious faith were rated as peripheral or non-important attributes to mental toughness.

In all, significant agreement ( $r = .31, p < .01$ ) was found between the frequency percentages (Part 1) and centrality ratings (Part 2) of attributes. For instance, determination and resilience were both frequently mentioned and assigned high centrality ratings. Despite significant agreement, some features such as self-belief, perseverance and focus were mentioned frequently but assigned relatively low centrality ratings. Similarly, mental strength, overcomes obstacles and achieve/operate under pressure were mentioned relatively infrequently but assigned high centrality ratings.

### **Overall discussion**

Despite empirical investigations in non-sporting contexts (e.g., Gerber et al., 2012; Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2015; St. Clair-Thompson et al., 2015), lay perceptions of mental toughness remain relatively unexplored. On this basis, the current research used a prototype analysis to understand lay perspectives of central and peripheral attributes of mental toughness. Findings from this analysis verify as well as expand existing knowledge in a number of ways and thus progress empirical and practical utility of mental toughness within and beyond sporting contexts.

First, in line with existing literature, mental toughness was construed using a wide variety of attributes ( $n = 75$ ). As this number of attributes resembles the total number of attributes generated for other common everyday constructs (e.g., love and commitment,  $n = 68$  and 40 features respectively, Fehr, 1988; forgiveness,  $n = 78$  features, Kearns & Fincham, 2004; infidelity,  $n = 95$  features, Weiser et al., 2014), findings show that mental toughness is a familiar term to laypeople.

Participants were also able to meaningfully and reliably distinguish between these attributes according to centrality, and as such, the current findings provided preliminary evidence of the prototypical nature or “internal structure” of mental toughness (Rosch, 1975). Although the impact of centrality on cognitions was not tested (the second criteria for demonstrating prototypical organisation; Rosch, 1975), this preliminary evidence of a prototypical arrangement of mental toughness lends credence to reviewers who note the conceptual chaos inherent in linear lists of attributes (Andersen, 2011). These findings thus highlight the necessity for current and future researchers to heed the hierarchical organisation of attributes to achieve a valid and organised evolution of understanding, measuring, and developing mental toughness.

Second, findings in the present study enabled a comparison between lay and sporting perceptions of the “internal structure” of mental toughness. For instance, determination and resilience represent common features of mental toughness between sporting and lay contexts, and as such, may indicate the presence of universal (i.e., not context-specific) attributes of mental toughness. Notwithstanding these similarities, a number of differences between perspectives also exist. For example, although frequently mentioned, attributes central to sporting perspectives such as self-belief and focus were rated as less important to mental toughness by laypeople. Instead, findings suggest that laypeople view mental strength as the most important attribute of mental toughness. Although not coherently documented, various researchers have used mental strength to describe

qualities of emotional stability (Deutscher, Frick, & Prinz, 2013), an ability to make hard decisions (Glozah, 2015), a strong “sense of self” that facilitates a capacity to deal with intimidating or difficult situations (such as domestic violence; Rose et al., 2010), focus, intelligence, the ability to learn, deep commitment, a positive outlook and an ability to resist feeling overwhelmed or discouraged (Stewart, 2009). As such, mental strength may be a higher-order attribute encompassing a collection of sub-attributes of mental toughness. An in-depth understanding of the nature of mental strength and its sub-components may provide fruitful avenues for “teasing out” various higher-order dimensions and mechanisms underlying mental toughness.

Particularly noteworthy was the relative prominence of outcomes in laypeople’s perceptions of mental toughness, which included recovery/resilience as well as overcoming obstacles and being able to achieve/operate under pressure. With the exception of resilience, these outcomes are relatively absent from existing lists of mental toughness attributes (see Table 4-1, page 90 above). However, outcomes do appear in a number of definitions of mental toughness, such as overcoming obstacles (e.g., Gucciardi et al., 2008) and performance and goal attainment under stress (e.g., Coulter et al., 2010; Gucciardi et al., 2015; Hardy et al., 2014; Loehr, 1994; Mahoney et al., 2014). Although resilience, overcoming obstacles and being able to achieve/operate under pressure may take on different forms in everyday situations, their centrality may highlight the necessity of positive outcomes for conceptualising mental toughness in lay contexts; that is, if attributes previously associated with mental toughness (see Table 4-1, page 90 above) occur in the absence of these central outcomes, are they still indicative of mental toughness? With the exception of the Cricket Mental Toughness Inventory (CTMI, Gucciardi & Gordon, 2009) which includes the subscale of resilience, this finding also highlights a challenge for applying current scales to non-sporting populations that solely rely on internal states or processes (*vis-à-vis* outcomes) as indicators of mental toughness

(e.g., Australian Football Mental Toughness Inventory, Gucciardi et al., 2009a; Mental Toughness Questionnaire 48, Clough et al., 2002; Mental Toughness Scale, Madrigal et al., 2013; Psychological Performance Inventory, Loehr, 1986; Sports Mental Toughness Questionnaire, Sheard et al., 2009). This observation is further extended to interventions that target development of less central attributes (e.g., coping, optimism and various psychological skills; Bell, Hardy, & Beattie, 2013; Gucciardi et al., 2009b; Parkes & Mallett, 2011; Sheard & Golby, 2006).

The data also indicated that although frequently-mentioned attributes were generally rated as more central, this trend was relatively absent from the social dimension of mental toughness. In particular, social relationships/openness/receiving help (i.e., a willingness to ask for help or openness to receiving help from friends and family) was the sixth most frequently mentioned attribute but was subsequently rated as peripheral to mental toughness. From what is known, social support does play a role in mentally tough outcomes (Smith, Wolfe-Clark, & Bryan, 2016) and is widely cited as a source of mental toughness development (e.g., Bull et al., 2005; Connaughton, Wadey, Hanton, & Jones, 2008). However, although participants may have recognised the role of social support as an attribute, the act of asking or receiving help may not have been interpreted as typical to mental toughness.

These findings, along with other peripherally rated attributes (such as emotional openness, positive emotions or happiness, wellbeing, mental recovery/escape and religiosity), may represent an enduring form of suffering, which, according to Morse (2001), is an emotionless state where emotions are suppressed or tolerated in order to enable an individual to function adequately and “come to grips” with a situation. This state is particularly reminiscent of peripherally-rated behaviours (such as little emotion, maintenance of control: that is, does not escape or attribute control over outcomes to external religious figures) that discourages rather than invites social consolation.

Although speculative, it is plausible that enduring suffering is also characteristic of the highly central attribute of mental strength and facilitates central outcomes (i.e., recovering from setbacks, overcoming obstacles and being able to achieve/operate (i.e., function) under pressure).

In all, the present study informed current theories of mental toughness by conceptualising mental toughness as a prototypically organised construct from a layperson's viewpoint. In doing so, findings supported some already well-established dimensions of mental toughness (i.e., resilience and determination), but also highlighted some conceptual differences. These differences include the overarching theme of mental strength, as well as the emphasis on outcomes as defining attributes of mental toughness. From examination of the social and peripheral attributes of mental toughness, current findings also highlighted the potential for mental toughness to be characteristic of enduring versus emotional suffering in stressful situations. Future research would do well to investigate and heed these universal and context-dependent "inner structures" of mental toughness to facilitate a valid and sophisticated conceptual, empirical and practical understanding of mental toughness in lay contexts.

### *Limitations*

First, participant demographics were estimated based on retrospective collection of information from a sample of participants. As such, demographics may have influenced the responses gained in the current research and, although unlikely, participants may have been involved in elite sports as well. Second, contrary to previous interview methods that enabled further probing of responses (e.g., Coulter et al., 2010; Gucciardi et al., 2008; Jones et al., 2002; Thelwell et al., 2005), the present method used open-response questionnaires to attain attributes of mental toughness. Although this approach was useful for obtaining a range of different opinions across a large sample size and aligned with

previous prototype analyses, open-ended questionnaires prevented us from elaborating meaning in some responses. Finally, preliminary evidence was shown for the prototypical organisation of mental toughness, however, without testing the effect of centrality on cognitions regarding mental toughness, its prototypical organisation remains inconclusive. Thus, testing the cognitive effects of attribute centrality is an important consideration for future research.

## CHAPTER 5. A SYSTEMS-APPROACH MODEL OF MENTAL TOUGHNESS: UNDERSTANDING INPUTS, PROCESSES AND OUTPUTS

### Preface

Although published definitions of mental toughness present a fixed statement outlining the nature of mental toughness, from Chapters 3 and 4, it is evident that perceptions of mental toughness are more fluid between populations. That is, the prototypical arrangement of attributes are likely to shift across contexts, which limits utility of existing definitions and thus measures of mental toughness. On this basis, the next study aimed to develop a single and all-encompassing conceptual model and definition of mental toughness that can be applied across a range of populations for empirical and practical purposes.

As a starting point, because I was aware that the *content* of mental toughness definitions are likely to differ between contexts, it was important that the model addressed the *system* underlying these divergent conceptualisations of mental toughness. To this end, attributes of mental toughness were organised into a system of inputs, processes and outputs. The decision to organise mental toughness attributes in this way was based on research in the wellbeing literature by Hagerty et al. (2001) and Jayawickreme et al. (2012) who consolidated and made sense of a number of confusing wellbeing theories by addressing their collective underlying system of inputs, processes and outputs. This decision was further informed by Hardy et al. (2014), who suggested that a considerable gap in existing conceptualisations of mental toughness is a lack of delineation between its inputs, processes and outputs.

Thus, by elucidating the inputs, processes and outputs in a systems-approach model of mental toughness, which has never been done before, this work represents a significant contribution to the mental toughness literature. A new definition of mental toughness is also offered, which remains general to encompass a range of populations and situations.

Moving forward, this preliminary systems-approach model and accompanying definition provides a strong platform for collaboration within the field aimed at progressing a robust and unified conceptualisation of mental toughness necessary for its practical and empirical utility in a range of contexts.

**Abstract**

Despite its rising prominence in the academic literature, the underlying inputs, processes and outputs of mental toughness remain relatively unexplored (Hardy et al., 2014). As such, the purpose of the study is to present a systems-approach model of mental toughness that classifies attributes of mental toughness within the aggregated system of inputs, processes and outputs. To this end, lay participants ( $n = 138$ ) were requested to provide a list of attributes of mental toughness in the form of a written questionnaire. Following guidelines for conducting Deductive Thematic Analysis (DTA) by Braun and Clarke (2006), and on the basis of similar frameworks by Hagerty et al. (2001) and Jayawickreme et al. (2012), data was thematically analysed and organised into inputs, processes and outputs. The resultant systems-approach model included a number of inputs (personal resources, stressors), processes (strength, accommodation) and outputs (surviving, striving, thriving) of mental toughness. Based on these findings, mental toughness was subsequently defined as a *resistance to psychological disintegration under stress*. Implications for future conceptualisation, measurement and development of mental toughness is discussed.

## **Introduction**

Mental toughness has received increased scholarly attention over the past decade due to its propensity to facilitate thriving (Gucciardi et al., 2015; Jones & Moorhouse, 2007; Weinberg, 2010) within a range of demanding sporting, academic, business and military contexts (Gucciardi et al., 2015). In an attempt to understand and replicate this psychological asset, researchers have produced a myriad of multidimensional conceptualisations that identify the attributes, causes, underlying processes and/or outputs of mental toughness (e.g., Clough & Strycharczyk, 2012; Coulter et al., 2010, Gucciardi et al., 2009a; Jones et al., 2002). Despite their contribution to understanding mental toughness, however, no single conceptualisation comprehensively encompasses the entire system of causes, processes and outputs involved in mental toughness (Hardy et al., 2014). Considering that each element carries important implications for mental toughness theory, measurement and interventions, the purpose of this research is to understand the causes, processes and outputs within a systems-approach model of mental toughness.

Previously, researchers investigated the attributes of mental toughness to provide a comprehensive description of mental toughness (Middleton et al., 2004) and inform a number of valuable measurement tools (e.g., Clough et al., 2002). For example, Jones et al. (2002) and Thelwell et al. (2005) identified twelve attributes of mental toughness, with an emphasis on determination, focus, confidence and control as defining attributes. Based on the related personality construct of hardiness, Clough et al. (2002) instead suggested attributes of challenge, commitment, confidence and control and subsequently developed the Mental Toughness Questionnaire 48 (MTQ48). Middleton et al. (2004) followed these accounts with a multidimensional description of mental toughness attributes, which corroborated as well as extended those attributes identified in previous literature.

Despite their contribution to mental toughness knowledge, however, researchers recognised a need for a deeper understanding of the inputs, processes and outputs

underlying these attributes of mental toughness (Gucciardi et al., 2009a), and as such, produced a number of models that account for these fundamental systematic elements. For example, Bull et al. (2005) identified inputs and processes involved in mental toughness by distinguishing environmental and personality inputs from attitudinal and cognitive manifestations of mental toughness. Although not explicitly, Gucciardi et al. (2008) and Coulter et al. (2010) account for processes and outputs in their models by classifying attributes into characteristics, cognitions, behaviours and situations of mental toughness (Gucciardi et al., 2009a). These findings were further extended by Gucciardi et al. (2009a), who identified positive iterative appraisals as the process underlying the translation from mental toughness attributes into mentally tough outcomes.

As a systems approach was not the main focus of these studies, however, differentiation between inputs, processes and outputs is piecemeal, not explicitly recognised and/or is ill-defined. For example, Bull et al. (2005) considers confidence as a personality input whereas this attribute is considered a cognitive element by Coulter et al. (2010). As such, the underlying system of inputs, processes and outputs remains relatively unknown in the mental toughness literature.

This study aimed to build on these existing models of mental toughness by providing a systems-approach model of mental toughness. To this end, attributes of mental toughness are classified into inputs, processes and outputs according to the established frameworks developed by Hagerty et al. (2001) and Jayawickreme et al. (2012). Addressing similar conceptual issues in the wellbeing literature, Hagerty et al. (2001) and Jayawickreme et al. (2012) implemented a systems-theory approach to consolidating and organising multiple attributes of wellbeing into inputs, processes and outputs. These criteria are subsequently used here to distinguish inputs, processes and outputs of mental toughness (see Table 5-1, page 122 below). Specifically, inputs are identified as environmental/exogenous (Hagerty et al., 2001; Jayawickreme et al., 2012) and

endogenous variables, such as personality traits (Jayawickreme et al., 2012). Process or throughput variables are defined as an individual's reaction and choices in these environments (Hagerty et al., 2001) and capabilities and subjective states, including beliefs or cognitions, cognitive evaluations, moods and emotional states (Jayawickreme et al., 2012). Finally, output variables are the result of inputs and processes, which are identified as voluntary behaviours (Jayawickreme et al., 2012) and final outcomes of the system (e.g., happiness, survival and contribution to humanity; Hagerty et al., 2001).

By presenting a systems-approach model of mental toughness, existing models can be consolidated and extended in order to advance the conceptual understanding, measurement and development of mental toughness. To this end, attributes of mental toughness were attained through written questionnaires and thematically analysed using guidelines by Braun and Clarke (2006). Based on the aforementioned criteria, attributes were then allocated into inputs, processes and outputs to arrive at a systems-approach model of mental toughness. On the basis of these findings, an accompanying definition of mental toughness is offered.

## **Method**

Data from this study have also been reported elsewhere by Sorensen, Jarden, and Schofield (in press; Chapter 4, page 87 above), who utilise a prototype analysis to investigate differences between lay and sporting or expert perceptions of mental toughness. However, the current study is primarily concerned with uncovering the underlying mechanisms of mental toughness vis-à-vis population differences. Participants and procedures used in collection of data are described below.

### *Participants*

One hundred and thirty eight laypeople participated in the current research. Due to an accidental omission of demographic questions from the original questionnaire, demographic information was collected retrospectively from participants at the same time that study findings were communicated. Fifty-one (37%) participants responded to the retrospective demographic questionnaire. These respondents consisted of females (57%) and males (43%), who ranged in age between 18 and 64+ years, with the biggest age groups being 50-64 years old (35%) and 35-49 years old (33%). The majority of participants were European/NZ European (92%), with remaining ethnicities being Māori (2%), Indian (2%) and other (4%). Participants worked across a range of industries in entry and managerial-level positions.

### *Procedure*

Participants were invited to participate in the research at various routine group meetings or online via social media in July 2015. The invitation included a request for all interested participants to attend a data collection session after the meeting (in person) or contact the first author via email (online) if they were interested in participating. The information sheet, consent form and questionnaire was then disseminated to participants either in person, or via email (for those restricted by location).

Once participants had read the information sheet and signed the consent form, the questionnaire invited participants to take 15 minutes to freely produce all features associated with mental toughness, according to the following instructions (adapted from Fehr & Russell, 1984, Study 6):

*This is a study on the attributes that people think of when they think of the word mental toughness in everyday situations. For example, if you were asked to list the attributes of a person experiencing fear, you might write possible danger occurs, attention is focused on the threat, heart beats*

*wildly, the person runs as fast as they can. In the current study, we are not interested in attributes of fear but in attributes of mental toughness in everyday situations. Imagine that you are explaining the word mental toughness to someone who has no experience of mental toughness. Include the obvious. However, try not to just free-associate. We're interested in what is common to instances of mental toughness. Remember that these attributes can be positive or negative.*

These instructions were followed by a statement to re-clarify the question and prompt participants:

*What, in your opinion, are the key attributes of mental toughness? Please list as many as you can below.*

Participants were provided with 15 blank lines to enter their responses, and were encouraged to take as much time as needed to generate as many attributes of mental toughness as possible. Once participants had completed and submitted the questionnaire, snowball sampling was encouraged by asking participants if they were affiliated with other community or occupational groups who may appreciate the opportunity to participate in this research. In this case, the researcher worked with the participant or an appropriate group representative to present the research in the appropriate format (in person or online). This process was repeated until a sufficient sample size was obtained.

#### *Data analysis*

Deductive Thematic Analysis (DTA; Braun & Clarke, 2006) was used in the present research. Following recommendations by Braun and Clarke (2006), this 'top-down' approach is best suited for research that is driven by a specific question (i.e., 'what are the inputs, processes and outputs of mental toughness?') and guided by previously

established frameworks (i.e., Hagerty et al, 2001; Jayawickreme et al., 2012). On this basis, Braun and Clarke's (2006) six-phase iterative approach was followed:

- 1) *Data familiarisation and identification of meaningful units.* Data was iteratively read and meaningful data extracted for coding.
- 2) *Initial code generation.* Units of data were assigned none, one or multiple codes. Coding was conducted according to the surface or explicit meanings of raw data, and as such, coding aligned with an essentialist/realist approach (Braun & Clarke, 2006).
- 3) *Identification of themes.* Codes were initially allocated into the major themes of inputs, processes and outputs according to criteria set out by Hagerty et al. (2001) and Jayawickreme et al. (2012; see Table 5-1, page 122 below for criteria). Within inputs, processes and outputs, similar codes and their constituent data extracts were grouped together to form sub-themes.
- 4) *Reviewing themes.* Sub-themes and codes were reviewed, combined, separated and/or re-categorised into inputs, processes and outputs according to their constituent data extracts and the dataset as a whole. This process was maintained until a satisfactory level of data representation was achieved and until themes collectively provided an accurate representation of the dataset.
- 5) *Defining themes.* Upon finalisation of themes, constituent raw data was inspected to identify and describe the essence of each theme.
- 6) *Identification of extract examples for the final report.*

Although presented in order, these phases were approached and organically revisited as the analysis progressed. The result was an exhaustive analysis of the data, with 94% of data allocated to at least one code.

## **Results**

Participants generated an average of 9.28 codes each ( $SD = 5.79$ , range 2-34). Analysis of these codes within the major themes of inputs, processes and outputs revealed a number of sub-themes, as presented in Table 5-1 below (see Appendix C, page 215 for a full list of themes).

Table 5-1.

*Criteria and themes and sub-themes identified from raw data*

	<b>Input variables</b>	<b>Process variables</b>	<b>Output variables</b>
<b>Criteria</b>	Exogenous or environmental variables Endogenous variables, e.g., personality	Choices Reactions Capabilities Subjective states	Voluntary behaviours Outcomes
<b>Themes and sub-themes identified from raw data</b>	Resources Stressors (external stress and internal strain)	<b>Strength of psychological functioning under stress</b>	<b>Accommodation of limitations or barriers to psychological functions</b>
		Performing and retaining the capacity to understand, reason and make accurate and timely judgements (cognitive faculty)	Tolerance of uncertainty
		Performing and retaining the capacity for purposeful direction of effort towards needs and goals (conative faculty)	Awareness and promotion of others' needs before one's own Tolerance of unfulfilled needs Tolerance of uncontrollable internal, external and future environments Emotional attachment to external entities
		Performing and maintaining favourable affect (affective faculty)	Tolerance of uncontrollable negative affect
			Preservation of wellbeing and intended behaviour under stress (surviving)  Goal maintenance (striving)  Growth and achievement (thriving)

These themes included inputs (*personal resources, stressors*), processes (*strength, accommodation*) and outputs (*surviving, striving, thriving*) of mental toughness.

### *Theme 1: Inputs*

A number of exogenous and endogenous influences were identified by participants, which generally fell into two themes of *personal resources* and *stressors*.

**Personal resources.** A collection of personality traits were the largest group of personal resources identified by participants. In particular, one participant referred to the inherent vis-à-vis developed dimension of mental toughness: “personality – it is an inane part of who you are. Some people are able to thrive under stress while others find it much more difficult”. Other participants prescribed particular personality qualities to mental toughness, such as “stable personality”, optimism, pessimism, hardiness, scepticism, adaptability, competitiveness and goal orientated.

Following personality traits, participants remarked on the value of competencies gained from previous experiences. These experiences were particularly useful for generating *wisdom* “the ability to draw on experience, having learnt from your own or others mistakes-wisdom”, *skills* “life/work experiences - in situations these are the skills that have come to the fore and gets you through” and *self-efficacy* “past experience proving “you can survive this too!””. Within the acquisition of skills, participants particularly mentioned that experience was pertinent for the development of technical skills, emotional intelligence, social intelligence and coping skills.

Similar to experience, social support was suggested as an external source of information for understanding how to navigate challenges, for example, “having good role models to learn from, i.e., a boss who handles difficult situations with clients well”. Social support was also important for self-efficacy, emotional and motivational resources. In particular, one participant commented “channel the energy of those you admire when

you're feeling small. Walk like you're Angelina Jolie". Responses such as this also indicated that a) social support may only be considered an input variable when the source is admired by the individual, and b) that social support may act as an input variable even when the role model is not directly accessible in person, i.e., behavioural observation or cognitive representation of significant others may be an effective substitute for direct social contact. In addition to these dimensions, past vis-à-vis present social support may be considered an input variable, for example, "nurture – having a supportive home life that sets you up for challenges".

A number of participants also mentioned morals and values (e.g., "having a clear moral code that you live by") and religion (e.g., "faith in God [higher power]"), which may again provide behavioural guidance and reassurance in uncertain or uncontrollable situations. Further, a number of participants noted wellness variables as an attribute of mental toughness, which included quality sleep, nutrition and being "physically well".

**Stressors.** Although stressors do not contribute to mental toughness per se, participants indicated that it may be impossible to understand attributes of mental toughness in a vacuum. For example, one participant commented that "mental toughness can thus include many things, and it is context dependent". Accordingly, participants included a number of contexts throughout their narratives, which generally consisted of external stress and/or internal strain.

External stressors ranged from negative situations, challenges or adversities to everyday mundane activities and obligations. Participants particularly mentioned social stressors (such as pressure to conform, conflict, confrontation, rejection and criticism) and difficulties in attaining goals (such as obstacles or problems, interruptions or distractions and negative outcomes such as mistakes, failure and defeat). Typical responses included "letting other people's jealousy, negative attitudes, doubt and pessimism bounce off you rather than derail you" and "knowing that hurdles are a part of

getting to the end result. If it is hard then less people finish”. Some participants also mentioned time-poor and high-stake situations (e.g., emergencies and pressure) and those that are psychologically and ethically challenging (e.g., change, out-of-control situations, poor odds of success, unexpected situations, difficult decisions, unpleasant/inconvenient/unenjoyable but necessary tasks and situations that are unethical or unfair). Attributes were further framed within specific life situations, such as social (caregiving, helping others in distress, bereavement, work/family conflicts, responsibilities), financial (financial strain), physical (military training, sport, gym, running), vocational (stressful job, studying) and psychological (witnessing/experiencing traumatic events, waiting) challenges.

On the other hand, participants indicated that mental toughness was also necessary for dealing with internal strain. Internal strain included physical (fatigue, pain, illness and discomfort), psychological (mental fatigue, uncertainty, uncontrollability, threat to wellbeing, mental illness, poor motivation, self-doubt and other negative beliefs) and emotional (disappointment, fear, guilt, sadness and emotional fatigue) conditions. In describing these internal strains, participants mostly suggested that they were derived from external occurrences (e.g., “situations which may cause negative emotional responses in an individual”).

### *Theme 2. Processes*

Within this category, two potentially conflicting processes were identified. These sub-themes were highlighted by a number of conflicting themes that often occurred within the same sentence. For example,

“Goal oriented but adaptable to change.”

“Be proud of our achievements and be proud of ourselves - also be humble and compassionate.”

“Keeps going and trying again or something different.”

“Being able to stop what you are doing to rectify a ‘wrong’ situation directly in front of you AND not ‘walking past’ it. If you do walk ‘past it’, being able to reconcile your own reaction or ‘inaction’.”

A few participants further identified that the effective use of any one process depends on situational conditions, such as uncontrollability, for example,

“While I have said to be persistent, sometimes mental toughness can simply be to accept a situation, especially if it is something that can’t be changed. Sometimes it can mean walking away. Sometimes it can be to be acquiescent to avoid conflict – this doesn’t mean you are giving in.”

“Picking your battles – acknowledging that you can't win/succeed at everything. Knowing when, and when not to use your energy to persevere with something.”

“If appropriate, choose not to respond/react.”

This dichotomy was labelled *strength* and *accommodation*, and is discussed in more detail below.

**Strength.** Responses under the theme of strength pertained to the capacity to perform and maintain various psychological functions under stress. Within this theme of strength, participants commonly referred to the power to perform and maintain cognitive (thinking, reasoning and judgement), conative (will and volition) and affective (emotive and energising states) functions under stress. Some representative quotes for this overarching theme include: “strong mentally” and “being able to draw on inner strength”.

First, cognitive functions included the speed and quality of thinking, reasoning and judging under stress particularly in the process of problem-solving and decision-making (e.g., “thinking ‘on your feet’”, “being able to think rationally under pressure”). The ability to perceive, know and understand was also reflected in narratives that included

awareness and comprehension of internal variables (e.g., internal states and the self; “having a realistic understanding of your own strengths and weaknesses”), external situations (e.g., “having an awareness of your situation and possible consequences”), other people (e.g., “the ability to recognise a strong ally”) and the past (e.g., “reflecting on past experiences”). As well as performance of these functions, participants also commented that mental toughness involved the maintenance of cognitive capacities, such as maintaining the ability to think (e.g., “maintain the capacity to think clearly in demanding situations”) and remaining rational, logical and objective (e.g., “staying sane”, “keep the head logical” and “retains objectivity”).

Second, conative attributes of mental toughness included the power to perform and maintain purposeful striving towards goals and needs. As a starting point, individuals require awareness of their needs and “possible selves” (Huitt & Cain, 2005). This was reflected in participant’s narratives, such that participants felt that sometimes it was necessary to be selfish and prioritise their needs above others’ needs: “sense of self – looking after yourself and making sure you make your needs and wants a priority”. Similarly, awareness of “possible selves” included the presence and clarity of goals, purpose, vision and ambitions and an ability to “visualise the outcome/results of what you’re doing”. Further, belief in one’s ability to achieve these “possible selves” was commonly noted as an attribute (e.g., “belief in yourself/confidence in your ability”). In order to actualise these “possible selves”, mental toughness was also associated with the conative functions of directed attention (i.e., focus and concentration), prioritisation, planning and preparation. Coinciding with the exercise of one’s will, participants also frequently mentioned mental toughness as the freedom to choose and/or control emotions (e.g., detachment from outcomes and situations, emotional control), thoughts (e.g., directed forgetting, thought blocking, cognitive distancing), actions (e.g., self-discipline, self-control, self-motivating) and external environments (e.g., being proactive, avoiding

distractions). Similar to the cognitive component, participants emphasised not only the power to perform these functions, but also the ability to maintain conative functions under stress. Maintenance of conation included maintaining focus, control and self-belief (e.g., “maintain focus under pressure, to make sure the job gets done”, “being able to maintain control over the way that you react and respond to stressful and challenging situations” and “in the face of adversity continuing on with belief in your path and direction you are taking”).

Finally, participants identified favourable affective states as hallmarks of mental toughness. Four affective dimensions were identified as typical to mentally tough individuals: the presence of positive emotions, absence of strong emotion, absence of negative emotions, and energising states. Specifically, participants commented on positive moods (e.g., “buoyant”), calmness (e.g., “the ability to crisis manage without panic and disorder”) as well as the absence of fear (e.g., “fearlessness”). Participants also referenced the presence of energising states which included the feeling of motivation and its subsidiaries (such as desire, commitment and obsession). Again, as with cognition and conation, the maintenance of these states under stress (rather than just their presence) was commonly noted as an important attribute of mental toughness (e.g., “stay calm, no matter what”, “the ability to remain positive in adversity”).

**Accommodation.** Although mental toughness was associated with the capacity to perform and maintain cognitive, conative and affective functions, participants simultaneously recognised that mental toughness abided in the ability to accommodate intrinsic weaknesses or barriers (i.e., internal strains) within cognitive, conative and affective faculties.

Within cognitive operations, an ability to tolerate limitations in one’s ability to know, understand and judge situations (such as uncertainty or imperfect knowledge), was commonly cited as an attribute. Participants included being comfortable with uncertainty:

“being able to cope with ambiguities, paradoxes and uncertainties that life inevitably throws up. Not needing things to be either black or white or put in boxes”, an open-minded approach to uncertain situations and outcomes: “the willingness to give something a go that is new/unknown, even when there are no guarantees what the outcome will be” and trust in yourself and others that you will make the right judgement and take the right course of action: “Trust your gut instinct/intuition”.

Accommodation of conative weaknesses included an awareness and promotion of others’ needs before one’s own (e.g., selflessness and humility; “being able to understand other’s needs and uphold them over your own”) which concurrently thwarts one’s ability to recognise and fulfil one’s own needs. Tolerance of unfulfilled needs was also recognised by participants who endorsed patience as an attribute of mental toughness (e.g., “if you can wait and not be tired by waiting”). Participants mentioned empathy and compassion as an attribute of mental toughness (e.g., “concern for the welfare of others”), which ties one’s emotions, attitudes and thoughts to the suffering of others and subsequently restricts self-preservation, free choice and control. Finally, a tolerance of uncontrollable external environments was reflected in responses that included acceptance (e.g., “knowing you can’t control everything”, “being able to acknowledge that and realising sometimes that is just how the ‘cards get dealt’...”), faith in external variables or higher powers (e.g., “if you find yourself in a bad situation you can have faith that your luck/situation will change in time”, “I always believe that whatever can’t be done anymore, it is up to God. He will do the rest”), flexibility in decisions and plans (“happy to change decisions as things change”) and self-compassion (“do the best you can, and know that no one can ask more of you than that”).

Finally, accommodation of affective weaknesses included an ability to tolerate negative affect. In particular, a number of participants commented on attributes of emotional detachment (e.g., “the ability to compartmentalise negative emotion”) and

independence from negative emotions (e.g., “accepting your emotions and not being controlled by them”).

### *Theme 3: Outputs*

Within this theme, a number of outcomes and behaviours were noted by participants which generally fell into the categories of surviving, striving and thriving.

**Surviving.** In terms of surviving, participants typically used words such as “surviving”, “get through”, “handle” or “overcoming”. Resilience was commonly mentioned by participants, which referred to recovery from both internal strain and external stress: “the ability to quickly recover from mental fatigue, poor motivation and self-pity” and “bouncing back from setbacks as a result of determination to succeed.” Within the theme of surviving, some participants specifically mentioned an ability to maintain both personal (e.g., self-preservation) and social (e.g., relationship preservation) wellbeing; for example, “to be able to deal with these situations with the least amount of personal damage inflicted – i.e., damage to relationships, stress and health, damage to personal confidence and self-esteem, and minimum of anxiety”. In service of maintaining wellbeing, participants mentioned the ability of mentally tough individuals to talk about feelings with others, take time out for self-care activities, and desist in an uncontrollable situation or acquiesce to avoid conflict if that was what the situation required.

Mental toughness was also associated with the maintenance of virtuous behaviour despite internal or external pressure to act otherwise. In particular, virtuous behaviours included an ability to “remain true to yourself and your beliefs” (i.e., authenticity, assertiveness), “being able to accept responsibility for your own stuff if it goes wrong” (i.e., honesty, integrity, responsibility/accountability), “never allowing oneself to complain or to criticise” (i.e., stoicism) and altruism, generosity and kindness towards others (e.g., “being able to sacrifice things for the greater good”).

Further to wellbeing and virtues, preservation of one's capacity to function under stress (e.g., consistency, performance under pressure, perform to potential) was identified by a number of participants: "to be able to continue functioning constructively in spite of challenging circumstances". As an illustration, one participant commented on how mental toughness enabled a friend to navigate complex and threatening situations whilst still maintaining necessary day-to-day activities e.g., [mental toughness has] "helped her keep her children safe, keep working, negotiate complex criminal legal proceedings". A maintenance of functioning was also reflected in behaviours that demonstrated personal effectiveness, such as having or showing good judgement, decisiveness, effective communication and leadership.

**Striving.** On the other hand, striving was oriented towards the maintenance of goals and visions under stress, described by one participant as: "effectively maintaining my own mental toughness in order to keep the 'mission' or dream alive". In particular, goal maintenance included rigid behaviours that continued in spite of discomfort or fatigue (e.g., persistence, perseverance, endurance and hard work; "persistence - keep going until the job gets done") and negative emotions (e.g., courage; "feel the fear and do it anyway").

**Thriving.** The final outcome of thriving went beyond surviving (e.g., "it is being taken out of your comfort zone, and surviving, and even succeeding") to include success, achievement, growth (such as learning and skill development: "improving from failure") and "innovation".

## **Discussion**

Current conceptualisations of mental toughness provide limited differentiation between causes, processes and outputs (Hardy et al., 2014). Thus, despite their contribution for describing mental toughness (Middleton et al., 2004; Sorensen et al.,

2016) and informing measurement (e.g., Clough et al., 2002), existing theories have so far provided a limited understanding of the 'engine' of mental toughness. The current study addresses this shortcoming by identifying the inputs, processes and outputs of mental toughness.

First, inputs included personal resources (personality, experience, social support, morals, values and religion) and stressors (external stress and internal strain). When considered together, personal resources and external stressors may represent the degree of person-environment fit, which subsequently determines the amount of internal strain that is experienced by an individual (French, Caplan, & Harrison, 1982). This element of mental toughness is referred to by Gucciardi et al. (2015), who positions mental toughness as a 'resource caravan' in the interaction between resources and demands. As such, the balance between personal resources and stressors may influence the strategy that is employed (i.e., strength or accommodation) and the extent to which outputs of mental toughness are subsequently achieved (i.e., surviving, striving and/or thriving).

Regarding the specific content of these inputs, the personal resources mentioned by participants converge with both inherent versus developed perspectives of mental toughness, which suggest genetic and relatively fixed personality traits on one hand (e.g., Clough et al., 2010; Horsburgh, Schermer, Veselka & Vernon, 2009) and developmental or environmental inputs on the other (such as experience and role models; Collins and MacNamara, 2012; Connaughton, Wadey, et al., 2008; Mahoney et al., 2014). Although this distinction exists, the present findings support the many conceptualisations of mental toughness that recognise dual-input from both internal and external inputs (Bull et al., 2005; Coulter et al., 2010; Gucciardi et al., 2009a; Jones et al., 2002; Mahoney et al., 2014; Thelwell et al., 2005; see Crust, 2008 for a review). Particularly noteworthy is the finding that, to be effective inputs, social supports need to be admired but do not require

direct contact. This finding corroborates assertions by Mahoney et al. (2014) who suggest that conditions apply for input variables (such as social support) to be effective.

Less supported are the input variables of morals, values, religion and physiological wellness. Although Gucciardi et al. (2008) and Coulter et al. (2010) include personal values as an attribute of mental toughness (e.g., integrity and honesty), ethical and religious inputs are relatively absent in the mental toughness literature. Moreover, although a number of empirical investigations note the importance of physiological wellness for mental toughness, such as sufficient sleep and exercise (Brand, et al., 2013; Gerber et al., 2012), this input has gone relatively unnoticed in the mental toughness literature. Because ethics are more applicable to everyday life and elite athletes are presumably physiologically healthy already, these new findings may stem from the use of lay vis-à-vis expert sporting samples.

By using laypeople as participants, this work also found an extensive range of stressors that differed somewhat from those specified in sporting-focused models by Gucciardi et al. (2008), Coulter et al. (2010) and Slack et al. (2013). Although Gucciardi et al. (2008) and Coulter et al. (2010) also distinguish between internal and external pressures and some overlap is evident within these (such as challenges, fatigue and confidence), the situations identified here extend beyond sports-specific situations to include a wider variety of life, social, vocational and achievement-oriented stressors. These findings thus support assertions of the applicability of mental toughness beyond sporting contexts (e.g., Gucciardi et al., 2015) and subsequently provide a richer understanding of the non-sporting applications of mental toughness.

Second, processes of mental toughness were identified as strength and accommodation. This dichotomy reflects an individual's capacity to perform and maintain cognitive, conative and affective functions under stress, as well as one's capacity to accommodate intrinsic weaknesses or barriers (i.e., internal strains) within cognitive,

conative and affective faculties. The first interesting finding was the clear allocation of data into cognitions, conation and affection within each process. Allocation of data into these faculties aligns with those distinctions made by Ryba et al. (2009), who likens mental toughness to volition and distinguishes between three constituents of intellectual (cognitive), affective (motivational) and operational components (skills, i.e., purposeful behaviours to overcome obstacles). Attributes of mental toughness identified in previous research also include cognitive (e.g., good decision-making, self and situational awareness, knowledge and understanding; Bull et al., 2005; Coulter et al., 2010; Gucciardi et al., 2008; Jones et al., 2007; Thelwell et al., 2005; Weinberg et al., 2011), conative (e.g., self-belief, emotional control, preparation, focus and concentration; Bull et al., 2005; Coulter et al., 2010; Driska, Kamphoff, & Armentrout, 2012; Gucciardi et al., 2008; Jones et al., 2002; Jones et al., 2007; Thelwell et al., 2005) and affective (e.g., calm, enjoyment of pressure; Driska et al., 2012; Jones et al., 2002; Thelwell et al., 2005) components of mental toughness. Accordingly, the faculties of cognition, conation and affect (also referred to as knowing, willing and feeling) represent constituents of 'the mind' (Hilgard, 1980; Huitt & Cain, 2005) and may thus represent the underlying psychological dimensions involved in *mental* toughness.

Regarding the specific processes of strength and accommodation, evidence to support this dichotomy is available throughout the mental toughness literature despite remaining previously unidentified. For example, Gucciardi et al. (2008) cites self-belief as a characteristic of mental toughness (i.e., strength) but also concurrently identifies mental toughness as relevant to situations of low or challenged self-belief (i.e., accommodation). Similarly, although current conceptualisations of mental toughness endorse characteristics akin to mental health (e.g., self-belief, motivation), Andersen (2011) argues that mental toughness also includes a capacity to function in spite of mental illness, such as clinical depression (i.e., accommodation of internal strain). Extending beyond the

mental toughness literature, general psychological interventions, such as Cognitive Behavioural Therapy (CBT) and Acceptance Commitment Therapy (ACT) differ in their objectives to control (i.e., strength; CBT, Beck, 2011) or accept (i.e., accommodation; ACT, Hayes, Strosahl, & Wilson, 2012) disturbing thoughts and emotions. As such, processes of strength and accommodation may underlie mental toughness and also extend to applications beyond this construct.

The identification of strength and accommodative processes may also compensate for the problem of “fantasies and absolute language” (Andersen, 2011, p. 73) evident throughout current conceptualisations of mental toughness. Specifically, Andersen (2011) suggests that absolute and rigid attributes such as ‘unshakeable belief’ (Jones et al., 2002) are unrealistic and may instead contribute to maladaptive outcomes in the face of disconfirming information. For instance, mental toughness may contribute to poor rehabilitation and recovery outcomes due to individuals appraising their injuries as less severe or less likely to re-occur (Levy et al., 2006). Rather than lending support to either argument, however, the current framework satisfies both perspectives by conceptualising mental toughness as a dichotomy between rigidity (i.e., strength) and tolerance of internal weaknesses (i.e., accommodation).

Finally, the outputs of surviving, striving and thriving were identified from voluntary behaviours and outcomes associated with mental toughness. Although current findings highlighted the new output of maintaining positive virtues (see Appendix C, page 215), the outputs identified here corroborate those identified in previous literature (e.g., Gucciardi et al., 2015). However, despite support for a wide range of outcomes from current and previous findings, the mental toughness literature remains predominantly oriented towards performance- or achievement outcomes. For example, recent definitions of mental toughness include:

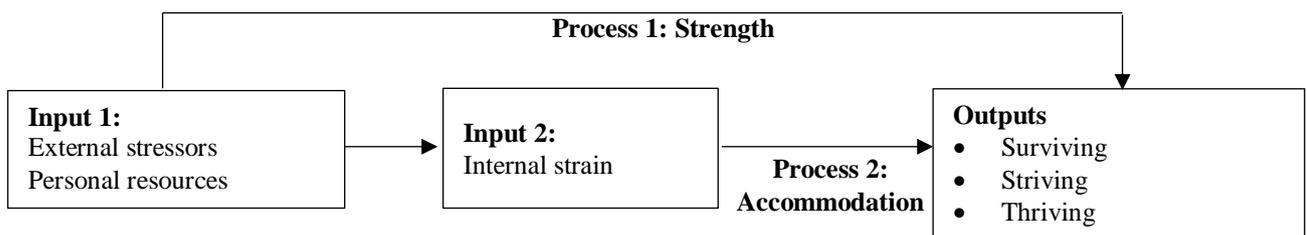
“A collection of personal characteristics (i.e., forces, resources, and demands, discussed later) that allow individuals to regularly perform to or around the best of their abilities regardless of circumstances faced” (Mahoney, et al., 2014, p. 234), and

“A personal capacity to produce consistently high levels of subjective (e.g., personal goal achievement) and objective (e.g., race times) performance despite everyday challenges and stressors as well as significant adversities” (Gucciardi et al., 2015, p. 28).

On this basis, conceptualisations of mental toughness ‘lag’ recent qualitative and empirical knowledge linking mental toughness to outcomes beyond performance and achievement (including maintenance of wellbeing; Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2015).

*Aggregation of findings into a systems-approach model of mental toughness*

As a step toward remedying this conceptual ‘lag’ and piecemeal understanding of mental toughness, based on the findings of the current study, the aggregated systems-approach model of mental toughness is presented in Figure 5-1 below.



*Figure 5-1.* A systems-approach model of mental toughness derived from thematic analysis of raw data

When viewed in its entirety, this model provides a ‘bird’s eye view’ of mental toughness, which includes the full range of inputs, processes and outputs. Attributes of mental toughness are housed within these components (see Appendix C, page 215), which

lends coherence to the chaotic, plentiful and sometimes contradictory list of attributes already available in the mental toughness literature (Andersen, 2011). As this model is an extension of existing models, it also carries a number of new implications for mental toughness theory, measurement and development. What follows is a theoretical discussion of this model and its implications.

Figure 5-1 above illustrates the causal pathway from inputs to outputs either through strength or accommodative processes. In particular, Figure 5-1 above illustrates strength as the capacity to perform and maintain psychological functions under stress (see Appendix C, page 215); that is, cognitive, conative and affective faculties are not influenced by external stress. Alternatively, in the case of internal strain within cognitive, conative and/or affective faculties, accommodative processes (see Appendix C, page 215) assist in sustaining one or more outputs of surviving, striving and thriving. Ultimately, a balance between these two pathways may be most facilitative of mental toughness, whereby an imbalance may result in ‘brittleness’ (i.e., high external stress tolerance but low internal strain tolerance) or ‘susceptibility’ (i.e., low external stress tolerance but high internal strain tolerance).

Overall, regardless of the pathway, mental toughness is a capacity to maintain one or more outputs (surviving, striving and thriving) under external stress and/or internal strain. As such, mental toughness is defined as:

*A resistance to psychological disintegration under stress<sup>10</sup>;*

*Specifically, resistance to disintegration in cognitive ability, will (or volition) and/or affect.*

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<sup>10</sup> *Psychological disintegration* is a term used in suffering research to describe a condition of being overwhelmed by negative psychological states, such as negative emotions and beliefs (i.e., internal strain; Diekstra, 1981, as cited in Kuitert, 1995; Morse, 2001). This state typically interferes with functioning (Morse, 2001) and individuals are unable to regain this inner stability on their own (Diekstra, 1981 as cited in Kuitert, 1995). Thus, whether these negative psychological states (i.e., internal strain) are bypassed by strength processes or tolerated by accommodative processes to maintain one or more mentally tough outcomes, *resistance to psychological disintegration* sufficiently captures the essence of mental toughness.

This conceptualisation represents a move away from the restricted focus of performance and achievement, and extends the applicability of mental toughness to the wide range of contexts and outcomes identified here and throughout previous literature.

An important implication of this definition is that mental toughness may not simply be the sum of strength and accommodation. Instead, mental toughness may be the timely use of pathways (i.e., strength or accommodation) according to inputs (i.e., situational requirements and personal resources, or person-environment fit) in order to attain one or more outputs of surviving, striving and/or thriving. This proposition is supported by the data (e.g., “*knowing when, and when not* [emphasis added] to use your energy to persevere with something”, “*if appropriate* [emphasis added], choose not to respond/react”) as well as in previous literature. For example, Crust (2008) notes that athletes inappropriately persisting (i.e., strength) in the face of injury may risk long-term damage and compromise team efficiency; alternatively, the author suggests that mental toughness may instead be the ability to make the difficult decision to stop training and competing in order to recover from injury. In other words, knowing *how* to use each pathway, as well as also accurately identifying *when* to use them may be the key to mental toughness.

Considering this complex balance, the majority of existing measures of mental toughness that solely measure the presence or absence of chosen attributes and outcomes may provide a rather elementary and haphazard assessment of mental toughness. Similarly, interventions that aim to develop mental toughness through building one or more attributes of mental toughness (e.g., coping, optimism and various psychological skills; Bell et al., 2013; Gucciardi, Gordon, & Dimmock, 2009c; Parkes & Mallett, 2011; Sheard & Golby, 2006) may also be limited in their ability to facilitate mentally tough behaviour and outcomes. These implications may extend to non-specific interventions that target strength or accommodative pathways (such as CBT and ACT) whereby these

therapies may be more effective when individuals are taught how to use *both* strategies and *when* it is most appropriate to use each one. As such, measuring and developing the complex system of mental toughness remains a challenge for future research.

In sum, most of the attributes within inputs, processes and outputs of mental toughness have previously been proven to contribute towards mental toughness in their own right. However, our findings and subsequent systems-approach model of mental toughness suggest that discrimination between inputs, processes and outputs, as well as concurrent consideration of all these elements together, is necessary for completely and accurately understanding, measuring and developing mental toughness. On this basis, the systems-approach model of mental toughness presented here, which is grounded in qualitative data, may be the best foundation on which to base future research. We hope that both the framework and content of this systems-approach model of mental toughness continue to be investigated, consolidated and extended in order to formulate a robust theory of mental toughness, to ultimately foster surviving, striving and thriving in a wide range of contexts.

#### *Study limitations*

Limitations of our research include subjective coding of qualitative data, the use of a questionnaire vis-à-vis in-depth interviews and feedback effects. First, as with any form of qualitative analysis, coding relied on a subjective interpretation of meanings inherent in the data. Although this limitation was minimised by following the well-defined and detailed guide to thematic analysis by Braun and Clarke (2006), biases and differences in conceptual understanding may always exist. Second, contrary to previous qualitative accounts of mental toughness (e.g., Coulter et al., 2010; Gucciardi et al., 2008; Jones et al., 2002; Thelwell et al., 2005), the present method used a written questionnaire to attain attributes of mental toughness. Although this approach was useful for obtaining a range of different opinions across a large sample size, the use of written questionnaires vis-à-

vis in-depth interviews prevented elaboration of meaning in some responses and clarification of various causal pathways. In line with causality, as recommended by Jayawickreme et al. (2012), it is possible that feedback effects may be present in the systems-approach model to mental toughness. In other words, direction of causality may instead be reversed from outputs to processes to inputs (although it is unlikely that this is a main effect; Jayawickreme et al., 2012). Thus, aligned with these recommendations, the systems-approach model of mental toughness is intended as a “causal but not exhaustive one” (Jayawickreme et al., 2012, p. 336) whereby it remains open to important feedback effects that may be present.

## CHAPTER 6. DISCUSSION

Presently there is a lack of comprehensive understanding of mental toughness among researchers and theorists. As such, in a series of four studies (Chapters 2 to 5), this thesis provided an original and substantial contribution to current knowledge by addressing what mental toughness is, and how it works. First, from written definitions and experts' perspectives, I ascertained how mental toughness is currently understood – within the field and alongside its nomological network (Chapters 2 and 3). However, because current understanding is dominated by academic and sporting perspectives, I then explored the meaning of mental toughness in lay populations (Chapter 4). Finally, I consolidated and drew together the above information into a new definition of mental toughness and a systems-approach model that delineates the mechanisms (i.e., inputs, processes and outputs) underlying mental toughness (Chapter 5). Taken together, findings of these studies address the objectives of this thesis (see page 15 above), which are discussed in further detail below.

### **Defining mental toughness: What is it?**

#### *Mental toughness as a standalone phenomenon (Objective 1)*

Understanding the additional value of mental toughness is crucial for justifying its ongoing inclusion in psychological literature and research. On the other hand, understanding how and why mental toughness fits into the wider network of constructs is important for gleaning conceptual information from its parents, siblings and neighbours; maintaining a coordinated conceptual evolution with similar constructs; and understanding their collective purpose as a group. Despite the importance of establishing mental toughness as a standalone phenomenon, however, findings in this thesis could not conclusively establish the location of additional value of mental toughness. On this basis, from findings here and within preceding literature, an alternative explanation is presented

that positions mental toughness as an encompassing framework that ties together, rather than adds additional conceptual information, to its nomological network.

The analysis of definitions in Chapter 2 and ratings by experts in Chapter 3 largely reinforced arguments by Gucciardi and colleagues (Gucciardi & Gordon, 2009; Gucciardi et al., 2008; Gucciardi et al., 2015) that suggest that mental toughness is conducive to thriving under both negative and positive challenges, such as performing under pressure or facing competition; on the other hand, neighbouring constructs such as hardiness and resilience only apply to negative challenges, such as adversity. However, although existing definitions uniquely position mental toughness in positive yet demanding situations, empirical research may dispute this source of additional value. For example, hardiness has been tested alongside mental toughness in positive situations of performing at elite levels of sport (Golby & Sheard, 2004; Sheard, 2009; Wieser & Thiel, 2014), and was subsequently proved a better predictor of performance than mental toughness (Golby & Sheard, 2004). In addition to empirical findings, parent terms of ‘mental’ or ‘toughness’ do not support the specification of positive situations in mental toughness definitions, such as performing under pressure or facing competition. On the basis that no other feature from definitions in Chapter 2 provided significant evidence for the additional value for mental toughness, evidence for mental toughness as a discrete standalone phenomenon remains inconclusive.

One possibility for these inconclusive findings is that mental toughness may not offer additional value in isolation per se. Instead, significant areas of additional value may be non-existent because mental toughness encompasses similar constructs and their attributes rather than provides additional value. This conclusion is drawn on the following premises. First, mental toughness includes a disproportionate amount of attributes (Andersen, 2011), which may not be the fault of research methodology, but instead the all-encompassing nature of the construct. The inclusive nature of mental toughness is

evident in findings here and elsewhere, where similar constructs, such as resilience, hardiness and grit, and/or their entire set of attributes were included in qualitative accounts of mental toughness, as well as throughout existing literature (e.g., confidence, commitment and control (hardiness); strength, flexibility and endurance (mental fitness); Andersen, 2011; Clough et al., 2002; Connaughton et al., 2011; Robinson et al., 2015). However, the reverse is not true: mental toughness and/or its entire set of attributes are not included in attributes of similar constructs. As such, mental toughness may be an overarching concept vis-à-vis standalone phenomenon.

The systems-approach model presented in Chapter 5 illustrates how and why mental toughness is an overarching concept that encompasses similar constructs. Specifically, in Chapter 3, experts positioned mental toughness as most closely related to hardiness, grit, psychological flexibility, resilience and mental fitness. Based on the definitions of these constructs (see Appendix A, pages 196 to 207), hardiness is a personality variable (i.e., input variable to mental toughness) with underlying attributes of control, commitment and challenge (which tap into strength processes of mental toughness). On the other hand, psychological flexibility may fit into neither process but rather relate to the *effective use* of strength or accommodative processes according to situational requirements (vis-à-vis enhance one's *capacity* for strength and accommodation). Attributes of grit may be allocated into strength processes (e.g., consistency of interest) and outputs of mental toughness (e.g., perseverance of effort; Duckworth & Quinn, 2009); and those of mental fitness may span across processes (i.e., strength, including self-efficacy, positive affect ratio and emotional management; and flexibility, including mindfulness and acceptance; Robinson et al., 2015) and outputs (i.e., endurance, including resilience; Robinson et al., 2015) of mental toughness. Finally, resilience as an output variable of mental toughness may relate to outcomes of wellbeing and functioning (i.e., stability and/or recovery) once

the immediate stressor (e.g., adverse event, trauma) is removed or in the past (Olsson et al., 2003).

The above conclusions are further consolidated with findings that show the purpose of the collective group of constructs (i.e., mental toughness, resilience, hardiness, psychological flexibility, grit and mental fitness) is to *maintain wellbeing and/or functioning under stress*. This overall function is similar to the outcomes of mental toughness identified by laypeople of surviving, striving and thriving (see Appendix C, page 215), which may provide further evidence of mental toughness as an umbrella term representing the collective function of the group.

Taken together, the findings in this thesis showed that mental toughness is not a stand-alone phenomenon as it is positioned in existing literature (Gucciardi & Gordon, 2009; Gucciardi et al., 2008; Gucciardi et al., 2015). However, these findings instead show that mental toughness may be a higher-level construct comprised of a number of more narrowly-defined phenomena - including but not limited to - resilience, hardiness, grit, psychological flexibility and mental fitness. In particular, because a number of other similar constructs appear in the systems-based model of mental toughness (see Appendix C, page 216; e.g., self-esteem, optimism and coping) we can speculate that mental toughness spans numerous constructs and fields responsible for the maintenance of performance and wellbeing under stress. For example, the mechanisms of strength and accommodation may be analogous to positive primary and secondary appraisals in Lazarus and Folkman's (1984) transactional model of coping. On this basis, mental toughness as a higher-level construct thus has the potential to effectively neutralise conceptual redundancies, and in doing so, eliminate the plethora of 'labels' for consolidation, organisation and significant progression of knowledge within and between these fields.

On the basis of similar outcomes between mental toughness and the overall group, rather than be the conceptual difference, mental toughness may instead be the common thread. It follows that this group of constructs may be tied together under the umbrella of mental toughness, and as such, can all be in one way or another conceptualised as a *resistance to psychological disintegration* within their unique conceptual boundaries and contexts.

As mental toughness and related concepts have not been conceptualised in this way before, these findings represent a significant addition to the literature for understanding mental toughness, its measurement and development. For instance, based on the above argument, developing mental toughness may be achieved through improving one's capacity for resilience, hardiness, grit, psychological flexibility and/or mental fitness. Further, consolidating similar constructs under a single overarching concept such as mental toughness may somewhat eliminate the need for numerous 'labels' that describe parts of the same system in a piecemeal manner.

Beyond elucidating the landscape around mental toughness, despite decades of conceptual enquiry, a consensus of the definition of mental toughness is yet to be established. As such, the next section discusses consolidation of existing conceptualisations as another step toward elucidating mental toughness.

#### *Consolidating and re-defining mental toughness (Objective 2a and 2b)*

I found at least seventeen definitions of mental toughness (see Appendix A, page 189). Beyond these definitions, over 118 attributes of mental toughness have been identified and inconsistently included/excluded from definitions (Connaughton et al., 2011). As a result of this conceptual diversity, measurement and findings have limited comparability with each other (Crust & Swann, 2011). To remedy this problem, this thesis provided a uniform conceptual platform that consolidates conceptualisations of mental toughness.

For the first time, I defined mental toughness as *a resistance to psychological disintegration under stress* (hereinafter referred to as ‘the definition’). Similar to existing definitions of mental toughness (e.g., Coulter et al., 2010; Gucciardi et al., 2008; Jones et al., 2002; Jones et al., 2007; Middleton et al., 2004; Thelwell et al., 2005) the definition was generated from qualitative data (vis-à-vis theoretical perspectives; e.g., Clough et al., 2002). Furthermore, on the basis that the pattern of central and peripheral features in the lay prototype analysis (Chapter 4) resembled characteristics of an enduring form of suffering (Morse, 2001), this definition was also grounded in psychological terms associated with suffering research (i.e., *psychological disintegration*; Diekstra, 1981, as cited in Kuitert, 1995; Morse, 2001). This approach ensures that the definition accurately aligns with ‘on the ground’ perceptions of mental toughness whilst retaining theoretical links to related bodies of psychology research (i.e., suffering and psychological pain; Diekstra, 1981, as cited in Kuitert, 1995; Morse, 2001). As well as its robust conceptual development, the definition also serves the purpose of consolidating conceptualisations of mental toughness in two ways: by encompassing existing definitions and contextual variations, whilst simultaneously avoiding additional conceptual spread through descriptive language.

First, the definition draws existing conceptualisations together by including current areas of conceptual agreement; on the other hand, it concurrently prevents further conceptual spread by avoiding current sources of conceptual disagreement. From published definitions and expert perceptions, *stability or consistency under stressful or pressurised situations* are defining features of mental toughness. These agreed-upon features are akin to *a resistance to psychological disintegration*, which maintains functioning and inner stability (Morse, 2001). On the other hand, the particular psychological state or entity that is held consistent or stable represents a main source of conceptual disagreement. On this basis, the definition prevents further conceptual spread

by remaining general (i.e., with the term *psychological*) without specification of context-dependent entities or states.

Second, the definition remains relevant to a variety of contexts whilst avoiding additional conceptual spread by not containing any specific features of mental toughness. In the past, researchers have included a number of context-specific features in definitions, for example, composure (Clough et al., 2002). However, in line with this example, composure may be a central feature of mental toughness in some situations (e.g., during the “final putt” in golf) but not in others (e.g., perseverance through physical pain may instead be a central feature in endurance sports; Bull et al., 2005). As such, specification of features have added conceptual diversity because contextual differences (even within sports) significantly impact its meaning (Bull et al., 2005; Crust, 2008). The difficulties of conceptualising mental toughness across contexts are further supported by qualitative remarks made by experts in Chapter 4 (see page 80 above) as well as differences between expert (Chapter 3), lay and sporting perceptions of mental toughness (Chapter 4). Further, the predominant emphasis on specific outcomes, such as performance and goal attainment, within existing definitions of mental toughness may not be applicable to all situations; instead, from expert and lay perspectives, other related and contradictory outcomes such as maintaining wellbeing (experts) and accepting failure (laypeople) may be more central depending on the situation (e.g., serious injury, death of a loved one, failing a course; Gucciardi et al., 2015). On the basis of contextual variations, therefore, *resistance to psychological disintegration* remains an overarching description that encompasses the nature (but not specific features) of mental toughness across contexts.

In all, mental toughness is robustly reconceptualised in this thesis as *a resistance to psychological disintegration under stress*. This definition successfully consolidates existing definitions and contexts and avoids the addition of further conceptual spread by

not specifying context-specific features. As such, these findings represent a valuable step towards accumulating a universal body of empirical and practical knowledge.

In order to consolidate the meaning of mental toughness, however, the definition remains context-general, and as a result, specific contextual nuances are likely to be lost. Although a context-general definition is required for a solid conceptual foundation of mental toughness, it is also important for researchers and practitioners to understand the context-specific features of mental toughness for targeted empirical and practical applications. On this basis, the next section discusses lay perceptions of mental toughness.

### *Lay perceptions of mental toughness (Objective 3)*

Mental toughness from a layperson's perspective has previously remained unexplored despite numerous empirical investigations in non-sporting contexts (Gerber et al., 2012; Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2015; St. Clair-Thompson et al., 2015). Because mental toughness is posited to vary across circumstances (Bull et al., 2005; Crust, 2008), understanding and incorporating layperson's perspectives of mental toughness is an important criteria for empirical and practical validity of mental toughness in non-sporting contexts. For the first time, therefore, this thesis investigated lay perceptions of mental toughness.

Using a prototype analysis approach, lay populations identify similar attributes of mental toughness to sporting populations. In particular, these attributes included self-belief, determination, perseverance, resilience and focus. However, when asked to rate these attributes for their centrality or importance to mental toughness, central attributes of mental toughness are significantly different between lay, expert (Chapter 3) and sporting contexts. In particular, laypeople identified mental strength, overcomes obstacles, achieve/operate under pressure, determination and resilience/recovery as the most central attributes to mental toughness. On the other hand, experts instead rate

maintaining focus and concentration, cognitive reappraisals and behavioural flexibility as most central to mental toughness.

Using the systems-approach model of mental toughness presented in Chapter 5, experts and sportspeople emphasise processes (e.g., maintaining focus and concentration, cognitive reappraisals, determination, focus, self-belief) and outputs of mental toughness (e.g., perseverance, resilience, behavioural flexibility) whereas laypeople tend to mostly emphasise outputs of mental toughness (e.g., overcomes obstacles, achieve/operate under pressure and resilience/recovery). One explanation for such differences may be a priori expert understanding and repeated exposure to inner psychological processes whereas laypeople may instead notice overt and observable outputs of mental toughness irrespective of their underlying psychological processes.

From this investigation, an interesting finding that warrants further investigation is the repeated occurrence of resilience and determination throughout these contexts, which may signify a potential for universal features of mental toughness. Definitions of its parent term 'toughness' from Chapter 2 also includes the theme of determination, which further supports this proposition. As such, determination and resilience may be universal attributes of mental toughness with cross-contextual applications.

Nonetheless, these findings present significant implications for the application of sporting-focused models or measures of mental toughness in non-sporting populations. For instance, the MTQ48 (Clough et al., 2002) is widely used in lay populations (e.g., MTQ48; Gerber et al., 2012; Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; St. Clair-Thompson et al., 2015) yet its sub-scales of confidence, commitment, challenge and control solely measure psychological processes vis-à-vis outputs, which as outlined above, do not match laypeople's perceptions of mental toughness.

In sum, this thesis provides an original and significant contribution to understanding mental toughness - starting from the wider conceptual network beyond mental toughness,

to nuanced contexts within mental toughness. Building on this knowledge, this thesis extends the understanding of mental toughness even further than a description of what it is, by identifying its underlying mechanisms: that is, how it works.

### **Understanding the mechanisms underlying mental toughness: How does it work?**

#### **(Objective 4)**

Following the above elucidation of what mental toughness is, I presented an original systems-approach model of mental toughness (hereinafter referred to as ‘the model’), which identifies how mental toughness works in a system of inputs, processes and outputs. The model was developed in Chapter 5 using Deductive Thematic Analysis (Braun & Clarke, 2006) of qualitative data gathered from laypeople. Themes attained from this analysis were then systematically organised into inputs, processes and outputs according to established frameworks developed by Hagerty et al. (2001) and Jayawickreme et al. (2012).

This model presents an original and substantial contribution to the research by delineating between inputs, processes and outputs of mental toughness, which has been noted as a major underlying conceptual issue in the mental toughness literature (Hardy et al., 2014). As previously discussed in Chapter 5, it was suggested that mental toughness is comprised of inputs of personal resources and stressors; processes of strength and accommodation; and outputs of surviving, thriving and surviving.

Within this systems-approach model, a significant contribution is made to existing models with the addition of internal strain (e.g., uncertainty, mental illness, poor motivation) as an input variable and subsequent accommodation processes (e.g., open-mindedness, acceptance, faith) for effective tolerance of this psychological discomfort or strain. Previously, models of mental toughness have tended to focus on external stressors and subsequent resistance to inner disturbances by using absolute language such as

“unshakeable belief”, “fully focused” and “insatiable desires”. Andersen (2011) challenged these accounts as idealistic, not human, and to the extreme, pathological (e.g., an unshakeable belief that is unable to be modifiable despite disconfirming evidence; Andersen, 2011). As well as this, reviewers have provided anecdotal evidence to pose alternative scenarios of mental toughness that are not encompassed by existing conceptualisations, such as of functioning in the face of mental illness (a state which is antithetical to current conceptualisations of mental toughness; Andersen, 2011) and desisting rather than persisting when it is wise to do so (e.g., to prevent further injury; Crust, 2008). Established definitions, expert and lay perspectives of mental toughness in Chapters 2 to 4 lend scientific credence to these reviewer objections. For example, although endorsed by mental toughness experts and a number of constructs related to mental toughness (e.g., resilience, hardiness, psychological flexibility and mental fitness), flexible processes such as *adaptation* (Chapter 2), *cognitive reappraisals* and *behavioural flexibility* (Chapter 3) are absent in existing models of mental toughness. Qualitative data obtained from laypeople in Chapter 4 further emphasise the need for tolerance of internal strain and flexibility (e.g., “on the contrary, they are frequently in us. Illness, fatigue, injury, self-doubt are all experienced from within and detract us from our goals as easily as external political or human influences can”; and “while I have said to be persistent, sometimes mental toughness can simply be to accept a situation, especially if it is something that can’t be changed”). On this basis, the addition of internal strain and subsequent accommodation processes lend a ‘human’ and realistic tone to mental toughness which facilitates a more accurate approach to its conceptualisation, measurement and development.

Overall, this thesis has widened and deepened current understanding of mental toughness by elucidating what mental toughness is, as well as how it works. Elucidating mental toughness in this way thus provides original and significant contributions to

solidifying conceptual understanding of mental toughness, which is necessary for improving empirical and practical utility of the construct within the wider discipline of psychology. The implications of this research for psychological research and practice are discussed below.

### **General discussion**

Many people can psychologically tolerate external stresses and internal strains, but to different extents and in different contexts. The work reported in this thesis extends our understanding of stress and strain tolerance into contexts beyond sports and elucidates the meaning and underlying mechanisms of mental toughness. In doing so, psychological science and practice are augmented with a greater understanding of how to protect and facilitate individual functioning under inevitable conditions of stress.

As a positive psychology construct (Rusk & Waters, 2013), this work has improved the usefulness of mental toughness by pulling mental toughness away from sports psychology and into the general arena of human strengths. Particularly relevant to the ‘second wave of positive psychology’ (Ivtzan, Lomas, Hefferon, & Worth, 2016), understanding mental toughness in a more general (*vis-à-vis* sporting) capacity enhances our ability to facilitate transformation and positive functioning within life’s darker episodes.

In particular, Kashdan and Biswas-Diener (2014) argue that ‘wholeness’ – capitalising on both positive and negative psychological experiences – *vis-à-vis* happiness, is the epitome of mental health and success. Although positive psychology traditionally and rightfully emphasises positive emotions, cognitions and behaviours on the basis that that they foster success in a number of life domains (see Lyubomirsky, King, & Diener, 2005, for a review), this orientation subsequently restricts potential benefits that can be gained from the negative spectrum of human psychological experience.

Although not subjectively pleasant, the benefits of negative psychological experiences include attaining desirable outcomes in some situations, and informing and mobilising attention and resources for survival (Baumeister, Bratslavsky, Finkenauer, & Vohs, 2001). As such, appropriate access to and use of both positive and negative dimensions are most beneficial for promoting mental health and success.

Limitations in attaining wholeness, mental health and the benefits of positive and negative human experience, however, lie in one's capacity to acquire or maintain positive psychological experiences as well as tolerate negative psychological experiences (Kashdan & Biswas-Diener, 2014). For example, Baumeister and colleagues found that positive internal and external events are more difficult to access, less memorable and relatively short-lived compared to negative events (2001). On the other hand, Lau, White and Schnall (2013) demonstrated low distress tolerance by finding that individuals would pay a greater sum of money to avoid or control negative internal experiences than they would to experience positive ones. Either way, restricted access to the full spectrum of positive and negative psychological events thus hampers wholeness and mental health (Kashdan & Biswas-Diener, 2014).

These limitations, however, can be uniquely attenuated by mental toughness above and beyond other psychological constructs already available in psychological literature. According to the systems-approach model of mental toughness outlined in Chapter 5 and in comparison with similar neighbouring constructs in Chapters 2 and 3, mentally tough individuals have a greater *capacity* and *effectively use* both positive and negative elements of wholeness: that is, they are more able to perform and maintain positive psychological functions under stress (i.e., strength processes) and also more equipped to withstand psychological discomfort or internal strain (i.e., accommodation processes). On the other hand, and as outlined above, mental toughness encompasses but also extends the contributions of discrete constructs within its nomological network. For example,

psychological flexibility only determines the *effective use* of any one of these capacities according to situational requirements; and remaining constructs such as hardiness, grit, psychological flexibility, resilience and mental fitness partially includes yet not wholly enhances capacities for one or more inputs, strength or accommodative processes and/or outputs.

Beyond mental health, by consolidating mental toughness as a human strength, it becomes contingent to one of “the most potent weapons in the arsenal of therapy” (Seligman, 2002, p. 3) and thus provides practical benefits to clinical psychology for preventing mental illness. In particular, as outlined in the introduction to the DSM-5, for a disorder to be identified it must be associated with distress or disability; that is, without a sense of distress or negative impact on your (or others) life then it is not a diagnosable condition. From the systems-approach model in Chapter 5, mentally tough individuals may be more likely to avoid distress or negative life impacts by maintaining one or more positive outputs of surviving, striving and/or thriving under external stress and/or internal strain through strength or accommodative processes. These pathways are already targeted by common therapies used to treat mental illness such as Cognitive Behavioural Therapy (CBT) and Acceptance Commitment Therapy (ACT), which differ in their objectives to control (i.e., strength; CBT, Beck, 2011) or accept (i.e., accommodation; ACT, Hayes et al., 2012) disturbing thoughts and emotions. On this basis, the systems-approach model presented in this thesis provides a compatible framework for understanding the prevention and alleviation of mental illness. As one in six New Zealanders have been diagnosed with a common mental disorder (Mental Health Foundation of New Zealand, 2014), which is elevated to one in four worldwide (World Health Organization, 2001), mental toughness literature and the findings inherent in this thesis are thus likely to make significant contribution towards alleviating the health, social, human rights and economic consequences of mental illness (World Health Organization, 2016).

In sum, the conceptual work done in this thesis aimed at clarifying mental toughness and extending its utility from sports psychology to the wider psychological arena significantly extends our capacity to facilitate mental health and prevent mental illness. As such, adding mental toughness to the positive and clinical psychological ‘toolkit’ may give researchers and practitioners the means to “apply the discipline’s scientific knowledge to help people, organisations and communities function better” (American Psychology Association, 2016, para 1).

### **Research limitations**

Despite making an original and significant contribution to the literature, research contained in this thesis was subjected to a number of limitations. Specifically, these include:

1. Although concurrently presenting a major contribution to literature, the population differences observed in this thesis also acted as a limitation. In particular, in Chapter 4, the term ‘laypeople’ is relatively generalised and as such, lay populations are likely to contain a large amount of inherent demographic variation. Although this variation was somewhat accounted for by excellent inter-rater agreement between participants (i.e., demographic variations did not significantly produce different rating judgements between participants), differences within this population were not analysed. As such, future research ought to ‘drill down’ into different demographic elements of lay populations to gain a richer understanding of mental toughness within these sub-groups.
2. Because of differences in the size of research fields, uneven numbers of definitions for mental toughness and its related constructs were attained and used in Chapters 2 and 3. These uneven numbers are likely to influence proximities (i.e., constructs offering a greater amount of themes may be more likely to have

more themes in common with its neighbours) and perceptions of conceptual spread within fields (i.e., more conceptual diversity was naturally observed in those constructs with a greater number of definitions available). Although navigating around uneven sizes of research fields is difficult, future research may provide a more standardised avenue for evaluating conceptual relationships between constructs.

3. Related to the size of research fields, Chapter 3 was limited by the small amount of experts that chose to participate. Although inter-rater agreement was acceptable for mental toughness, resilience, hardiness, psychological flexibility and the total dataset, remaining inter-rater agreements were either unacceptable (i.e., gender norm toughness) or unable to be calculated due to only one expert participating in that construct category. Going forward, future research would build on this research by recruiting a greater number of experts.
4. In assessing the central and peripheral features of mental toughness from experts' perspectives (Chapter 3), experts were limited to a choice of themes extracted from construct definitions. Although this was purposefully done for practical reasons (i.e., free generation of attributes for all eight constructs was likely to generate a large response burden when rating themes for centrality), centrality ratings and subsequent proximities may have differed on the basis of the themes offered.
5. Only experts were used to assess construct proximities (Chapter 3). However, because experts' and laypersons' perspectives of mental toughness were different (Chapters 3 and 4), construct proximities may differ depending on what population is used. For instance, resilience was not rated as very similar to mental toughness by experts compared to hardiness, psychological flexibility and grit.

However, resilience features as a highly central attribute of mental toughness from lay perspectives.

6. Qualitative data from laypeople in Chapter 4 (Part 1) were collected using open-ended questionnaires vis-à-vis in-depth interviews. Although open-ended questionnaires were used in line with existing prototype analysis procedures, and also had the added benefit of gaining a large cross-section of the lay population, this method of data collection limited in-depth probing of responses. As such, interpretation of responses was left to the researchers' judgements and important additional conceptual information may have been missed.
7. The systems-approach model developed in Chapter 5 may involve important feedback effects not included in the model discussion; that is, outputs may also act as inputs to the system. However, as laypeople were unable to be probed further due to the nature of the written questionnaire, the presence of these feedback effects are unclear. Further, these feedback effects could also not be inferred from existing literature due to cross-sectional research between mental toughness and outputs such as wellbeing (e.g., Gerber, Brand, et al., 2013; Gerber, Kalak, et al., 2013; Gucciardi et al., 2015). On this basis, in-depth interviews and/or longitudinal research would significantly elucidate the direction of elements within the systems-based model of mental toughness.

### **Recommendations for future research**

This thesis presents an important 'springboard' on which to base future conceptual developments of mental toughness. In particular, future avenues of research are required to further elucidate the additional value of mental toughness, between-context differences, test and further extend the systems-approach model and progress measurement and development of mental toughness on these bases. Further avenues are

available for understanding mental toughness and its neighbours as a collective group, and understanding ‘toughness’ at a wider familial, organisational and societal level.

First, although mental toughness provides additional value in positive situations, such as performing under pressure, existing empirical research involving similar constructs in these situations (e.g., hardiness; Golby & Sheard, 2004; Sheard, 2009) suggest that other constructs are equally – if not more – valid in these contexts. However, on the basis of findings here and elsewhere, a new argument was presented that positions mental toughness as an umbrella term vis-à-vis distinct yet related phenomenon. As this argument was conceived from exploratory research, conclusive evidence for this proposition is required. In particular, because mental toughness was confined to comparisons with resilience, hardiness, grit, psychological flexibility, *sisu* and mental fitness, mental toughness as an umbrella term requires validation against other similar constructs not considered here, such as coping (Gucciardi et al., 2015), buoyancy (Clough & Strycharczyk, 2015), self-esteem (Madrigal et al., 2013), optimism (Nicholls, Polman, Levy, & Backhouse, 2008) and flow (Madrigal et al., 2013).

The prototype analysis conducted here was the first of its kind in the mental toughness literature. However, the effect of centrality of attributes on cognitions was not tested, which is an important measure of the prototypical arrangement of a construct (Fehr, 1988). By testing the cognitive effect of centrality of attributes in lay, as well as a number of other populations, researchers may further establish differences in the prototypical arrangement of mental toughness between contexts. In all, understanding the structure of the prototypical arrangement of mental toughness, and its subsequent impact on cognitions, is likely to provide a valuable contribution towards understanding mental toughness within and between contexts.

The definition presented in Chapter 5 provided an initial avenue for extending conceptualisation of mental toughness across contexts whilst concurrently

accommodating existing conceptual issues inherent in the literature. On the basis that this definition remains at an exploratory level, further research is required to confirm and/or extend its capacity for adequately defining mental toughness. One particular avenue would be the use of alternative methodologies, such as Delphi studies (Linstone & Turoff, 1975) and concept analysis (Walker & Avant, 2005).

Also in Chapter 5, the systems-approach model presented provided valuable inroads to understanding the mechanisms underlying mental toughness. However, it was developed on the basis of qualitative comments from laypeople only. As contextual differences are evident between populations, therefore, elaboration and rigorous testing of the model is required in specific contexts.

On the premise that the systems-approach model is applicable to a range of populations, and their nuanced conceptual differences are appropriately specified, future research is required to develop more agile and robust measurement and development tools. This work will significantly extend empirical and practical utility of mental toughness, which is presently based on measuring or enhancing the presence or absence of mental toughness attributes rather than their nuanced application within strength and accommodation processes according to situational and psychological demands.

Finally, researchers, including myself, have retained an exclusive focus of mental toughness at an individual level. Another important consideration for future ‘toughness’ research is to understand what ‘toughness’ or *resistance to disintegration under stress* means (i.e., what it is and how it works) at a wider group level within families, organisations and societies. Research of this kind is important for understanding group coherence within these entities under a variety of stressful situations, which is likely to facilitate positive individual and collective outputs beyond specific psychological and individual outcomes and behaviours considered here.

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## Appendix A.

Definitions (in chronological order) of mental toughness and its parent ('mental', 'toughness'), sibling (gender norm toughness, material toughness) and neighbouring terms (resilience, hardiness, grit, psychological flexibility, sisu and mental fitness)

**Mental toughness**

<b>Author (s)</b>	<b>Definition</b>
Loehr (1994, p. 5)	Toughness is the ability to consistently perform toward the upper range of your talent and skill regardless of competitive circumstances.
Hollander and Acevedo (2000, p. 5)	Tenacity for success.
Jones, Neuman, Altman and Dreschler (2001, p. 496)	An athlete's ability to maintain an optimal mindset throughout a sporting event.
<b>Jones et al. (2002, p. 209)</b>	<b>Having the natural or developed psychological edge that enables you to, generally, cope better than your opponents with the many demands (competition, training, lifestyle) that sport places on a performer and, specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.</b>
Clough et al. (2002, p. 38)	Mentally tough individuals tend to be sociable and outgoing; as they are able to remain calm and relaxed, they are competitive in many situations and have lower anxiety levels than others. With a high sense of self-belief and an unshakeable faith that they control their own destiny, these individuals can remain relatively unaffected by competition or adversity.
<b>Middleton et al. (2004, p. 1)</b>	<b>An unshakeable perseverance and conviction towards some goal despite pressure or adversity.</b>
Fletcher (2005, p. 1246)	An individual's propensity to manage the demands of environmental stressors, ranging from an absolute resilience to extreme vulnerability.

## Mental toughness

Author (s)	Definition
Thelwell et al. (2005, pp. 328 – 329)	<b>Mental toughness is having the natural or developed psychological edge that enables you to always cope better than your opponents with the many demands (competition, training, and lifestyle) that soccer places on the performer. Specifically, be more consistent and better than your opponents in remaining determined, focused, confident, and in control under pressure.</b>
Gardner and Moore (2007, p. 108)	The ability to act in a purposeful manner, systematically and consistently, in the pursuit of values that underlie performance activities, even (and especially) when faced with strong emotions that we as humans naturally want to control, eliminate or reduce.
Gucciardi et al. (2008, p. 278)	A collection of values, attitudes, behaviors, and emotions that enable you to persevere and overcome any obstacle, adversity, or pressure experienced, but also to maintain concentration and motivation when things are going well to consistently achieve your goals.
Gucciardi et al. (2009a, p. 67)	Mental toughness is a collection of experientially developed and inherent sport-specific and sport-general values, attitudes, emotions, and cognitions that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities to consistently achieve his or her goals.
<b>Coulter et al. (2010, p. 715)</b>	<b>Mental toughness is the presence of <i>some or the entire collection</i> of experientially developed and inherent values, attitudes, emotions, cognitions and behaviours that influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges and adversities to consistently achieve his or her goals.</b>
Mallett and Coulter (2011, p. 191)	Mental toughness is associated with the pursuit of goals in achievement contexts, and in that quest, particular values, attitudes, emotions, cognitions, and behaviours seem to influence the way in which an individual approaches, responds to, and appraises both negatively and positively construed pressures, challenges, and adversities.
Clough and Strycharczyk (2012, p. 1)	The quality which determines in large part how people deal effectively with challenge, stressors and pressure... irrespective of prevailing circumstances.

## Mental toughness

<b>Author (s)</b>	<b>Definition</b>
Hardy et al. (2014, p. 70)	The ability to achieve personal goals in the face of pressure from a wide range of different stressors.
Mahoney et al. (2014, p. 234)	A collection of personal characteristics (i.e., forces, resources, and demands, discussed later) that allow individuals to regularly perform to or around the best of their abilities regardless of circumstances faced.
Gucciardi et al. (2015, p. 28)	A personal capacity to produce consistently high levels of subjective (e.g., personal goal achievement) or objective (e.g., race times) performance despite everyday challenges and stressors as well as significant adversities.

*Note.* Boldtype definitions represent those definitions developed through qualitative enquiry (see introduction chapter, page 5 above) for further details on their development). Definitions included in this list were extracted from the systematic literature review conducted in Chapter 2, but also include additional definitions that did not meet inclusion criteria (e.g., Middleton et al. (2004) definition, which was not published in a peer-reviewed journal).

## Dictionary definition of mental

<b>Source</b>	<b>Definition</b>
“Mental” (n.d.)	Of or relating to the mind; specifically of or relating to the total emotional and intellectual response of an individual to external reality <mental health>; of or relating to intellectual as contrasted with emotional activity; of, relating to, or being intellectual as contrasted with overt physical activity; occurring or experienced in the mind <mental anguish>; relating to the mind, its activity, or its products as an object of study; relating to spirit or idea as opposed to matter.

### Dictionary definitions of toughness

Source	Definition
"Toughness" (n.d.)	Strong or firm in texture but flexible and not brittle; Not easily chewed <tough meat>; Characterised by severity or uncompromising determination <tough laws> <tough discipline>; Capable of enduring strain, hardship, or severe labour <tough soldiers>; Very hard to influence, stubborn <a tough negotiator>; Difficult to accomplish, resolve, endure, or deal with <a tough question> <tough luck>; Stubbornly fought <a tough contest>; Unruly, rowdyish <a tough gang>; Marked by absence of softness or sentimentality <a tough critic>
"Tough" (n.d.)	Of close tenacious substance or texture; strongly cohesive, so as to be pliable or ductile; not easily broken, divided, or disintegrated; not fragile, brittle, or tender; of food, difficult to masticate; Of viscous consistence or nature; sticky, adhesive, tenacious; glutinous; Stiff; severe, violent; (sometimes) grievous, painful; of a contest, etc.: stoutly maintained, strenuous, vigorous and stubborn; Capable of great physical endurance; strongly resisting force, injury fatigue, etc.; not easily overcome, tired, or impaired; hardy, stout, sturdy; Having great intellectual or moral endurance; difficult to influence, affect, or impress; steadfast, firm, persistent; also, stubborn, obstinate, hardened; Resolute in dealing with opposition; vigorously uncompromising; severe; Of laws or rules: strict, inflexible. Of an institution: marked by strict enforcement of discipline; Difficult to do, accomplish, perform, or deal with; hard, trying, laborious, troublesome; To be persistent or obstinate; Vigorously, stoutly; persistently; In an uncompromising, aggressive, or unyielding manner; A person of uncompromising or aggressive views.

**Gender norm toughness**

<b>Source</b>	<b>Definition</b>
Miller (1966, p. 140)	Physical prowess, evidenced both by demonstrated possession of strength and endurance and by athletic skill; masculinity, symbolised by a distinctive complex of acts and avoidances (bodily tattooing, absence of sentimentality, non-concern with art, literature, conceptualisation of women as conquest objects, etc.); and bravery in the face of physical threat.
Fischer, Tokar, Good and Snell (1998, p. 136)	Toughness, reflecting the expectation of men's being independent and rugged mentally, emotionally and physically.
Luyt and Foster (2001, p. 5)	Discomfort tolerance, emotional detachment, self-containment and physical endurance.
Luyt (2005, p. 212)	Discomfort tolerance, emotional detachment, self-containment and physical practice.
Thompson and Cracco (2008, p. 87)	The importance of the values of being emotionally inexpressive and physically aggressive, if necessary.
Gaffney and Manno (2011, p. 197).	Such key ideas include the “tough guise” performance that displays risk-taking, competitiveness, assertiveness, stoicism, and independence, while masking vulnerability, sensitivity, and emotion; in other words, this performance is a deception, whether conscious or not.
O'Loughlin et al. (2011, p. 740)	The toughness norm, which entails hiding pain and maintaining independence.
Vincent, Parrott and Peterson (2011, p. 385)	Toughness (i.e., the Sturdy Oak and Give ‘em Hell), which reflects the expectation that men are physically tough and willing to be aggressive.
Wong, Shea, Lafollette, Hickman, Cruz and Boghokian (2011, p. 242)	Emotional toughness: Being emotionally strong, controlling one’s emotions, not crying, being stoic, not disclosing weakness, not being vulnerable.
Levant et al. (2012, p. 361)	Absence of softness or sentimentality and uncompromising determination.

### Gender norm toughness

Source	Definition
Luyt (2012, p. 42).	'Toughness' norm. This norm captured the importance of men's toughness. 'Real' men are emotionally contained. They do not express fear or pain and remain level-headed and rational. They are physically tough and should be prepared to engage in physical violence. It included two categories and their associated sub-categories [i.e. no; yes: traditional representation (e.g. a man does not let others see he is in pain), including successful or unsuccessful performance, or alternative representation (e.g. a man discusses his emotions with others), including successful or unsuccessful performance].
Lu and Wong (2013, p. 355).	Participants necessitated embodying "tough" characteristics: courage, confidence, dominance.
Leone and Parrott (2015, p. 184)	Toughness, which reflects the expectation that men be physically tough and inclined to be aggressive.
Lisco et al. (2015, p. 2)	Toughness, which reflects men's belief that they must appear aggressive and physically and emotionally strong.
Sobiraj, Rigotti, Weseler and Mohr (2015, p. 55)	The toughness norm relates to a man's physical strength and often embodies the willingness to engage in physical fighting. It prescribes ideals for emotional toughness, such as being highly independent or distant, or behaving invulnerably and concealing pain.

### Material toughness

Source	Definition
Smith (1993, p. 246)	Toughness is a measure of the amount of energy a material can absorb before fracturing.
Ivanoff (1996, p. 328)	The ability of a material to absorb energy when being deformed and therefore resist deformation and failure.
Callister and Rethwisch (2000, p. G14)	A mechanical characteristic that may be expressed in three contexts: (1) the measure of a material's resistance to fracture when a crack (or other stress-concentrating defect) is present, (2) the ability of a material to absorb energy and plastically deform before fracturing, (3) The total area under the material's tensile engineering stress-strain curve taken to fracture.

**Material toughness**

<b>Source</b>	<b>Definition</b>
Ashby (2005, p. 396)	The toughness of a material measures its resistance to the propagation of a crack.
Beer, Johnston and DeWolf (2006, p. 673)	It is equal to the area under the entire stress-strain diagram and represents the energy per unit volume required to cause the material to rupture.
Ashby, Hugh and Cebon (2007, p. 4)	The resistance of materials to cracking and fracture.
Callister (2007, p. G13)	A measure of the amount of energy absorbed by a material as it fractures. Toughness is indicated by the total area under the material's tensile stress-strain curve.
Beer, Johnston, DeWolf and Mazurek (2012, p. 772)	The area under the entire stress-strain diagram was defined as the modulus of toughness and is a measure of the total energy that can be acquired by the material.
Callister and Rethwisch (2014, p. 932)	A mechanical characteristic that may be expressed in three contexts: (1) the measure of a material's resistance to fracture when a crack (or other stress-concentrating defect) is present, (2) the ability of a material to absorb energy and plastically deform before fracturing, (3) The total area under the material's tensile engineering stress-strain curve taken to fracture.

## Resilience

Author(s)	Definition
Cohler (1987, p. 389)	The capacity to maintain feelings of personal integration and sense of competence when confronted by a particular adversity.
Rutter (1987, p. 316)	Protective factors which modify, ameliorate or alter a person's response to some environmental hazard that predisposes to a maladaptive outcome.
Masten, Best and Garmezy (1990, p. 426).	The process of, capacity for, or outcome of successful adaptation despite challenging or threatening circumstances.
Richardson, Neiger, Jensen and Kumpfer (1990, p. 34)	The process of coping with disruptive, stressful, or challenging life events in a way that provides the individual with additional protective and coping skills than prior to the disruption that results from the event.
Dyer and McGuinness (1996, p.277)	A global term describing a process whereby people bounce back from adversity and go on with their lives.
Carver (1998, p. 247)	Homeostatic return to a prior condition.
Masten and Coatsworth (1998, p. 206; *see p. 206 for a discussion on the definition of competence)	Manifested competence in the context of significant challenges to adaptation or development.
Rutter (1999, p.119)	The phenomenon of overcoming stress and adversity.
Luthar and Cicchetti (2000, p. 858)	A dynamic process of positive adaptation in the context of significant adversity.
Luthar, Cicchetti and Becker (2000, p. 543).	A dynamic process encompassing positive adaptation within the context of significant adversity.
Masten (2001 , p. 228)	A class of phenomena characterised by good outcomes in spite of serious threats to adaptation or development.
Coleman and Ganong (2002, p. 1)	A dynamic process encompassing positive adaptation within the context of significant adversity.
Connor and Davidson (2003, p. 76).	The personal qualities that enables one to thrive in the face of adversity.
Curtis and Cicchetti (2003, p.776)	A dynamic process that is influenced by neural and psychological self-organisation, as well as transactions between the ecological context and the developing organism.

## Resilience

Author(s)	Definition
Bonanno (2004, pp. 20–21).	The ability of adults in otherwise normal circumstances who are exposed to an isolated and potentially highly disruptive event such as the death of a close relation or a violent or life-threatening situation to maintain relatively stable, healthy levels of psychological and physical functioning, as well as the capacity for generative experiences and positive emotions.
Tugade and Fredrickson (2004 , p. 320)	Psychological resilience has been characterised by the ability to bounce back from negative emotional experiences and by flexible adaptation to the changing demands of stressful experiences
Agaibi and Wilson (2005, p. 197)	Complex repertoire of behavioural tendencies.
Davidson et al. (2005, p. 43)	The capacity to recover or bounce back, as is inherent in its etymological origins, wherein ‘resilience’ derives from the Latin words salire (to leap or jump), and resilire (to spring back).
Fergus and Zimmerman (2005, p. 399)	Resilience refers to the process of overcoming the negative effects of risk exposure, coping successfully with traumatic experiences, and avoiding the negative trajectories associated with risks.
Ahern, Kiehl, Sole and Byers (2006, p. 104)	A personality characteristic that moderates the negative effects of stress and promotes adaptation.
Everall, Altrows and Paulson (2006, p. 462)	An adaptive process whereby the individual willingly makes use of internal and external resources to overcome adversity or threats to development.
Hjemdal, Friborg, Stiles, Rosenvinge and Martinussen (2006, p. 94)	The protective factors and processes or mechanisms that contribute to a good outcome, despite experiences with stressors shown to carry significant risk for developing psychopathology.
Rutter (2006, p. 1)	An interactive concept that refers to relative resistance to environmental risks or overcoming stress or adversity.
Jackson et al. (2007, p. 3)	The ability of an individual to adjust to adversity, maintain some sense of control over their environment, and continue to move on in a positive manner.
Lee and Cranford (2008, p. 213).	The capacity of individuals to cope successfully with significant change, adversity or risk.
Netuveli, Wiggins, Montgomery, Hildon and Blane (2008, p. 987)	Resilience is having good outcomes despite adversity and risk and could be described in terms of preserving the same level of the outcome or rebounding back to that level after an initial set back.
Young, Green and Rogers (2008, p. 42)	The factors, processes and mechanisms which, in the face of significant risk/trauma/adversity/stress/disadvantage, nonetheless work to enable an individual, family or community to thrive and be successful.

## Resilience

Author(s)	Definition
Leipold and Greve (2009, p. 41).	An individual's stability or quick recovery (or even growth) under significant adverse conditions
Cicchetti (2010, p. 151)	Protective and vulnerability forces at multiple levels of influence - culture, community, family and the individual.
Yi-Frazier et al. (2010, p. 2)	An individual's capacity to maintain psychological and physical well-being in the face of adversity
Windle (2011, p. 163)	Resilience is the process of effectively negotiating, adapting to, or managing significant sources of stress or trauma. Assets and resources within the individual, their life and environment facilitate this capacity for adaptation and 'bouncing back' in the face of adversity. Across the life course, the experience of resilience will vary.
Lee, Cheung and Kwong (2012, p. 2)	The process of effectively mobilising internal and external resources in adapting to or managing significant sources of stress or trauma.
Smith-Osbourne and Bolton (2013, p. 112)	A process of personal, interpersonal and contextual protective mechanisms, resulting in an anomalous, positive outcome in the face of adversity, including a range of outcomes, such as health status, educational attainment, and vocational success.
Marriott, Hamilton-Giachritsis and Harrop (2014, p. 19)	The presence of a positive outcome and the absence of a negative outcome.
American Psychological Association (2015)	The process of adapting well in the face of adversity, trauma, tragedy, threats, or even significant sources of stress – such as family and relationship problems, serious health problems, or workplace and financial stressors. It means 'bouncing back' from difficult experiences.

**Hardiness**

<b>Author(s)</b>	<b>Definition</b>
Kobasa (1979, p. 3)	Persons who experience high degrees of stress without falling ill have a personality structure differentiating them from persons who become sick under stress. This personality difference is best characterised by the term hardiness.
Kobasa, Maddi and Kahn (1982, p. 169)	A constellation of personality characteristics that function as a resistance resource in the encounter with stressful life events. The personality dispositions of hardiness are commitment, control, and challenge.
Lee (1982, p. 33)	Endurance - the physiological and/or psychological toughness to continue, strength - the ability to resist force, stress, hardship, boldness - the quality of being courageous, daring, adventurous, and power to control - the ability to exercise authority or influence.
Kobasa and Puccetti (1983, p. 840).	Hardiness is presented as facilitating the kind of perception, evaluation, and coping that leads to successful resolution of the situation created by the stressful events ... [thus] hardiness prevents the organismic debilitation associated with continuous demand for readjustment.
Blaney, et al. (1991, p. 297)	A composite of commitment, challenge and control, qualities which presumably foster cognitive reappraisals that enhance adjustment under stressful circumstances.
Tartasky (1993, p. 225)	A personality construct that is thought to influence illness outcomes by mediating the impact of stressful life events.
Bernard, Hutchison, Lavin and Pennington (1996, p. 116)	Is [also] theorised to reflect adaptational capacity and general coping ability, which may buffer the effects of stress on health.
Benishek and Lopez (1997, p. 34)	Hardiness buffers people against the negative effects of life stress.
Constantini, Solano, Di Napoli and Bosco (1997, p. 81)	Cognitive and behavioural flexibility, motivation to carry out plans successfully, endurance under stress... are all features of a hardy personality.
Maddi (1999, p. 83)	A credible buffer in the relationship between stressors and illness.

**Hardiness**

<b>Author(s)</b>	<b>Definition</b>
Robitschek and Kashubeck (1999, p. 160)	Stress resistance.
Soderstrom, Dolbier, Leiferman and Steinhardt (2000, p. 312)	A personality characteristic describing an individual with three closely related tendencies: Challenge, commitment, and control.
Britt, Adler and Bartone (2001, p. 54)	A dispositional tendency to find meaning in events, particularly stressful events that challenge the individual.
Maddi et al. (2002, p. 72).	A composite of interrelated attitudes of commitment, control, and challenge that facilitates the management of stressful circumstances by turning them into growth-inducing rather than debilitating experiences.
DiBartolo and Soeken (2003, p. 446)	An amalgam of three crucial personality traits: commitment, control, and challenge. These characteristics function as an active resistance or stress-buffering resource that can enable the person to cope in ways that facilitate adaptation to stress (Kobasa et al., 1982) or inhibit maladaptive coping (Cohen & Edwards, 1989).
Lopez, Haigh and Burney (2004, p. 239)	A measure of an individual's commitment to their life goals, sense of control or belief that they can control life events, and a perception of change as challenge.
Maddi (2004, p. 280)	A set of attitudes that motivate one to respond to stressful circumstances with the particular coping and social interaction efforts likely to produce resiliency by turning potential disasters into opportunities instead.
Maddi (2004, p. 286)	A set of attitudes or beliefs about yourself in interaction with the world around you that provides the courage and motivation to do the hard work of turning stressful changes from potential disasters into opportunities instead... specifically, the attitudes or beliefs involved are the 3 Cs of commitment, control and challenge.

**Hardiness**

<b>Author(s)</b>	<b>Definition</b>
Chan (2005, p. 48)	Individual hardiness encompasses both cognitive and behavioral aspects of personality that act as a buffer or mediating factor in mitigating the effects of stressors and demands. More specifically, individual hardiness consists of a sense of meaningfulness in life (commitment), a belief that change is normal in life and brings opportunities for development (challenge), and a belief that the individual can influence the events in his or her life (control).
Judkins, Arris and Keener (2005, p. 319)	A group of personality characteristics that function as a resistance in the encounter with stressful life events.
Cole, Bruch and Vogel (2006, p. 467)	A personality composite of beliefs about self and world involving the importance of a sense of commitment, control, and challenge.
Maddi (2006, p. 160)	A combination of attitudes that provides the courage and motivation to do the hard, strategic work of turning stressful circumstances from potential disasters into growth opportunities.
Maddi, Harvey, Khoshaba, Lu, Persico and Brow (2006, p. 575)	A dispositional factor in preserving and enhancing performance and health despite stressful circumstances.
Maddi et al. (2006, p. 576)	A combination of attitudes that enhance performance, health and mood despite stressful circumstances.
Maddi, Khoshaba, Harvey, Fazel and Resurreccion (2010, p. 370)	Personality hardiness is emerging as a composite of the interrelated attitudes of commitment, control, and challenge (the 3Cs) that together provide the existential courage needed in turning life's ongoing stresses from potential disasters into growth opportunities and, in this way, continuing to construct and appreciate the meaning of experience rather than just holding on to old, preconceived ways of understanding life.
Cash and Gardner (2011, p. 646)	A trait which is proposed to distinguish between those who do well and those who do less well in stressful situations.

### Hardiness

Author(s)	Definition
Maddi (2012, p. 6)	Is the pattern of attitudes and strategies that constitute the existential courage and motivation to do the hard work of turning stressful circumstances from potential disasters into growth opportunities.
Maddi (2013, p. 236)	A learned aspect of personality that facilitates the human capability to search for meaning, and enhance performance and health, regardless of circumstances.
Abdollahi, Talib, Yaacob and Ismail (2014, p. 790)	An ability incorporating three components - commitment, control, challenge - that prepare an individual to handle problematical life events.
Golubovich et al. (2014, p. 757)	A personality trait that is indicative of individuals' resilience and success in managing stressful circumstances.
Maddi (2014, p. 292)	A pattern of attitudes and skills that help in this important process of turning stressors to our advantage.

### Grit

Author(s)	Definition
Duckworth et al. (2007, p. 1087).	Perseverance and passion for long term goals.
Duckworth and Quinn (2009, p. 166).	Trait-level perseverance and passion for long-term goals.
Maddi, Matthews, Kelly, Villarreal and White (2012, p. 20).	Sustained interest and persistent effort in the passionate pursuit of long-term goals.
Kleiman, Adams, Kashdan and Riskind (2013, p. 540).	A psychological strength involving the pursuit of long-term goals with perseverance and passion.
Maddi, Erwin, Carmody, Villarreal, White and Gundersen (2013, p. 129)	Sustained interest and persistent effort in the passionate pursuit of long-term goals.

**Grit**

<b>Author(s)</b>	<b>Definition</b>
Silvia, Eddington, Beaty, Nusbaum and Kwapil (2013, p. 200).	Personality trait associated with persistence for long-range goals.
Duckworth and Gross (2014, p. 319).	Passion for and perseverance toward especially long-term goals.
Hill, Burrow and Bronk (2014, p. 2).	Researchers have defined this combination of passion and perseverance as “grit,” a dispositional tendency that helps account for individuals’ success above and beyond cognitive functioning.
Kelly, Matthews and Bartone (2014, p. 329).	The sustained and passionate pursuit of a given interest or goal.
Robertson-Kraft and Duckworth (2014, p. 2).	Perseverance and passion for long-term goals.
Von Culin, Tsukayama and Duckworth (2014, p. 306).	The tendency to pursue long-term goals with sustained zeal and hard work.
Wolters and Hussain (2014, p. 2).	A person's trait-level perseverance and passion for long-term goals.
Anestis and Selby (2015, p. 212).	The ability to strenuously pursue long-term goals despite obstacles and adversity.

**Psychological Flexibility**

<b>Source</b>	<b>Definition</b>
Bond, Flaxman and Bunce (2008, p. 645)	Psychological flexibility, or flexibility, refers to an ability to focus on the present moment and, depending upon what the situation affords, persist with or change one's (even inflexible, stereotypical) behaviour in the pursuit of goals and values.
Kashdan and Rottenberg (2010, p.866)	Psychological flexibility [actually] refers to a number of dynamic processes that unfold over time. This could be reflected by how a person: 1) adapts to fluctuating situational demands, 2) reconfigures mental resources, 3) shifts perspective, and 4) balances competing desires, needs, and life domains.

## Psychological Flexibility

Source	Definition
McCracken, Vowles and Zhao-O'Brien (2010, p. 346)	A quality contact with present experiences such that behaviour can persist or change in service of longer term values and goals and in a way that is not unnecessarily restricted by cognitive or language-based influences.
Vowles and McCracken (2010, p. 141)	One's ability to directly and openly contact experiences in the present moment and persisting or changing behaviour according to what the situation affords and one's personal goals and values.
Bond et al. (2011, p. 678)	The ability to fully contact the present moment and the thoughts and feelings it contains without needless defence.
Gloster, Klotsche, Chaker, Hummel and Hoyer (2011, p. 970)	Psychological flexibility (PF) refers to the process of contacting the present moment and the thoughts and feelings it contains, without needless defence, fully as a conscious human being and, depending on what the situation affords, persisting or changing behavior in the service of chosen values.
Masuda and Lutzman (2011, p. 435)	The ability to experience whatever one is experiencing openly and fully, when doing so promotes value-directed activities.
McCracken, Williams and Tang (2011, p. 905)	The ability to actively contact negatively evaluated experiences, consciously in the present moment, in a way that is not overwhelmed by processes of interpretation and belief, from a perspective that does not equate the self with the content of thoughts or judgements, and to persist with or change behaviour as required to pursue one's goals and values, depending on what the situation affords.
Atkins and Parker (2012, p. 528)	The term psychological flexibility refers to being open and curious regarding the present moment and, depending on what the situation affords, acting in accordance with one's chosen values.
Masuda and Tully (2012, p. 66)	Psychological flexibility is roughly conceptualised as an over-arching regulation process of a) experiencing the present moment as it is without judgement and avoidance and b) persisting or changing behaviour when doing so serves valued-ends.

## Psychological Flexibility

Source	Definition
Williams, Ciarrochi and Heaven (2012, p. 1053)	Psychological flexibility is a set of dynamic processes that describes a pattern of interacting with the environment. These processes include awareness of the present moment (mindfulness), adaptation to situational demands, and the ability to shift perspective, balance competing needs, and change or maintain behaviour to pursue valued ends.
Bond, Lloyd and Guenole (2013, p. 332)	[It] refers to people's ability to focus on their current situation and based upon the opportunities afforded by that situation, take appropriate action towards achieving their goals and values, even in the presence of challenging or unwanted psychological events (e.g., thoughts, feelings, physiological sensations, images, and memories).
Fledderus, Bohlmeijer, Fox, Schreurs and Spinhoven (2013, p. 142)	Psychological flexibility is a competence that includes two mutually dependent processes: Acceptance of experiences and value-based behaviour.
Luoma and Vilardaga (2013, p. 1)	The process of contacting the present moment fully as a conscious human being and, depending on what the situation affords, persisting or changing behavior in the service of chosen values.
McCracken (2013, p. 829)	The capacity to persist with or change behaviour in the context of personal goals, psychological influence, and situational prospects.
White, Gumley, McTaggart, Rattrie, McConville and Mitchell (2013, p.7).	The ability to fully contact the present moment and the thoughts and feelings it contains without needless defence and, depending upon what the situation affords, persisting or changing in behavior in the pursuit of goals and values.
Masuda, Le and Cohen (2014, p. 31)	A general regulation process of a) experiencing the present moment as it is, without judgement and avoidance, and b) persisting with or changing behaviour when doing so serves valued ends.
McCracken and Morley (2014, p. 225)	The capacity to persist or to change behaviour in a way that 1) includes conscious and open contact with thoughts and feelings, 2) appreciates what the situation affords, and 3) serves one's goals and values.

### Psychological Flexibility

Source	Definition
McCracken, Barker and Chilcot (2014, p. 1216)	The capacity to persist or change behaviour guided by one's goals and values, and attuned to what situations afford, in a context of interacting cognitive processes and direct experiences.
McCracken, Chilcot and Norton (2015, p. 677)	The capacity to persist with or change behaviour, in a context of interacting psychological influences, in a way that serves one's goals, and is consistent with what the situation at hand allows one to achieve.
Wallace, McCracken, Weiss and Harbeck-Weber (2015, p. 235)	The capacity to persist with or change behaviour, depending on one's values and the current situation, while recognising cognitive and noncognitive influences on behaviour.
Wei, Tsai, Lannin, Du and Tucker (2015, p. 41)	Psychological flexibility is defined as the ability to contact the present moment and to change or persist in behaviour that benefits one's personal values. Being psychologically flexible involves behaving consistently with one's chosen values even in the presence of unwanted internal experiences
Whiting et al. (2015, p. 415)	The ability to persist with and/or change behaviour that is consistent with personal values while allowing difficult thoughts or feelings to occur.

### Sisu

Source	Definition
Stoller (1996, p. 154)	Perseverance and tenacity are two words used to define the Finnish characteristic of sisu, which one respondent translated as guts, courage, determination, with just a trace of Finnish stubbornness.
Lucas and Buzzanell (2004, p. 273)	Sisu (SIH-soo or SEE-soo): (1) inner determination; (2) courage, tenacity, stubborn determination, energy and a will and an ability to get things done (Kolehmainen, 1957, p. ix).
Sinkkonen (2013, pp. 49-50)	The Finnish word "sisu" is very dear to us. It is untranslatable, but it means approximately strength of will, determination, and perseverance. We want to see ourselves as modest, hard-working, no-nonsense people who do not bow or resign to anyone.

**Mental fitness**

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<b>Source</b>	<b>Definition</b>
Robinson et al. (2015, p. 56)	Mental fitness is the changeable capacity to utilise resources and skills to psychologically adapt to environmental challenges or advantages to meet psychological needs.

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*Note:* Definitions included in these lists were extracted from the systematic literature review conducted in Chapter 2 (page 24 above)

Appendix B.  
Chapter 4, Part 2 Questionnaire



### Mental Toughness

In a previous study, we asked people to tell us their views of mental toughness. Specifically, we asked them to “list the characteristics or attributes of mental toughness that come to mind.” Below are some of the responses we got. We now want to find out how important each attribute is to mental toughness. In other words...

### Typically, a mentally tough person is someone who is...

*Part 1: Social aspects*

*Please read through the entire list and then rate how typical each attribute is by circling a number between 1 (not at all typical) and 7 (extremely typical).*

	Not at all typical			Sort of typical			Extremely typical
A good leader	1	2	3	4	5	6	7
Able to accept responsibility or 'own it'	1	2	3	4	5	6	7
Able to take criticism	1	2	3	4	5	6	7
Assertive (stand up for themselves)	1	2	3	4	5	6	7
Effective communicators	1	2	3	4	5	6	7
Good at not taking things personally	1	2	3	4	5	6	7
Guided by a clear moral code	1	2	3	4	5	6	7
Humble	1	2	3	4	5	6	7

	Not at all typical			Sort of typical			Extremely typical
Independent	1	2	3	4	5	6	7
Just themselves (authentic)	1	2	3	4	5	6	7
Kind and compassionate	1	2	3	4	5	6	7
Not easily intimidated or undermined	1	2	3	4	5	6	7
Open to receiving help / support	1	2	3	4	5	6	7
Resistant to influence from others	1	2	3	4	5	6	7
Selfish	1	2	3	4	5	6	7
Trustworthy	1	2	3	4	5	6	7
Willing to make personal sacrifices for others	1	2	3	4	5	6	7

*Part 2: Goals and Motivation*

## Typically, a mentally tough person is someone who is...

*Please read through the entire list and then rate how typical each attribute is by circling a number between 1 (not at all typical) and 7 (extremely typical).*

	Not at all typical			Sort of typical			Extremely typical
Able to achieve or operate under pressure	1	2	3	4	5	6	7
Able to overcome obstacles	1	2	3	4	5	6	7
Committed	1	2	3	4	5	6	7
Confident	1	2	3	4	5	6	7
Consistent	1	2	3	4	5	6	7
Determined	1	2	3	4	5	6	7
Focused	1	2	3	4	5	6	7
Goal or purpose driven	1	2	3	4	5	6	7
Gritty (perseveres)	1	2	3	4	5	6	7
Has a desire to succeed	1	2	3	4	5	6	7
In control	1	2	3	4	5	6	7
Proactive	1	2	3	4	5	6	7
tough because they don't have a choice	1	2	3	4	5	6	7

*Part 3: Emotions***Typically, a mentally tough person is someone who is...**

*Please read through the entire list and then rate how typical each attribute is by circling a number between 1 (not at all typical) and 7 (extremely typical).*

	Not at all typical			Sort of typical			Extremely typical
Able to deal with stress and pressure	1	2	3	4	5	6	7
Able to express emotions	1	2	3	4	5	6	7
Able to see the funny side of a situation	1	2	3	4	5	6	7
Calm and in control	1	2	3	4	5	6	7
Courageous	1	2	3	4	5	6	7
Emotionally stable / strong	1	2	3	4	5	6	7
Happy	1	2	3	4	5	6	7
Patient and tolerant	1	2	3	4	5	6	7
Resilient	1	2	3	4	5	6	7

*Part 4: Psychological aspects***Typically, a mentally tough person is someone who is...**

*Please read through the entire list and then rate how typical each attribute is by circling a number between 1 (not at all typical) and 7 (extremely typical).*

	Not at all typical			Sort of typical			Extremely typical
A clear thinker	1	2	3	4	5	6	7

	Not at all typical			Sort of typical			Extremely typical
A good planner	1	2	3	4	5	6	7
A good problem- solver	1	2	3	4	5	6	7
A quick thinker	1	2	3	4	5	6	7
A rational thinker	1	2	3	4	5	6	7
A slow but good decision-maker	1	2	3	4	5	6	7
A strategic thinker	1	2	3	4	5	6	7
Able to compartmentalise / detach themselves	1	2	3	4	5	6	7
Able to control their thoughts	1	2	3	4	5	6	7
Able to learn from mistakes	1	2	3	4	5	6	7
Able to put things in perspective	1	2	3	4	5	6	7
Able to take it one step at a time	1	2	3	4	5	6	7
Able to trust / respect themselves	1	2	3	4	5	6	7
Accepting of failure / negative situations as part of life	1	2	3	4	5	6	7
Adaptable	1	2	3	4	5	6	7
Flexible	1	2	3	4	5	6	7
Good at positive self- talk (e.g., "you can do this")	1	2	3	4	5	6	7

	Not at all typical			Sort of typical			Extremely typical
Good at prioritising	1	2	3	4	5	6	7
Grateful	1	2	3	4	5	6	7
Knowledgeable	1	2	3	4	5	6	7
Likely to enjoy pressure or 'the challenge'	1	2	3	4	5	6	7
Likely to focus on controllable /positive aspects of a situation	1	2	3	4	5	6	7
Likely to take time out / escape from the situation	1	2	3	4	5	6	7
Mentally strong	1	2	3	4	5	6	7
Mindful	1	2	3	4	5	6	7
Open-minded	1	2	3	4	5	6	7
Positive (e.g., optimistic)	1	2	3	4	5	6	7
Prepared	1	2	3	4	5	6	7
Realistic	1	2	3	4	5	6	7
Religious	1	2	3	4	5	6	7
Self-aware	1	2	3	4	5	6	7
Stubborn	1	2	3	4	5	6	7

Section 5: Other

**Typically, a mentally tough person is someone who is...**

*Please read through the entire list and then rate how typical each attribute is by circling a number between 1 (not at all typical) and 7 (extremely typical).*

	Not at all typical			Sort of typical			Extremely typical
A strong character	1	2	3	4	5	6	7
Experienced	1	2	3	4	5	6	7
Healthy	1	2	3	4	5	6	7

## Appendix C.

## Full list of themes obtained from raw data in Chapter 5

Inputs	Processes		Outputs	
	Strength	Accommodation		
<b>COGNITIVE FACULTY</b>				
<b>RESOURCES</b> <ul style="list-style-type: none"> <li>• Personality</li> <li>• Stability</li> <li>• Optimism</li> <li>• Pessimism</li> <li>• Hardiness</li> <li>• Scepticism</li> <li>• Adaptability</li> <li>• Competitiveness</li> <li>• Goal orientated</li> <li>• Experience</li> <li>• Competence</li> <li>• Emotional intelligence</li> <li>• Social intelligence</li> <li>• Coping skills</li> <li>• Social support</li> <li>• Social influence (role models)</li> <li>• Emotional and motivational support</li> <li>• Nurture (supportive home life)</li> <li>• Morals and values</li> <li>• Religion</li> <li>• Physiological wellbeing</li> </ul>	<b>SPEED OF THINKING AND REASONING</b> <ul style="list-style-type: none"> <li>• Quick thinking</li> </ul>	<b>UNCERTAINTY</b> <ul style="list-style-type: none"> <li>• Comfortable with uncertainty</li> <li>• Open-mindedness</li> <li>• Trust</li> </ul>	<b>SURVIVAL</b> <ul style="list-style-type: none"> <li>• Overcoming (adversity, emotions, obstacles)</li> <li>• Resilience</li> </ul>	
		<b>QUALITY OF THINKING AND REASONING</b> <ul style="list-style-type: none"> <li>• Analytical thinking</li> <li>• Logical thinking</li> <li>• Mental clarity</li> <li>• Methodical</li> <li>• Objective thinking</li> <li>• Rational thinking</li> <li>• Realistic thinking</li> <li>• Strategic thinking</li> </ul>		<b>MAINTAIN WELLBEING</b> <ul style="list-style-type: none"> <li>• Coping</li> <li>• Self-preservation</li> <li>• Relationship preservation</li> <li>* Talk about emotions</li> <li>* Self-care</li> <li>* Desist</li> <li>* Acquiesce</li> </ul>
		<b>LATERAL THINKING</b> <ul style="list-style-type: none"> <li>• Perspective</li> <li>• Creativity</li> <li>• Problem-solving</li> </ul>		<b>MAINTAIN FUNCTIONING</b> <ul style="list-style-type: none"> <li>• Consistency</li> <li>• Function under stress</li> <li>• Performance under pressure</li> <li>• Perform to potential</li> <li>* Having or showing good judgement</li> <li>* Decisiveness</li> <li>* Effective communication</li> <li>* Courage</li> <li>* Leadership</li> <li>* Assertiveness</li> <li>* Stoicism</li> </ul>
		<b>ACCUMULATION OF KNOWLEDGE AND UNDERSTANDING FROM PAST AND PRESENT, INTERNAL AND EXTERNAL</b> <ul style="list-style-type: none"> <li>• Mindfulness</li> <li>• Awareness (internal and external)</li> <li>• Reflection</li> </ul>		<b>MAINTAIN POSITIVE VIRTUES</b> <ul style="list-style-type: none"> <li>* Authenticity</li> <li>* Honesty</li> <li>* Integrity</li> <li>* Responsibility/Accountability</li> <li>* Altruism</li> <li>* Generosity</li> <li>* Kindness</li> </ul>
	<b>STRESSORS - EXTERNAL</b> <i>General</i> <ul style="list-style-type: none"> <li>• Challenges</li> <li>• Negative situations</li> <li>• Everyday stressors</li> <li>• Difficult situations</li> <li>• Stress</li> <li>• Adversity</li> </ul>	<b>COGNITIVE MAINTENANCE</b> <ul style="list-style-type: none"> <li>• Maintain mental clarity</li> <li>• Maintain objectivity</li> <li>• Maintain rationality</li> <li>• Maintain logic</li> </ul>		
	<i>Social stress</i> <ul style="list-style-type: none"> <li>• Conflict/confrontation/criticism</li> <li>• External opposing forces</li> <li>• Difficult personal relationships</li> <li>• Oppression</li> <li>• Social pressure</li> <li>• Rejection</li> </ul>			
		<b>CONATIVE FACULTY</b>		
		<b>AWARENESS OF NEEDS</b> <ul style="list-style-type: none"> <li>• Selfishness</li> </ul>	<b>AWARENESS AND PROMOTION OF OTHERS' NEEDS</b> <ul style="list-style-type: none"> <li>• Selflessness</li> <li>• Humility</li> </ul>	<b>STRIVING</b> <ul style="list-style-type: none"> <li>• Goal maintenance</li> <li>* Persistence / grit</li> <li>* Perseverance</li> <li>* Endurance</li> <li>* Hard work</li> </ul>
	<i>Goals</i>	<b>AWARENESS OF THE "POSSIBLE SELF" - DEFINITION</b>	<b>UNFULFILLED NEEDS</b>	

Inputs	Processes		Outputs
	Strength	Accommodation	
<ul style="list-style-type: none"> <li>• Deadlines</li> <li>• Obstacles/problems</li> <li>• Interruptions/distractions</li> <li>• Negative outcomes (mistakes, failures)</li> <li>• Defeat</li> </ul>	<ul style="list-style-type: none"> <li>• Ambition</li> <li>• Purpose</li> <li>• Goal setting</li> <li>• Visualisation of outcomes</li> <li>• Goal clarity</li> <li>• Vision</li> </ul>	<ul style="list-style-type: none"> <li>• Patience</li> </ul>	<ul style="list-style-type: none"> <li>* Stubbornness</li> </ul>
<p><i>Time-poor or high stake situations</i></p> <ul style="list-style-type: none"> <li>• Pressure</li> <li>• Emergencies</li> <li>• Crises</li> </ul>	<p>AWARENESS OF THE “POSSIBLE SELF”- SELF CONCEPT</p> <ul style="list-style-type: none"> <li>• Confidence</li> <li>• Self-esteem</li> <li>• Self-belief</li> <li>• Self-efficacy</li> </ul>	<p>UNCONTROLLABLE INTERNAL AND EXTERNAL ENVIRONMENTS</p> <ul style="list-style-type: none"> <li>• Acceptance</li> <li>• Faith</li> <li>• Flexibility</li> <li>• Self-compassion</li> </ul>	<p>THRIVING</p> <ul style="list-style-type: none"> <li>• Growth</li> <li>• Innovation</li> <li>• Success</li> <li>• Achievement</li> </ul>
<p><i>Psychological and ethical challenges</i></p> <ul style="list-style-type: none"> <li>• Change</li> <li>• Uncontrollable situations</li> <li>• Poor odds of success</li> <li>• Situations that are out of control</li> <li>• Unexpected events/outcomes /traumas</li> <li>• Difficult decisions</li> </ul> <p>Unpleasant/inconvenient/unenjoyable but necessary tasks</p> <p>Unethical or unfair situations</p>	<p>VOLUNTARY ATTENTION</p> <ul style="list-style-type: none"> <li>• Focus</li> <li>• Concentration</li> </ul> <p>GOAL PATHWAY</p> <ul style="list-style-type: none"> <li>• Prioritisation</li> <li>• Planning</li> <li>• Preparation</li> </ul> <p>VOLITION – FREEDOM TO CHOOSE THOUGHTS AND AFFECT</p> <ul style="list-style-type: none"> <li>• Independence from external and social pressures</li> <li>• Detachment from outcomes and situations</li> <li>• Less empathy</li> <li>• Forgiveness</li> </ul>	<p>EMOTIONAL ATTACHMENT</p> <ul style="list-style-type: none"> <li>• Empathy</li> <li>• Compassion</li> </ul>	
<p><i>STRESSORS - SPECIFIC</i></p> <p>Waiting</p> <p>Multi-tasking</p> <p>Work/family conflicts</p> <p>Witnessing/experiencing trauma</p> <p>Stressful job</p> <p>Responsibilities</p> <p>Studying</p> <p>Bereavement</p> <p>Helping others in distress</p> <p>Caregiving</p> <p>Military training</p> <p>Financial strain</p>	<p>VOLITION – CONTROL OVER AFFECT</p> <ul style="list-style-type: none"> <li>• Emotional control</li> <li>• Self-soothe</li> <li>• Unemotional</li> <li>• Rationalisation</li> <li>• Emotional suppression</li> <li>• Regaining emotional control</li> <li>• Gratitude</li> <li>• Humour</li> </ul>		
<p><i>STRESSORS - INTERNAL</i></p> <p><i>Physical</i></p> <p>Fatigue</p> <p>Pain</p> <p>Illness</p> <p>Discomfort</p>	<p>VOLITION – CONTROL OVER ACTIONS</p> <ul style="list-style-type: none"> <li>• Self-discipline</li> </ul>		
<p><i>Psychological</i></p>			

Inputs	Processes		Outputs
	Strength	Accommodation	
Mental fatigue	• Self-control		
Uncertainty	• Self-motivating		
Uncontrollability			
Threat to wellbeing	VOLITION – CONTROL		
Mental illness	OVER THOUGHTS		
Poor motivation	• Thought control		
Self-doubt and other	• Cognitive distancing		
negative beliefs	• Thought blocking		
	• Cognitive reframing		
<i>Emotional</i>	• Directed forgetting		
Disappointment	• Break through mental		
Fear	barriers		
Guilt			
Sadness	VOLITION – CONTROL		
Emotional fatigue	OVER		
	ENVIRONMENT		
	• Proactive		
	• Avoid distractions		
	CONATIVE		
	MAINTENANCE		
	• Maintain focus		
	• Maintain self-esteem		
	• Maintain self-belief		
	• Maintain control		
	Maintain self-control		
	<b>AFFECTIVE FACULTY</b>		
	POSITIVE AFFECT	NEGATIVE AFFECT	
	• Positivity	• Detachment from	
		emotions and pain	
	ABSENCE OF STRONG	• Independence from	
	EMOTION	thoughts and	
	• Calm	emotions	
	ABSENCE OF		
	NEGATIVE AFFECT		
	• Fearlessness		
	ENERGISING AFFECT		
	• Motivation		
	• Challenge		
	• Desire		
	• Commitment		
	• Obsession		
	• Determination		
	• Energy		
	• Driven		
	AFFECTIVE		
	MAINTENANCE		
	• Emotional stability		
	• Maintain positivity		

---

<b>Inputs</b>	<b>Processes</b>		<b>Outputs</b>
	<b>Strength</b>	<b>Accommodation</b>	
	<ul style="list-style-type: none"><li>• Maintain calm</li></ul>		
	Maintain motivation		

---

*Note:* \* behavioural outputs

## Appendix D.

## AUTECH approval for lay prototype analysis of mental toughness (Chapter 4)



26 May 2015

Aaron Jarden  
Faculty of Health and Environmental Sciences

Dear Aaron

Re Ethics Application: **15/148 Mental toughness in lay contexts: Improving conceptual, empirical and practical utility of MT for everyday populations.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTECH).

Your ethics application has been approved for three years until 25 May 2018.

As part of the ethics approval process, you are required to submit the following to AUTECH:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 25 May 2018;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 25 May 2018 or on completion of the project.

It is a condition of approval that AUTECH is notified of any adverse events or if the research does not commence. AUTECH approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTECH grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz).

All the very best with your research,

A handwritten signature in black ink, appearing to read 'Kate O'Connor'.

Kate O'Connor  
Executive Secretary  
Auckland University of Technology Ethics Committee

Cc: Sarah van Rooyen [sarahvanrooyen@gmail.com](mailto:sarahvanrooyen@gmail.com)

A u c k l a n d   U n i v e r s i t y   o f   T e c h n o l o g y   E t h i c s   C o m m i t t e e

WA606F Level 5 WA Building City Campus

Private Bag 92008 Auckland 1142 Ph: +64-9-921-9999 ext 3318 email [ethics@aut.ac.nz](mailto:ethics@aut.ac.nz)

## Appendix E.

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Gucciardi et al. (2008),

Figure 1-1 (page 7 above)

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**Title:** Towards an Understanding of Mental Toughness in Australian Football  
**Author:** Daniel F. Gucciardi, Sandy Gordon, James A. Dimmock  
**Publication:** Applied Sport Psychology  
**Publisher:** Taylor & Francis  
**Date:** Jul 18, 2008  
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Gucciardi et al. (2009a), Figure 1-2 (page 8 above)

The screenshot shows the Copyright Clearance Center RightsLink interface for a 2009 article. The layout is identical to the previous screenshot, but with the following article details:

**Title:** Advancing mental toughness research and theory using personal construct psychology  
**Author:** Daniel F. Gucciardi, Sandy Gordon, James A. Dimmock  
**Publication:** International Review of Sport and Exercise Psychology  
**Publisher:** Taylor & Francis  
**Date:** Mar 1, 2009  
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Coulter et al. (2010), Figure 1-3 (page 10 above)

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**Author:** Tristan J. Coulter, Clifford J. Mallett, Daniel F. Gucciardi

**Publication:** Journal of Sports Sciences

**Publisher:** Taylor & Francis

**Date:** May 1, 2010

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Rusk and Waters (2013), Figure 1-4 (page 13 above)

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**Title:** Tracing the size, reach, impact, and breadth of positive psychology

**Author:** Reuben D. Rusk, Lea E. Waters

**Publication:** Journal of Positive Psychology

**Publisher:** Taylor & Francis

**Date:** May 1, 2013

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