Can We Help Adolescents Improve Their Mental Health with a Healthy Diet? A Formative Study

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Co Authored Works

Wardle, C., Schofield, G., Crofts, C., (2023) *Can School Guidance Counsellors Promote Healthy Eating to Improve Adolescent Mental Wellbeing?*

Wardle, C., Schofield, G., Crofts, C., (2023) *Will Adolescents Eat a Healthy Diet to Improve Adolescent Mental Wellbeing?*

The contributions for the papers are as follows:

Study 1: *Can School Guidance Counsellors Promote Healthy Eating to Improve Adolescent Mental Wellbeing?*

Wardle, C, (80%) Schofield, G, (10%) Crofts, C, (10%)

Study 2: *Will Adolescents Eat a Healthy Diet to Improve Adolescent Mental Wellbeing?*

Wardle, C, (80%) Schofield, G, (10%) Crofts, C, (10%)

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Attestation of Authorship

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

Christine Wardle

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Abstract

Adolescents are overrepresented in current global mental health statistics. As most mental illnesses begin in adolescence, this is likely to increase the burden of mental illness for subsequent generations. Under resourcing of mental health care provision means many adolescents do not receive appropriate care and many cases go untreated. Furthermore, mental health care operates on a deficit model, which creates a dependency paradigm and does not address the causes of poor mental health in this age-group.

Although there are multiple causes of poor mental health in adolescents, recent research has found a significant connection between poor diet and mental illness. High consumption of ultra-processed food means adolescent diets, overall, are not meeting the nutritional requirements for optimal brain function. This is causing neurological disturbances which are manifesting in mood disorders, especially anxiety and depression. There is a strong likelihood that therapeutic dietary intervention would significantly reduce the burden of mental illness in adolescents.

Eliciting dietary change in adolescents could be challenging. Current research suggests unhealthy eating is driven by impulsivity and risk-taking behaviour which is prevalent in this age-group due to their stage of neurological development. Therefore, we need to determine how dietary behaviour change could be effected in this age-group, either through current health-care providers or by motivating adolescents themselves to make autonomous dietary changes.

This thesis used two qualitative formative studies to explore possible scenarios for dietary intervention to promote adolescent mental wellbeing. The first was the potential for school

guidance counsellors to incorporate therapeutic dietary intervention into their therapeutic practice; the second was for adolescents to autonomously change their dietary behaviour. The overall aim was to determine the feasibility, and the structural and delivery points of a dietary intervention in the interests of adolescent mental wellbeing. Further aims of the two studies were to understand participants' knowledge of the relationship between diet and mental wellbeing. Additionally, they determined motivators and barriers to healthy eating and how dietary change could be effected in adolescents in the interests of mental wellbeing.

Both studies used the interpretivist theoretical framework. Data were interpreted in relation to recent cohort studies in this field.

The following themes (in bold) were constructed from the data using thematic inductive analysis:

Study 1:

Guidance counsellors' **knowledge** of the relationship between diet and mental health was based on **inherent beliefs** and there was **inconsistency** between inherent beliefs and professional practice. They were unwilling to use therapeutic dietary intervention because it was not a prescribed **therapeutic modality**. They also believed that approaching sensitive issues, such as diet, may adversely affect their **therapeutic relationships**.

Guidance counsellors identified that **multiple factors influenced adolescent diet**. The **influence of food marketing** and **cost** were significant barriers to healthy eating. Guidance counsellors believed eating **'bad' food was better than no food** and it was acceptable to eat **everything in moderation.**

A significant finding was that therapeutic dietary intervention was not within guidance counsellors' **scope of practice**. Lack of training and professional development meant they were not ready and lacked a remit to give such advice. Therefore, **school wide approaches** should be used for dietary intervention.

Overall, guidance counsellors did not have the necessary skills and knowledge to implement a therapeutic dietary intervention to improve adolescent mental wellbeing.

Study 2:

Adolescents showed they would make autonomous **(autonomy)** healthy dietary choices when they were **empowered** through **knowledge** about how diet could improve their mental wellbeing. **Connecting** negative experience to unhealthy eating steered them towards healthier eating.

Ethics and **heteronomy** were also the basis of autonomous choices. Adolescent rebellious tendencies could be directed towards positive dietary behaviour, provided adolescents believed it was beneficial.

Autonomous dietary behaviour change was not entirely possible, however, because they were still subject to **parental influence**. Dietary behaviour change depended on how willing or able parents were to support them.

The studies showed dietary intervention was a feasible therapeutic strategy for adolescents with mild to moderate mood disorders; however, delivery was not within guidance

counsellors' scope of practice, knowledge or skill base. Guidance counsellors were not the most appropriate professionals to conduct a dietary intervention. Therefore, it would be necessary to consider alternative providers, potentially outside the school setting. Although adolescents demonstrated they could be motivated to make autonomous healthy dietary choices, overcoming heteronomous barriers to healthy eating was not entirely possible without the support of parents.

Future formative research is needed to determine whether parents could support adolescent dietary change. A subsequent phase would involve conducting effective implementation research across multiple settings to determine the efficacy of a dietary intervention in assisting adolescents with mood disorders.

1. Introduction

The Global Burden of Mental Illness

Mental illness has become a global epidemic in recent years. The World Health Organization (WHO) now considers it to be the leading cause of disability in the developed world (WHO, 2020). Rates of mental illness have increased exponentially in the last decade and the WHO estimates approximately 1 in 4 people suffer from a diagnosed mental health disorder. This places a US$1 trillion cost burden on global health care systems (WHO, 2020).

Adolescents are overrepresented in global mental illness statistics. Due to their stage of neurological development, they are more vulnerable to exogenous stresses and therefore prone to mental illness. Anxiety and depression are the most common disorders in this age group (Kessler et al, 2012; Marikana's et al, 2010) with an estimated 24% diagnosed in New Zealand (NZ) (Bowden, 2020). It is believed figures are much higher due to underdiagnosis. Female adolescents are especially vulnerable and are twice as likely as male adolescents to become sufferers. Suicidality is more common in male adolescents (New Zealand Ministry of Health (MoH), 2020). Current MoH statistics show suicide rates at 22.1 per 100,000 in NZ male adolescents compared to 7.0 per 100,000 for female adolescents.

As many mental illnesses begin during adolescence, failure to address adolescent mental illness will escalate the social burden in subsequent generations (Kessler et al, 2007). Increasing rates of mental illness suggest current treatments are not effective. Typical therapies focus on developing resilience to trauma through cognitive and pharmacological remedies. These neglect other contributing environmental factors, which are not necessarily trauma based, but still distort the neurological mechanisms which underpin mental wellbeing. Consequently, current treatments have low efficacy and rather than promote recovery, lead to people living with life-long mental health conditions (Moncrieff, 2013).

The Link between Diet and Poor Mental Health

Evidence is emerging that lifestyle factors significantly contribute to poor mental health (Firth, 2020; Jacka et al, 2017; Sarris 2019). Diet, especially, has become the focus of research on the pathology of mental illnesses and there is evidence that it might, in fact, be the leading cause (Jacka et al, 2017). This is plausible because nutrients play a key role in maintaining the neurological mechanisms which support resilience to psychological stress (Miyagi, 2020; Feldman, 2020; Gomez-Pinilla, 2008). Excessive junk food consumption in adolescents is a reliable explanation as to why rates of mental illness are higher in this age-group; adolescent brains are more vulnerable to neurological distortions caused by excessive sugar consumption due to the ongoing development and maturation of the brain during this period (O' Neil et al, 2014).

Although research demonstrating the connection between poor mental health and diet is strong, little research has been done to show a healthy diet can remediate mental illness (Sarris et al, 2022). Consequently, dietary intervention is not considered as a viable treatment option in mainstream healthcare. Dietary intervention may provide a long-term, sustainable solution to the current global mental health epidemic (Sarris et al, 2022). Therefore, implementation research is critical in developing an understanding of how adolescents can promote mental well-being through dietary change (Jacka et al, 2017).

Recent evidence has linked poor diet quality to the global increase in adolescent mood disorders (Hinchliffe, 2016; Jacka 2017; Opie, 2018). Jacka (2017) found diet exceeds other social, economic, and family factors in determining mental health. Animal studies support the hypothesis that consumption of refined processed carbohydrate is exacerbating neurological distortions caused by stress-induced glutamate excitotoxicity in the developing brain (Arain, 2013; Malter, 2013). Research into the neurological mechanisms which cause mental illness in adolescents is currently lacking; however, adult studies have helped determine how mental illness occurs, especially when there is high dietary intake of refined carbohydrate (Firth, 2019).

It is well known that mood disorders result from frequent activation of the stress response in the brain when exogenous threats are perceived (Cowen, 2013). Over time, this leads to neurological damage to key limbic systems which regulate autonomic or endocrine function in response to emotional stimuli and are also involved in reinforcing behaviour (Cowen, 2013). Animal studies suggest that acute exposure to stress

increases glutamate release in these areas of the brain, leading to glutamate excitotoxicity which causes neuronal death (Popoli, 2011).

Nutritional deficits caused by diets comprising highly processed refined carbohydrates (Standard American Diet (SAD)) exacerbates disruptions to neurocircuitry because the bioavailability of key nutrients involved in reducing inflammation and restoring limbic neurocircuitry is reduced (Asensi, 2023). Repeated stress responses maintain elevated levels and this, over time, leads to atrophy and loss of key limbic and corticoid circuitry. This contributes to behavioural abnormalities associated with depression (Filatova, 2021).

During adolescence, the brain is undergoing a phase of neuroplasticity, meaning it is more vulnerable to exogenous stress (Arain, 2013). Furthermore, adolescents are also more prone to glutamate excitotoxicity because the main inhibitory neurotransmitter, GABA, which mediates glutamatergic action in the brain, is underdeveloped (Arain, 2013). Evidence is emerging that dietary strategies are not only superior in mediating mood disorders than conventional drug-based therapies; they also support the development of neurological mechanisms for healthy brain development (Lachance, 2015). Adult studies have shown nutritional supplementation can mediate mood disorders (Rucklidge 2013). Furthermore, studies have shown symptoms of anxiety and depression were improved in adults (age >18) who adopted a healthy diet (Francis, 2019; Jacka, 2017). Similar results may be found in adolescents because similar pathologies cause mood disorders in adults and adolescents.

Therapeutic Dietary Intervention

Therapeutic dietary intervention is promising as a treatment pathway for mental illness, although research demonstrating its efficacy is lacking. Interventions using micronutrient supplementation have demonstrated that optimising nutritional intake can remediate mental health issues (Kaplan and Rucklidge, 2015). In these trials, micronutrient supplementation was four to eight times higher than recommended by national Nutrient Reference Value requirements (NVIs). This suggests that nutritional requirements for poor mental health sufferers are significantly higher than current nutritional recommendations, although precise requirements are not confirmed.

Achieving these levels through diet alone could be difficult; however, there was no dietary modification in these studies, therefore it is possible that a high intake of micronutrient supplements in these studies could have been compensating for ultra-processed foods depleting nutrients (Jacka et al., 2010). Therefore, a dietary intervention would need to eliminate ultra-processed foods entirely to ensure nutrient intake from whole foods is not compromised.

Health promoting behaviour can be challenging in adolescents with mood disorders. Research suggests this can be achieved with a well-planned intervention strategy (Hoying et al., 2015). Findings support The Healthy Active Lives (HeAL) international consensus statement that early dietary intervention can reduce the likelihood of developing long-term mental illness (International Inc., n.d). A qualitative study involving adolescents with mood disorders would provide further understanding of how beliefs, attitudes, knowledge, barriers, and motivators may be affecting dietary choices that are contributing to poor mental health in adolescents.

Pharmacological Treatments

The use of psychotropic medications in adolescents is a controversial topic among health practitioners. Although research has raised doubts over the efficacy of pharmacological treatments, in NZ approximately 25% of adolescents with mood disorders are treated with psychotropic medications (Bowden, 2020). This is a concern because the long-term neurological damage caused by taking psychotropic medications outweigh the benefits (Mohn et al., 2018). Psychotropic medications have been shown to reduce the bioavailability of micronutrients required for healthy brain function and development (Mohn et al., 2018). Long-term use can lead to neurological damage over time and increase the risk of comorbidity.

While psychotropic medications aim to normalise neurological pathways associated with negative mood, by regulating serotonin transmission in the brain, the lack of data on how they affect the mechanisms of the adolescent brain raises concerns about potential harm, particularly due to the vulnerability of the adolescent brain to pharmacological disturbance (Karanges, 2011). Furthermore, the dysregulation of glutamate, rather than serotonin, has been found to be involved in the pathophysiology of depression in adolescents, making the efficacy of psychotropic medications in this age group questionable (Moncrieff, 2022).

Studies have raised doubts over the efficacy of pharmacological treatments for adolescents with mood disorders (Cipriani et al., 2016). Poor methodology and potential bias are common in studies that suggest benefits of psychotropic medications, making it difficult to draw reliable conclusions about their effectiveness (Munkholme, 2019). Negative effects on wellbeing, including a perceived threat to autonomy, decreased self-esteem and morale, have been reported by adolescents who take psychotropic medications (Maroun, 2018). Family pressure and difficulties in going against doctors' advice can also undermine adolescents' autonomy, making it challenging for them to articulate their experiences.

Nutritional approaches to improving mental wellbeing are less risky than pharmacological treatments (Liu et al., 2018); however, obtaining reliable data on the efficacy of dietary interventions through randomised controlled trials is challenging due to various factors, such as difficulty in controlling participants' diets and compliance issues (Liu et al., 2018; Sarris et al., 2022). Qualitative research can help to identify potential barriers and motivators affecting dietary choices and adherence to dietary interventions, and to improve the efficacy of future studies on dietary interventions for adolescent mental wellbeing (Gorin et al., 2017).

Guidance Counsellors

Guidance counsellors play an important role in supporting student well-being, mental health, and academic achievement in schools (Hughes, 2019). They deal with a wide range of issues faced by adolescents, including substance abuse, bullying, and mental health. The increasing rates of adolescent mental illness have made it challenging for guidance counsellors to keep up with the changing nature and complexity of cases due to under-resourcing and excessive workload (Hughes, 2019; Manthei, 2020). As a result, many students with mental health issues are unable to access help.

Dietary intervention is a promising solution to the increasing burden of adolescent mental illness on guidance services because it has the potential to remediate mental illness, rather than simply help adolescents develop coping strategies for ongoing issues (Sarris et al., 2022). Guidance counsellors could incorporate dietary intervention into their practice, and if such interventions prove successful, reduce case numbers and subsequent workload burden. For this to happen, formative research is required to ascertain how far guidance counsellors understand the therapeutic role of nutrition in ameliorating mood disorders, and how far their professional learning supports the implementation of nutritional interventions. A formative quantitative study

on the role and experience of guidance counsellors in supporting adolescents with mood disorders would be a useful addition to current knowledge about how behaviour change could be encouraged in the interest of adolescent mental health.

Statement of Problem

Poor diet has been identified as a significant risk factor for mental illness, and it could possibly be the biggest contributor to poor mental health (Berk et al., 2013; Firth et al., 2019; Jacka, 2017). Ultra-processed, or junk foods, are now estimated to make up over 50% of the average Western diet (Monteiro et al., 2013). The dominance of fast-food outlets in external environments has made it increasingly difficult to eat healthy foods away from home (Story et al., 2008). Ultra-processed foods also make up the bulk of produce in supermarkets and are much cheaper than healthy whole foods (Moodie et al., 2013). Consequently, most people's diets in the developed world are exceeding safe limits of polyunsaturated fatty acids (PUFAs) and refined carbohydrates, which are known to be significant causal factors in emotional dysregulation, leading to anxiety and depression (Firth et al., 2019; Jacka, 2017).

Misleading health information is compounding the problem of people eating excessive amounts of junk food. Current nutritional guidelines promote high carbohydrate consumption, including processed carbohydrate options, over healthy fats and proteins, which means recommended diets are not meeting the nutritional requirements for brain health (MoH, 2023; Sarris, 2019). Furthermore, current medical practice neglects diet as a therapeutic modality for mental health (Jacka et al., 2017), therefore, it is difficult for people to take responsibility for their mental wellbeing through diet.

Implementing a nutritional intervention for adolescents is challenging because their stage of neurological development makes them more prone to emotional decision making (Romeo, 2017). This makes them more likely to engage in risky eating behaviour (Hinchliffe, 2016). Exogenous factors, such as socio-economic status, peer and parental influence, also gives them less autonomy over their diet. Therefore, effecting dietary behaviour change requires adolescents to overcome several exogenous and cognitive barriers; however, recent research has shown that mechanisms in the brain which cause impulsivity can also cause prosocial behaviour (Schreuder, 2021). This could translate into healthy eating. Currently, there is no research to determine the effectiveness of an intervention using diet alone to improve mental wellbeing in this age

group. Therefore, implementation effectiveness research is important, in the first instance, to determine the feasibility of a dietary intervention and how it could be delivered.

Aims:

The aims of this formative research are to determine:

1) Whether an intervention to promote healthy eating for mental health and wellbeing in adolescents is feasible.
2) If feasible, what are the important structural and delivery points as identified by adolescents?
3) Whether the intervention could be delivered by guidance counsellors within the school context.
4) How far school guidance counsellors understand the potential of nutrition in treating mood disorders.

Aims 1 and 2 will be addressed in Study 2. Aims 3 and 4 will be addressed in Study 1.

Methodology Overview

This research will involve a two-stage qualitative formative study to provide insights into the feasibility of a dietary intervention for adolescents with poor mental health, as well as the structural and delivery points necessary for effective implementation. The first stage involves school guidance counsellors; the second stage involves adolescents aged 16 to 18 years who are in school.

The theoretical framework for the study is interpretivist (Levers, 2013). Thematic inductive analysis of focus group/interview data (Braun and Clarke, 2014) will determine guidance counsellors' and adolescents' understanding of how lifestyle affects mental health. Semi-structured interviews will be conducted one-to-one with the guidance counsellors and in focus groups of no more than five adolescents. Interviews will explore guidance counsellors' and adolescents' perceptions of the relationship between diet and mental health in adolescents. Data will be interpreted in relation to recent cohort studies in this field (Jacka, 2017: Kulkarni, 2015; Malter, 2013). Thematic inductive analysis (Braun and Clarke, 2014) will determine common themes relating to guidance counsellors' and adolescents' knowledge of how diet affects mental health, and how willingly adolescents would change their diet, to improve their mental health.

Positionality

The researcher acknowledged how she positioned herself in relation to the research through reflexivity (Pitard, 2017). This study and research journey was informed by quantitative findings (from clinical trials), personal experience as a teacher and caregiver for people of this age suffering poor mental health, her own nutrition and health journey, and a desire to effectively translate trial findings into real world action which will be measured quantitatively.

Significance of Research

This research is an essential step in translating research findings on the relationship between diet and mental health into practical, effective, and sustainable interventions that can improve the mental wellbeing of adolescents. It will help determine whether dietary intervention can be incorporated into treatment modalities currently used by school guidance counsellors. By understanding the beliefs, attitudes, and behaviours of adolescents towards diet, researchers can identify potential barriers and facilitators to the intervention's success. Additionally, formative research can help refine the intervention's design and delivery to ensure it meets the specific needs and preferences of the target population. More broadly, the research can be used to inform ministerial policy on promoting mental wellbeing among adolescents.

Study Delimitations

Specific parameters were identified as delimitations of this research and should be considered when interpreting these results or applying them to other situations. School guidance counsellors were recruited throughout New Zealand. The recruitment parameters remained within the context of schools' learning support. Adolescents aged 16 – 18 years currently attending school were recruited for this study. Adolescents were recruited from South Auckland and North Waikato and included urban, suburban and rural adolescents. Adolescents included a cross-section of ethnic groups, including Maori, Pakeha, Asian, and European migrants.

Thesis Outline

The intention of this research is to present the findings to those who will benefit from them; therefore, this thesis is presented in a 'manuscript format'. This thesis is presented as a sequential progression of studies arranged in a series of chapters. The Literature Review, followed by two research papers, represent a comprehensive understanding of the current burden of mental illness, globally and in New Zealand. Especially in relation to adolescents, the research determines: how poor diet affects adolescent mental illness; and the potential involvement of school guidance counsellors in delivering a dietary intervention as part of their therapeutic practice for adolescents with mental health issues. Chapters 3 and 4 have been prepared as, or adapted from, papers to be published in peer-reviewed journals. As such, repetition of information may occur. The reference styles for this thesis is APA Edition 7th style.

2. Literature Review

An Overview of the Global Mental Health Crisis and in New Zealand

The Global Picture of Mental Health

The increasing prevalence of mental illness is a significant public health concern. Over the last 50 years, global mental illness has risen and is now one of the leading causes of disability (WHO, 2022a). WHO statistics show mental illness affects nearly 800 million people globally with depression, the most common disorder, affecting 264 million people. Organisation for Economic Co-operation and Development (OECD) countries have the highest incidence. Greater economic inequality corresponds to higher rates of mental illness in individual countries (Patel, 2018). According to the WHO, mental illness can reduce life expectancy by up to 25 years and increase suicide risk by 5-8% (Bradvik, 2018). Adolescents are especially vulnerable and experience the highest rates of mental illness (WHO, 2021). As most mental illnesses start in adolescence (Solmi, 2022), rates are likely to increase in subsequent age-groups over time. The WHO has identified that about half of mental health disorders begin before the age of 14 years. Therefore, addressing adolescent mental health could provide a long-term solution to the overall global mental health crisis.

The global prevalence and burden of poor mental health costs the world economy approximately US$8.5 trillion annually in mental health service and reduced productivity (Trautman, 2016). It is projected to rise to US$6 trillion by 2030 (Saha, 2021). On average, spending on mental health, directly or indirectly, comprises 5% of GDP in OECD countries. Rising rates of mental illness show increased spending is not fully addressing the mental health crisis. In NZ, the 2022 Mental Health Commission Report showed an additional NZ$1.9bn spending on mental health services had resulted in no change to service access.

Bromet (2011) suggested OECD countries have higher rates of mental illness because their more advanced health care systems allow more cases to be diagnosed. This over simplistic view does not consider estimates that over 36% of cases in OECD countries go undiagnosed and over 50% of cases go untreated in poorer countries outside the OECD. Therefore, the true extent of mental illness is unknown (McKenzie, 2004) and the systemic failure to address the mental health crisis is global. McKenzie (2004) asserts that advanced nations can learn from developing countries how social mechanisms can be used to develop resilience as a

prevention strategy; however, this does not properly examine how populations become more resilient to mental illness.

Failure to adequately address mental health issues creates a significant socio-economic burden (OECD, 2021). Countries with higher direct spending on mental health services achieve better mental health outcomes (OECD, 2021); however, disparities exist between individual nations in how far spending corresponds to better mental health outcomes and it is not clear how some countries achieve more equitable mental health outcomes. The efficacy of pharmacological treatments is subject to debate (Garland, 2016; Karanges, 2011a; Karanges, 2011b). OECD (2021) found that countries who employ more psychiatrists per capita and have lower prescription rates of psychotropic medication prescriptions, achieve better mental health outcomes. This suggests that psychotherapy is more effective than pharmacological approaches. Global increases in mental illness suggest current treatment models are not addressing the challenges of mental health overall (Lake, 2017). Most likely, this is due to emphasis on treatment rather than prevention.

The State of Mental Health in New Zealand

New Zealand's (NZ) level of mental health and treatment success performance is poor compared to other OECD countries (OECD, 2021) The 2017/18 New Zealand Health Survey found 16.6% of the population had been diagnosed with depression. Rates were double for females, regardless of age. The most socio-economically deprived people were 2.5 times more likely to experience psychological distress as people living in the least deprived areas, after adjusting for age, sex, and ethnicity. Māori and Pacifica had higher mental health diagnosis rates and their service use is rising disproportionately to the rest of society (Cunningham, 2018; Gibb, 2018). Adolescents had the highest rates overall.

The He Ara Oranga (2018) report on NZ's current approach to mental health and addiction recommends specific changes to improve NZ's mental health system. Its findings were based on 'voice of the people' affected by mental health issues either as service users or health care professionals. Therefore, recommendations suffer due to lack of robust research methodology. The report highlights the lack of understanding in both the public domain and mental health care providers about causes of mental illness. Its recommendations largely mimic current rhetoric and although it acknowledges the need to prevent the

occurrence of mental illness, it emphasises therapeutic solutions, not causes. Trauma and stress are cited as the main determinants of mental illness. Recommended treatments aim to resolve symptoms and prevent their reoccurrence through psychotherapy and psychotropic medications.

Recommendations are evidence-based and promote 'what works' principles. These do not address systemic failures in mental health care, but rather look to extending existing provision to more people and creating additional treatment options which are already under-resourced. The current shortfall of provision means there are not enough health professionals to provide treatments prioritised by best practice guidelines (BPACNZ, 2023; Rucklidge, 2018a). Therefore, psychotropic medications are overprescribed in place of therapies (Bowden 2020; Mulder, 2018).

Rather than address the systemic failure of the current mental health system, He Ara Oranga cites poor funding as the main cause of NZ's failure to adequately address its mental health problem. Additionally, under-resourcing of behaviour therapies has led to over-prescription of psychotropic medications in cases such as anxiety and depression where they are not recommended (Barczyk, 2019).

Providing more funding for mental health services is not sufficient to lessen the burden of poor mental health on society (Rucklidge, 2018a). It creates a dependency paradigm (Geurtzen, 2018) and increases the burden of associated comorbidities. Underfunding of mental health services has created a paradox. Currently, 1.7% of NZ GDP is spent on mental health, whereas the actual economic burden, resulting from social problems caused by mental health, is approximately 5% of GDP (He Ara Oranga, 2018). He Ara Oranga found this additional burden was caused by social problems associated with poor mental health, including criminal offending and substance abuse. Simply increasing funding for mental health services is not enough to address the burden of poor mental health on society. The underfunding of mental health services has created a paradox in which the economic burden resulting from social problems caused by mental health far exceeds the amount spent on mental health services. A more comprehensive approach is needed to address the social problems associated with poor mental health.

The failure of mental health services in NZ can be attributed to an over-reliance on standardised treatments.

Evidence-based practices (EBPs), which inform best practice guidelines, (BPG) (BPAC^{NZ}, 2016) do not sufficiently account for the social determinants of mental health. EBP is a framework for integrating the best available research evidence with clinical expertise and patient values and preference (Whāraurau, n.d.); however, it is over-reliant on evidence that supports psychotropic medications and cognitive-behaviour therapy (CBT). The research supporting EBP is not current as it was conducted prior to 2015. Since then, the evidential base for nutritional psychiatry has burgeoned, while evidence has emerged that challenges the scientific basis for treating some mental illnesses with psychotropic medications. Furthermore, EBP misrepresents some of the research that underpins BPGs (Fonagy, 2015).

The systemic failure of current mental health services demonstrates the need to shift from treatment to preventative strategies. Although the burgeoning field of nutritional psychiatry is gaining global momentum, current research is not sufficient to persuade governments to adopt dietary treatments (Marx, 2017; Rucklidge, 2018a). Perversely, substantial evidence of low efficacy and risk associated with long-term use of psychotropic medications has not encouraged governments to use them more cautiously to treat mental illness; however, implementing nutritional strategies is problematic because current practices are not sophisticated enough to promote therapeutic lifestyle intervention (Firth, 2020). The aim of this literature review is to determine how dietary intervention can be implemented to reduce the socio-economic burden of mental illness.

Can Healthy Eating Reduce the Burden of Poor Mental Health?

Several studies have found a statistically significant correlation between poor diet and mental illness (Hinchliffe, 2016; Opie, 2018; Rucklidge, 2013); Rucklidge (2022) asserts that strengthening neurological mechanisms in the brain, through optimum nutrition, underpins resilience to mental illness. Evidence that lifestyle factors, especially poor diet, exceed all other factors in determining mental health (Jacka, 2017), suggests the potential of lifestyle interventions to prevent the escalating upward trend needs to be explored. The potential for nutritional approaches to address the treatment gap, across all countries, needs greater consideration in UN sustainable development goals (Thornicroft, 2014).

Translating evidence into practice is problematic while current ministerial health literature pays lip service,

at best, to healthy diet as a mechanism for addressing mental illness (BPAC^{NZ}, 2023). BPGs prioritise healthy diet over psychotherapy and psychotropic medications but offer no guidance on how to adopt a healthy eating regime. Lifestyle factors, such as diet and exercise, are understated in EBP (Whāraurau, n.d.) and there are no guidelines other than supplementing Omega 3 fatty acids. It can be discerned that there is a mismatch between EPGs and BPGs which is causing a workplace delivery problem.

He Ara Oranga understates the role of diet in causality and its therapeutic potential is not acknowledged. During public consultation for He Ara Oranga, nutrition was named as a factor that could aid recovery from mental illness. This suggests there is growing public awareness that a healthy diet is important to mental health; however, diet was not cited in recommendations. Instead, the report focuses on the behavioural causes and consequences of mental illness, with no reference to the neurological mechanisms of mental illness. This highlights a disconnect between neurological and behavioural perspectives on mental illness. The report fails to acknowledge the burgeoning field of nutritional psychiatry and does not acknowledge that nutrition can strengthen neurological mechanisms for resilience to psychological stress. Furthermore, nutrition is not being given credence in mainstream medicine. While there is a failure to understand that mental illness is a manifest of poorly functioning neurological mechanisms, which is affected by poor diet, the mental health crisis is unlikely to be resolved.

Focusing on prevention by promoting healthy lifestyles, on the other hand, could reduce need and the related costs. Lifestyle interventions, which promote healthy eating, could be a cost-effective solution to the mental health crisis and its associated problems (Burrows, 2022). Lack of translational research is holding back its implementation in mainstream medicine.

The Inadequacies of the Current Mental Health Service

Issues with Current Mental Health Service

Mental health services are not adequately meeting the needs of NZ's adolescents (He Ara Oranga, 2018). Under resourcing means providers are not keeping up with increasing demand. Consequently, short-term solutions are offered to what can become a life-long mental-health problem. Approaches to adolescent mental health care tend to be expedient and neglect long-term implications (Gibson, 2016). Unless such disorders lead to severe social dysfunction, long-term sufferers tend to cope on their own or rely on psychotropic medications (Cunningham, 2018).

Current treatments for mental health issues in adolescents do not offer a cure but rather require life-long management, either through self-management or medical intervention. Mental illness is characterised by periods of wellness and lapse (Jacob, 2015). When symptoms reoccur, previous difficulties in navigating the health system can deter subsequent attempts to seek medical help (Cunningham, 2018).

Prolonged management of mental illnesses often increases the risk of developing neurodegenerative disorders in later life (Richmond-Rakerd, 2022), leading to a heavier burden on society and healthcare providers. Dietary intervention offers a potential cure for mental health issues, therefore, it is imperative to explore dietary intervention as an alternative therapeutic option to prevent mental health issues going beyond adolescence.

An Adolescent Treatment Modality

The failure of current strategies to improve mental wellbeing in adolescents is because therapies are based on adult models (Gibson, 2016). This may not be appropriate because adolescents have different emotional needs to adults due to their stage of psychological development. Current research has shown adolescents recognise the inadequacies of current service and are dissatisfied with mental healthcare (Gibson, 2021).

Gibson (2016) found adolescents were dissatisfied with current treatment pathways, which involve reaching out to health professionals, because it can be a lengthy process. Adolescents believed current treatment options were designed for a different generation and did not address their needs. Digitised treatments were

preferred to clinical treatments. The rationale was that young people live in a digitised world; therefore, a digital treatment paradigm would be more effective; however, findings did not consider that adult treatment also has low efficacy, therefore, failure to meet the needs of adolescents is related to the broader context of an inadequate health service. Although participants provided a legitimate critique of the current system's methodology, findings suggested that its failure was due to under-resourcing.

Experiential/Behavioural Versus Neurobiological Lens

A further possible explanation for the systemic failure of mental health treatment paradigms is that they focus on symptoms rather than cause. Emphasis on self-determinism and resilience (Perlman, 2018) are influenced by psychoanalytical narratives which underpin current treatment paradigms. These have led to distinctions being drawn between mental illness and neurological disorders in treatment modalities. Psychotherapists tend to view mental illness through an experiential and behavioural lens which overlooks the underlying neurobiological mechanisms. Consequently, psychotherapies focus on cognitive behaviour modification, as opposed to healthy neurological functioning (BPAC^{NZ}, 2023).

The neurobiological lens, on the other hand, has contributed to the view that mental illness should be treated in the same way as somatic illnesses (Malla, 2015). Gibson (2021) asserts that the subsequent perception of mental illness, as a disease, can lead to stigma that discourages adolescents from seeking help. At a time when life is meant to be characterised by youth and vitality, the possibility of having a disease has serious psychological implications for adolescents. Believing that mental illness is a disease can lead to feelings of hopelessness, helplessness, and a loss of control over their own lives. This can result in increased stigma, shame, and self-blame, which can in turn lead to social isolation and a reluctance to seek treatment. Additionally, the medicalisation of mental illnesses can contribute to adolescents believing that mental illnesses are diseases. This is because medicalisation reinforces the biological nature of illnesses.

The idea that mental illness is a disease is contentious from a neurological perspective because the underlying causes of mental health conditions are complex and multifactorial. While some mental health conditions are caused by neurological distortions, such as changes in the structure or function of the brain, this is not characteristic of all mental illnesses. Mood disorders develop in response to stress and trauma which cause neurological distortions, which can be resolved if the stress and trauma are resolved.

Chronic stress and trauma can lead to lasting changes in the brain, such as reduced neuroplasticity and impaired stress response, which can contribute to more serious mental disorders developing, such as PTSD, or severe anxiety and panic disorder. It is important to distinguish between neurological distortions and neurological damage when distinguishing between illness and disease. Mental illness should only be classed as a disease if it has been sufficiently prolonged to cause neuronal damage.

Therapeutic lifestyle intervention could reduce the stigma of mental illness being associated with disease. Firstly, it removes the medicalisation of the illness and puts the onus on the individual to be proactive in their own recovery. In turn, this can ameliorate their feelings of hopelessness and loss of control over life. Healthy diet is neuroprotective, and not only can it prevent the neurological distortions or damage caused by stress and trauma, but it can also restore neurocircuitry damaged by chronic stress and trauma. Recognising the role of lifestyle factors, such as diet, in mental health can help reduce stigma and promote a more comprehensive approach to treatment and management.

Pharmacological Treatments

Neurobiological perspectives, which emphasise that mental illnesses are caused by neurological distortions or imbalances, are the basis for pharmacological treatment of mental illness. The WHO (2021) have reported an exponential rise in psychotropic prescriptions in the last decade, however, it is difficult to determine the precise number of adolescents taking psychotropic medication globally. The most recent figures for NZ show 2,494 per 100,000 young people aged 13 - 17 take psychotropic medications (Bowden, 2020). Lack of data on the specific circumstances of prescriptions means the reasons for the increase are difficult to discern (Piovani, 2019); however, increased psychotropic medication prescriptions are indicative of a worsening adolescent mental health crisis. Guidelines for adolescents recommend they are strictly supervised and should have access to counselling while using them. Owing to the poor availability of counsellors, it is debatable whether this is happening in practice. It is likely that many adolescents are reliant on anti-depressants without additional support.

Adolescent anti-depressant use is contentious due to its poor evidence base (Hengartner, 2020). Antidepressants act to normalise neurological pathways associated with negative mood; however, this

premise is based on studies of adult brains (Wang, 2023). Data is lacking on how it affects the mechanisms of the adolescent brain. Karanges (2011) found the developmental trajectory of the adolescent brain may be particularly vulnerable to pharmacological disturbance. Furthermore, adolescent use of antidepressants can increase the risk of psychological disturbance in adulthood due to neuronal imprinting (Karanges, 2011).

Widespread use of antidepressants is based on the hypothesis that diminished activity in serotonin pathways is a pathophysiological cause of depression (Cowen, 2021). It is now known that the dysregulation of glutamate is involved in the pathophysiology of depression, as opposed to serotonin (Onaolapo, 2021). Glutamate is more abundant in the adolescent brain due to the underdevelopment of GABAergic systems which mediate glutamate transmission (Perica, 2022). Therefore, targeting serotonin systems is likely to have little or no effect on adolescent mood disorders (Cowen, 2015; Moncrief, 2022). Furthermore, disrupting serotonin transmission during a critical stage of neurological development could have dire consequences for long-term brain health (Karanges, 2011). Inhibiting serotonin reuptake can also disrupt glutamate transmission.

The paucity of neuroimaging studies involving adolescents means it is not currently known how this affects the developing brain. Disrupting neurotransmitters could destabilise synaptic pruning which is crucial for healthy brain development (Karanges, 2011). Consequently, pharmacological treatments for anxiety and depression in adolescents are likely to cause symptoms to recur in later life. Furthermore, it is now known that prolonged antidepressant use causes mitochondrial damage (Allen, 2018). Perversely, psychotropic medications cause the same neurological distortions that underlie the mental illness they are meant to treat.

Associated risks of using psychotropic medications are acknowledged in healthcare (BPAC^{NZ}, 2021); however, despite 'black box' warnings of increased risk of suicide, there is still widespread use of anti-depressants in adolescents. This is based on findings that benefits outweigh risks (Garland, 2015). Studies finding some benefit from antidepressants suffer from poor methodology, risk of bias within individual studies, and potential selective reporting (Cipriani, 2018; Holper, 2020; Munkholme, 2019). Increases in adolescent and young adult antidepressant dispensing (0–27 years of age) and suicide are more consistent with findings that anti-depressants increase the risk of suicide in young people (Whitely, 2021).

Thematic analysis of adolescent's experiences with psychotropic medications indicate they have negative effects on wellbeing (Maroun, 2018). These include: a perceived threat to autonomy; a sign of severity; a support, not a solution; and an ongoing process of trial and error (Maroun, 2018). This suggests that, although psychotropic medications are intended to aid users in managing their symptoms while undergoing therapy, they may lower self-esteem and morale. On the balance of current evidence, antidepressants do not alleviate symptoms of depression.

Gibson, (2016) reported that many adolescents take antidepressants because of family pressure and difficulties going against their doctor's advice. This undermines the autonomy that is important for recovery. Adolescents also find it difficult to articulate their experiences of using antidepressants (Gibson, 2018). Therefore, obtaining reliable data on the efficacy of antidepressants for adolescents is challenging. Although the overall efficacy of psychotropic medications is unclear, evidence suggests long-term risks outweigh benefits (Allen, 2018; Karanges, 2011).

Neurological Aspects of Mental Health

Understanding how neurological mechanisms in the brain affect mood regulation is critical to developing treatments to remediate mental illness. Current pharmacological treatments are based on a limited understanding of the neurological mechanisms of mental illness and their application has not kept up with neuroscience (Cowen; 2015; Moncrieff, 2022). Conversely, lifestyle interventions are developing in concurrence with a sound understanding of how nutrition affects the neurological mechanisms in the brain (Gomez-Pinilla, 2008). Mental wellbeing depends on the health and integrity of neuronal structures and neurotransmitter function in the brain (Gomez-Pinilla, 2007). Healthy neuronal structures are fundamental to emotional regulation because they allow the brain regions associated with emotional processing and regulation to function properly.

Neurotransmitters play a critical role in the communication between neurons, which is essential for the proper functioning of the nervous system, including emotional regulation. Mitochondria play a critical role in the proper functioning of neurons and maintaining cell homeostasis (Trigo, et al., 2022). Neurons require a constant supply of energy to carry out their various functions, including the transmission of electrical signals and the synthesis of neurotransmitters. Mitochondria are responsible for producing adenosine

triphosphate (ATP), the primary energy currency of the cell, through oxidative phosphorylation. They also play a role in regulating calcium ion levels, which are important for the proper functioning of neurons (Deutschenbaur, 2016).

Stress leads to the release of adrenaline and cortisol which increase levels of the major excitatory neurotransmitter, glutamate. When glutamate levels become too high, they can overstimulate a variety of intracellular biochemical processes resulting in increased oxidative stress and mitochondrial dysfunction (Corriera, 2023; Daniels, 2020). Mitochondrial dysfunction has been linked to various neurological disorders, including mental illnesses, which are characterised by the loss of neurotransmitter-producing neurons.

The efficacy of pharmacological treatments for mental illness is uncertain, from a neurological perspective (Cowen, 2015; Moncrieff, 2022). Therapeutic dietary intervention, on the other hand, is not associated with neurological risk. Furthermore, therapeutic dietary intervention does not carry the stigma and threat to morale of psychotropic medications. Overall, the efficacy of therapeutic dietary intervention is promising in both a neurological and experiential treatment paradigm.

Challenges in Eliciting Dietary Behaviour Change in the Interest of Adolescent Mental Wellbeing.

Several cohort studies have indicated that poor diet could be the primary risk factor for adolescent depression (Jacka, 2017). Owing to the challenges in eliciting dietary behaviour change in this age-group (Fulkerson, 2004; Hinchliffe, 2016), obtaining translational data is difficult. This is compounded by the view that trialling therapeutic lifestyle intervention is 'too risky', which presents an ethical barrier to translational research (Blampied, 2020b). The research base for dietary intervention is relatively new, and not enough is known about potential adverse events that could occur with dietary change. Adolescents with anxiety and depression are highly vulnerable and changing their diet could negatively impact their wellbeing. Adherence and compliance to dietary modifications could be challenging in this age-group. Overall, conducting randomised control trials for therapeutic lifestyle intervention is difficult (Blampied, 2020b). Withholding a nutritious diet from the control group could have ethical implications because of potential harms.

Effecting dietary behaviour change requires adolescents to overcome several exogenous and cognitive barriers. Adolescents are at a stage of neurological development which makes them more prone to emotional decision making. This makes them less able to resist impulses to eat ultra-processed food (Shriver, 2021). Adolescent neurology also makes them less likely to plan and think of the consequences of dietary choices before making them. Additionally, dietary change requires autonomy which can be challenged by exogenous influences. Exogenous factors, such as socio-economic status, peer and parental influence, affect adolescents' ability to make autonomous decisions. To overcome these issues, a dietary intervention would require careful planning, support, and guidance from responsible adults to ensure adolescents adhere to the intervention diet. The COPE Healthy Lifestyles Teen programme (Melnyk 2015) demonstrated the efficacy of implementation research and that better mental health outcomes for adolescents can be achieved with a well-planned intervention strategy (Hoying, 2015).

Adolescent Mental Health in Context.

It is widely perceived that eliciting dietary change in the interests of mental health would be challenging in adolescents (Lowe, 2020). This stems from beliefs that adolescents are irresponsible, reckless and pose a risk to themselves and society (Gibson, 2018). There is a basis for these beliefs in neurological and socio-

psychological research. Findings suggest adolescents tend to take risks and emotions influence their judgements (Jacka, 2017). This compromises their ability to make rational, health-promoting dietary choices; however, research is biased as it focuses on adolescents who have psychological issues, such as mood disorders. There is a lack of comparative data on mentally healthy adolescents. Furthermore, adolescents can act responsibly. This is supported by recent neuroimaging studies which found that the same mechanisms that govern impulsive or risky behaviours can promote prosocial behaviours (Schreuders, 2019).

Adolescents suffering from mood disorders are more likely to engage in risk taking behaviour and emotional decision making (Sanci, 2018). This should not predetermine societal opinions about all adolescents. Nor should it typify assumptions about those suffering from mood disorders. Adolescents suffering from poor mental health are not always outwardly symptomatic (Gibson, 2021). Often, psychological issues are internalised and do not manifest in distress or erratic behaviour. How mood disorders are expressed depends upon the context in which their psychological problems developed. Common factors typically cause anxiety and depression in adolescents. These include peer relationship breakdowns, bullying, poor academic performance, racism, social and domestic violence, and sexual abuse. Adolescents in lower socio-economic areas are more likely to be exposed to social and domestic violence, sexual abuse, and substance misuse (Karamanos, 2022). This translates into higher rates of severe misbehaviour in lower decile schools. On this basis, it is presumable that lower decile schools would have higher rates of poor mental health. School guidance services are universally oversubscribed, suggesting otherwise. This reflects needs not being met due to under resourcing, rather than mental illness rates having parity across all socio-economic groups. Although adolescents from more affluent backgrounds are less likely to be exposed to severe environmental threats, the issues facing them should not be trivialised.

There are commonly held views that adolescents are entitled and have a ‘safer’ existence than previous generations who lived through war and experienced extreme poverty (Gibson, 2021). Most adolescents reside in a socio-cultural environment which exposes them to more stresses than previous generations (Gibson, 2021). Adolescents face more uncertainty than millennials and the generation before them about their futures (Gibson, 2021). Economic security is no longer guaranteed by achieving a high standard of education. The threat of climate change to humanity is a further cause of stress for this age-group. In their immediate environment, there is a greater risk of being a victim of crime, exposure to illegal drugs and risky

use of social media. These societal threats have manifested in global rates of adolescent mental illness which exceed 20% (WHO, 2022a). Despite high exposure to these exogenous stresses, most adolescents are resilient and make sensible autonomous choices (Gibson, 2021).

Overcoming Barriers to Nutritional Intervention

Developing resilience to exogenous stresses is the focus of mental health therapeutic practice (Dray, 2021; Padesky and Mooney, 2012). Resilience depends on cognitive functions that are underpinned by neurological processes (Hunter, 2017). Emotional decision making and risk-taking behaviour are indicators of poor mental health (Fulkerson, 2004) and need to be tackled at neuro-cognitive level. Good nutrition is fundamental to the effectiveness of this neuro-cognitive relationship (Jacka, 2017). Although evidence is emerging that poor diet is the greatest contributor to poor mental health (Jacka, 2015), it is largely ignored in therapeutic practice. It is probable that this is caused by reliance on pharmaceuticals (Bowden, 2020), perceived difficulties in eliciting dietary change (Jacka, 2017), and a general lack of awareness of the therapeutic potential of nutrition. Understanding dietary behaviour in adolescents is complex (Borracino, 2016; Bugge, 2016; Glover, 2020). Adolescent engagement with food is determined by the interplay of social, economic and psychological influences and intergenerational relationships (Glover, 2020). An important theme emerging in research is the relationship between poor emotional regulation and unhealthy eating (Miccoli, 2018; Shriver, 2020; Vega-Torres, 2020).

Targeting Emotional Regulation

Targeting emotional regulation has contributed to the effectiveness of campaigns to reduce risk-taking behaviours, such as smoking and alcohol abuse in this age-group (Hafstad, 1997; Pechmann, 2006). Therefore, similar interventions may be effective in reducing junk food consumption. The success of anti-smoking campaigns shows adolescents can resist health-compromising behaviours when informed of the risks (New Zealand Records Lowest Smoking Rate Ever, 2022). Anti-smoking campaigns are targeted at the general population. This suggests societal trends in adult populations affect adolescent behaviour (White, 2003). Therefore, raising adult awareness could be instrumental in changing adolescent dietary habits in the interest of mental wellbeing. Healthy eating does not have the same momentum as anti-smoking campaigns despite findings that excessive consumption of ultra processed foods has major detriments to health (Cotter, 2021; Monteiro and Cannon, 2022). This is most likely due to an over-reliance on pharmaceuticals to treat

chronic disease and mental illness and a lack of understanding of how diet can affect mental health. Furthermore, modern lifestyles have led to an overdependence on ultra processed foods (Scrinnis, 2020). Eliciting dietary change in the interest of mental wellbeing would require a substantial shift in cultural norms and practices.

Findings from the COPE intervention strategy (Hoying, 2015) showed healthy life-style scores could be improved in early adolescents through a carefully planned programme involving cognitive behaviour therapy (CBT). The study addressed several risk factors for poor mental health, including sleep, nutrition, exercise, and positive mindset. Meta-analysis of 11 studies found nutrition and physical activity had the greatest effect on mental health and provided a framework for the research (Hoying, 2015). Findings from the control group showed education alone is insufficient to elicit behaviour change in adolescents; participants needed to develop positive emotions around behaviours to effect long-term change (Hoying, 2015). This suggests emotional decision making needs to be targeted at a cognitive level for adolescents to be able to make autonomous lifestyle choices in the interests of mental health.

The COPE intervention (Hoying, 2015) also indicated support from adults could increase the success rates of life-style intervention in improving adolescent mental wellbeing; however, it was not clear in research outputs how far parental participation influenced outcomes for adolescents. Given the socio-cultural proximity of parents to participants, this would have been helpful in determining the degree to which exogenous influences affected their behaviour change. Furthermore, the study targeted early adolescents aged 11 to 13 (Hoying, 2015). Older adolescents typically become more socially and emotionally distant from their parents. Gibson (2018) found that adolescents prefer their parents not to know they are seeking help for mental health issues. This could present a further barrier in eliciting dietary change in the interests of mental wellbeing because parental support would be required to meet the costs and provide resources for dietary change. Further research is needed to determine whether a similar intervention to the COPE programme would be effective in an older adolescent cohort.

Adolescent Autonomy

Distancing from parents does not mean adolescents have full autonomy from parental influence, especially when making dietary choices. US data shows parents' economic circumstances and beliefs largely determine

adolescents' diet (Fulkerson, 2008); however, this may not apply to all meals. Parents' work commitments determine how much independence adolescents have over breakfast and lunch (Reicks, 2015). These meals are typically provided outside the home and tend to be convenient and nutritionally poor (Golper, 2021). Conversely, lack of adult supervision of adolescents' meals can mean they go without food throughout the day. This is more typical in females who skip meals to reduce their calorie intake due to concerns over body image (Story, 2002).

Gibson's (2021) research highlighted that in NZ, a significant barrier to eliciting dietary behaviour change to improve mental wellbeing in adolescents, is their lack of understanding of the link between diet and mental health. Participants' responses focused on how treatment options could be changed to fit youth culture (Gibson, 2021). A shortcoming of Gibson's research is that it focuses on a cohort who may not have the emotional literacy to determine what works in the interests of their mental wellbeing. Gibson's findings could be distorted, therefore, because the cohort were adolescents with mood disorders, and less likely to provide reasoned responses. The research design is aligned to treatment paradigms rather than prevention (Gibson, 2018). Although it is important to consider adolescents' beliefs when designing treatment pathways, it would also be helpful to consider what healthy adolescents believe contributes to their mental wellbeing.

It is advantageous that adolescents can exercise autonomy when dealing with mental health issues. Evidence suggests their therapeutic preferences are determined by their experience and knowledge of therapeutic practice (Gibson, 2021). Therapeutic lifestyle intervention is absent from Gibson's (2021) recommendations because participants are unaware of the relationship between lifestyle and mental health. Raising the profile of therapeutic lifestyle intervention in health literature would be helpful in assisting adolescents' autonomous choices in the interests of mental wellbeing. It is important for influential adults to know about the relationship between lifestyle and mental wellbeing because they play a key role in imparting such knowledge to adolescents.

Poor Information and Lack of Resourcing.

Promoting dietary change is also compromised because the Ministry of Health has not done enough to promote healthy eating in adolescents (Mackay, 2022). It is possible that adolescents engage in health

compromising behaviours, therefore, because they downplay, or are unaware of the risk of poor nutrition. Furthermore, public health nutritional information is not aligned to recent research on how nutrition can promote mental wellbeing (MoH, 2023). This has misled healthy eating perceptions in all age groups. Therefore, health-conscious adolescents are also compromised in their lifestyle choices.

Lack of resourcing means public health campaigns cannot compete with intensive marketing of unhealthy foods which target adolescents. Such campaigns employ emotive strategies which deliberately exploit adolescents' developmental vulnerabilities (Harris, 2020). During adolescence, reward centres in the brain are highly sensitised (Xie, 2021). Junk food adverts employ reward cues which deactivate adolescents' critical responses, thus effectively reducing their ability and motivation to resist (Harris, 2020). A dietary intervention strategy would need to target emotional regulation and impulse control strategies when confronted with emotive food cues.

Challenging Beliefs

It is indicative in research (Gibson, 2021; Hoying, 2016) that behaviours are driven by belief, therefore changing belief is fundamental to behaviour change. Given the amount of misinformation about nutrition in mainstream media and public health material, it is unsurprising that adolescents' diets are not meeting the nutritional requirements for brain health. This can lead to false perceptions that some ultra-processed foods are healthy (Scrinnis, 2020), which is caused by advertising and packaging which emphasise the nutrient content of ultra-processed foods (Scrinnis, 2020).

Nutritional guidelines which promote carbohydrate consumption in the form of wholegrains has given rise to the marketing of ultra-processed foods on the strength of their whole grain content (LoDolce, 2013). This presents a significant challenge to eliciting changes in dietary habits in the interest of mental wellbeing because it is underpinning misguided beliefs about what constitutes a healthy diet. A stronger research foundation is urgently needed to effectively challenge these beliefs and encourage dietary habits which promote mental wellbeing.

How does Diet Affect Mental Health?

The impact of diet on mental wellbeing is significant due to its influence on brain function (Gomez-Pinilla, 2008). The brain is the most metabolically active organ in the body and has high energy requirements to carry out cognitive processing, neural signalling, and maintain cellular homeostasis (Farier-Pereira, 2022). Consequently, the brain is vulnerable to oxidative stress, especially when dietary sugar intake is high (Zebrowska, 2020). Inflammation and oxidative stress can damage neurons and impair brain function. Lowering carbohydrate intake and eating a nutrient rich whole food diet is essential for protecting against oxidative damage and maintaining the structural integrity of the brain (Jiang, 2021).

Both micronutrients and macronutrients play an essential role in supporting brain health by providing the necessary nutrients for energy metabolism, neurotransmitter synthesis, and brain structure and function. Fats, specifically omega-3 fatty acids, play a critical role in brain development, maintenance, and cognitive function (Dyall, 2015). Micronutrients are essential for supporting brain health by regulating nerve cell communication, providing energy, protecting against oxidative stress, enhancing neurotransmitter function, and supporting mitochondrial function (Rodríguez-Cano, 2020).

Poor diet can cause mental illness because it does not provide the nutrition to support the structure and function of the brain, and protect against stress and trauma (Rucklidge, 2018b). The high sugar and omega-6 content of ultra-processed food can have the same effect on the brain as psychological stress or trauma. An imbalance of PUFAs, with an excess of omega-6 and a deficiency of omega-3, can lead to chronic low-grade inflammation (Aly, 2020; Mariamenatu, 2021; Mota, 2023) which has been associated with several mental illnesses, including depression and anxiety.

Hyperglycaemia, and reactive hypoglycaemia, caused by high sugar intake, can lead to oxidative stress and mitochondrial dysfunction (Maciejczyk, 2019), which can disrupt neurological pathways, and cause cell necrosis. Similarly, hyperglycaemia can lead to glutamate excitotoxicity which can also cause neurological disturbances which underlie several mental illnesses (Baek, 2022). The neuroplasticity of the developing brain during adolescence makes this age group more vulnerable to the effects of poor diet on neurology (Reichelt, 2017). Poor diet during this critical period can disrupt neuroplasticity and negatively impact brain development, which can lead to permanent distortions and long-term mental illness into adulthood. High

consumption of ultra processed food explains the higher rates of mental illness in this age group. Therefore, addressing poor diet in adolescents is crucial to reducing the burden of mental illness in years to come.

Revisiting Nutrient Reference Values (NRVs) and Recommended Daily Intake (RDI)

Promoting healthy eating habits has the potential to avert the current mental health crisis due to its viability as both a preventative and therapeutic strategy; however, public health nutrition is contentious and there is continued debate over what constitutes a healthy diet. Despite emerging evidence that micronutrient and macronutrient RDAs are suboptimal (Rucklidge, 2021), NZ government guidelines (MoH, 2023) continue to recommend low fat/high carbohydrate diets and vicariously endorse UPFs. Furthermore, government guidelines are geared towards reducing chronic physical conditions, which highlights the low priority of mental health in dietary considerations.

Current micro and macronutrient RDAs do not reflect the metabolic needs of adolescents overall, or recognise individual variations in metabolic needs (Rucklidge, 2021). They are based on adult needs as a ratio of energy expenditure as opposed to biological function (Rucklidge, 2021). Guidelines do not consider requirements for healthy brain function or development, even though the brain uses >20% of the body's energy expenditure and does not use micronutrients in the same proportions as the body (Rucklidge, 2021). Adolescent nutritional requirements vary depending on their stage of neurological development (Das, 2017). If these requirements are not met, neurological distortions could occur, resulting in mood disorders (Opie, 2017). Research is lacking on the precise requirements for brain health. As a percentage of calories, current NZ guidelines recommend high carbohydrate intake (45-65%), moderate protein intake (15-25%) and low-fat intake (20-35%). Emerging evidence favours reducing carbohydrate and increasing fatty acid intake in accordance with the Mediterranean diet for optimal brain health (Gerber et al., 2023; Naveed, 2020).

Micro and macro nutrient RDAs urgently need revisiting for adolescents to determine requirements for healthy brain development. Diets comprising ultra-processed foods do not meet the nutritional requirements for healthy brain development without significantly exceeding calorie requirements and increasing risk of obesity (Arain, 2013; Jacka, 2017; Kulkarni, 2015). Whole food diets, on the other hand, are abundant in nutrients and therefore better meet nutritional needs without the risk of obesity (Kaplan and Rucklidge, 2021).

Obesity is a further risk factor for mental illness (Blasco, 2020; Nemiary, 2012). Studies have shown that the excessive accumulation of body fat in adolescents can lead to changes in the brain's structure and function, which can ultimately result in the development of mental health disorders such as depression and anxiety (Monda, 2017). These changes in the brain may be caused by the chronic inflammation and oxidative stress associated with obesity (Ghowsi, 2021), as well as alterations in the levels of hormones and neurotransmitters that regulate mood and behaviour (Schmitt, 2023). Although studies support the neurological connection between obesity and depression (Zaporoli, 2022), it is not clear how far the neurological distortions are caused by obesity or addiction to obesogenic foods (Raghu, 2022).

Evidence-base for Micronutrient Supplementation

The extent to which micronutrient RDI is underestimated, especially for people suffering from mood disorders, is highlighted in recent research findings. Rucklidge (2018) found that increasing micronutrient intake through supplementation can ameliorate anxiety and depression. This works on the premise that synergism between micronutrients optimises brain function (Kaplan and Rucklidge, 2021). Poor diet does not cause deficiencies in all micronutrients; therefore, it is likely that specific micronutrient deficiencies are affecting mental wellbeing (Rucklidge, 2021). It is known that magnesium, Vitamin D, and Vitamin B12 are important for brain health (Botturi, 2020; Eby, 2006; Khosravi, 2020; Sangle, 2020; Somoza-Moncada, 2023). Rucklidge's (2012) findings that taking eight times the recommended dose of specific multivitamins improved trauma symptoms could be attributed to high doses of Vitamin B12 and magnesium in the supplement. Supplementing, or consuming a diet rich in these nutrients, therefore, could remediate mood disorders.

Sangle's (2020) systematic review of 35 articles found that Vitamin B12 supplementation had a positive effect on mood in healthy subjects but had no significant effect on anxiety and depression. Vitamin B12 was shown to reduce the risk of mood disorders and enhance the effects of psychotropic medications (Sangle, 2020). Unlike Rucklidge's (2018) study, none of the studies in Sangle's (2020) review exceeded RDI for B12. Participants in Rucklidge's (2012) study were given either 4- or 8-times RDI micronutrient complex. Higher doses corresponded to greater improvement in anxiety and depressive symptoms (Rucklidge, 2012). It is discernible from Rucklidge (2018) that the nutritional needs of people with mood

disorders substantially exceeds current RDI. More research is required to determine precise nutrient requirements for people with mood disorders. This is likely to vary on an individual basis. Concerns over safety present a challenge to conducting research where vitamin and mineral doses exceed RDI. Rucklidge's (2012; 2018; 2021) studies suggest RDI can be substantially exceeded without biological risk.

How Micronutrients Affect the Neurological Mechanisms of Mental Wellbeing

Although it is known that micronutrient synergy is important for maintaining brain health and function, the precise mechanisms of antidepressant action of individual nutrients are not yet fully understood (F Białas, 2022). Studies have consistently found magnesium can support the management of depression (Nazarinasab, 2022). Magnesium is hypothesised to be an effective treatment for major depression because it mitigates neuronal damage during the stress response (Maier, 2022; Tian, 2022). This is because it protects against cell necrosis and supports neurogenesis (Yamanaka, 2016).

Acute stress increases glutamate neurotransmission which is potentiated by low magnesium levels (Botturi, 2020). This supports an environment for excitotoxicity, which can lead to oxidative stress and neuronal cell death (Popoli, 2011). When magnesium is deficient, other micronutrients can have harmful neurological effects. Calcium overload has been shown to accentuate cell necrosis, caused by oxidative stress, in the absence of magnesium (Eby, 2006). This highlights the importance of balanced micronutrient intake to mitigate harmful effects of high levels of single micronutrients (Rucklidge, 2012; 2018; 2021). Furthermore, deficiencies in single micronutrients, especially magnesium can potentiate harmful effects of other micronutrients.

Abnormal glutamatergic neurotransmission has been implicated in anxiety and depression (Popoli, 2011). Undernourishment increases the vulnerability of the developing adolescent brain to glutamate excitotoxity. This is because the neurological mechanisms which mediate glutamate excitotoxicity are not mature in the adolescent brain (Silveri, 2013). Adolescents are less able to regulate cognitive and emotional processing, which makes them more prone to extreme mood fluctuations and irrational behaviours (Selemon, 2013).

During adolescence, interconnectivity between the prefrontal cortex and amygdala are not fully established. This is facilitated by GABAergic systems, which are not fully mature until mid-twenties (Silveri, 2013).

Undernourishment during adolescence can distort the development of GABAergic systems and cause neurological distortions which lead to behavioural disorders in adulthood. It is likely adolescents have higher nutritional needs than adults to maintain brain health and prevent mental health disorders occurring in adulthood (Lassi, 2017).

How Macronutrients Affect the Neurological Mechanisms of Mental Wellbeing.

While micronutrients are important for mental wellbeing, macronutrients are also essential for mental wellbeing as they support the integrity and function of the brain. Protein plays a significant role in the production and synthesis of neurotransmitters (Rao, 2008). Amino acids derived from dietary protein provide the building blocks for neurotransmitter synthesis, including serotonin, dopamine, and norepinephrine. These neurotransmitters are known to regulate mood, cognition, and emotions, thereby influencing mental health. Studies have shown increasing protein in favour of carbohydrate can ameliorate the symptoms of anxiety and depression (Oh, 2020).

Dietary fat has also been shown to benefit mental health (Rao, 2008). Omega-3 fatty acids are essential for proper brain function. These fats contribute to the structural integrity of brain cells and aid in the transmission of signals between neurons. Additionally, omega-3 fatty acids possess anti-inflammatory properties that support optimal brain health. Adequate consumption of healthy fats has been associated with improved mood stability and cognitive function.

Recent debate has opened over the role of saturated fats in promoting brain health (Chianese, 2018; Li, 2020; Teicholz, 2023). Concerns over increased risk of heart disease led to its removal from healthy eating guidelines (Lui, 2017). Saturated fats have been grouped with trans fats in Ministry of Health (2021) guidelines which recommend they are limited to <10% of calorie intake in favour of higher polyunsaturated fat intake. The evidential basis for these recommendations has been shown to be evidentially flawed (Deghan, 2017; Ramsden, 2016). Nonetheless, the recommendations have led to the discouragement of meat and dairy consumption. This can cause deficiencies in eicosapentaenoic acid (EPA), and docosahexaenoic acid (DHA), which are specific types of omega-3 fatty acids found in fish, meat, and dairy, which are essential for brain health (Bradbury, 2011; Fayet-moore, 2015). Additionally, Vitamin B12 is only found in animal-sourced foods. Therefore, vegans are especially at risk of deficiencies in key nutrients for brain

health. Although global vegan rates are low, the highest incidents are in the 14 – 34-year age-group (42%) and there has been an upward trend in recent years (Alcorta, 2021; WHO, 2022b). The potential detriments to adolescent mental well-being are concerning.

Deficiencies in EPA and DHA are not entirely caused by people following misleading nutritional advice. Red meat consumption is still high in Western civilisations despite government guidelines (Hocquette, 2023). Modern agricultural practices and meat processing mean commercially produced animal foods are no longer good sources of EPA and DHA (Tocher, 2019). Intensive farming has led to beef cattle being reared on corn, rather than grass. This means they are less able to synthesise EPA and DHA from foods. This is compounded by high intake of n-6 PUFA from processed foods offsetting Omega 3 and Omega 6 (n-6) intake ratios. Average Omega 3/Omega 6 ratios are estimated at 1/20 when there should be parity (Simopoulos, 2002b). High intake of n-6 PUFAs, relative to omega 3, results in oxidative stress which causes neuronal cell necrosis (Mariamenatu, 2021). Whole food diets, which include meat, fish and dairy, can remediate this issue because they provide these ratios naturally (DiNicolantonio, 2021). Careful sourcing of grass-fed beef can ensure EPA and DHA levels are not affected by farming practices (Nogoy, 2022).

Are Nutritional Guidelines Fit for Mental Health Purpose?

Over the last 50 years nutritional guidelines have been developed to improve population health (Mozaffarian, 2018). The rising rates of chronic disease and mental illness (Hajat, 2018), since their implementation suggests they have failed. The New Zealand Ministry of Health (MoH) (2015) asserts there is a robust evidence base for current nutritional guidelines; however, nutritional research results are conflicting and hard to verify (Gibney, 2020).

Research supporting nutritional guidelines promotes the consumption of carbohydrate and emphasises the reduction of saturated fat and trans-fat (Mann, 2007). The detriments of trans fats to health are well-known. Saturated fat remains subject to debate. Recent research has found saturated fat is beneficial to physical and mental health (Li, 2020) when it is not combined with refined carbohydrate consumption (DiNicolantonio, 2014). In formulating nutritional guidelines, the Ministry of Health NZ did not consider the effects of saturated fat consumption in a low-carbohydrate diet.

Concerns over the consumption of saturated fat have led to guidelines (MoH, 2015) that promote carbohydrate as the primary energy source and promote consumption of vegetables and whole grains over meat. Evidence suggests this has caused populations to reduce their consumption of red meat which is vital to health (Paquette, 2005). This has led to the under consumption of protein and saturated fat in preference for polyunsaturated fats from vegetable sources which are highly processed. Consequently, people are consuming omega 6 at 20 times the level of Omega 3 (Simopoulos, 2002). This causes oxidative stress in the body and is known to be a risk factor for chronic disease and mental illness (Simopoulos, 2002).

Advocacy of whole grains in nutritional guidelines means populations are consuming heavily processed foods in the belief that they are conducive to health. Nutritional guidelines do not advocate refined grains (MoH, 2015). Whole grains are still subject to processing, however, which distorts their balance of healthfulness to harm. The health spectrum of grains depends on their level of processing (Gibney, 2019). Furthermore, many processed foods that contain whole grains often have processed oils and sugars in them. These include cereal bars, whole grain crackers, and whole grain bread, which are often perceived to be healthy. Advocacy of whole grains in nutritional guidelines has led to 'health washing' in ultra-processed food marketing, which misleads consumers into believing unhealthy food products are healthy. The whole grain content of foods is emphasised while underplaying the amount of sugar and n-6 PUFAs (Curtain, 2019).

While the impact of ultra-processed food consumption is a focus of concern in the formulation of nutritional guidelines, nutritional guidelines may be unintentionally contributing to the problem of ultra-processed food consumption (MoH, 2015). Guidelines advocate minimising, as opposed to eliminating them. Therefore, guidelines are subject to misinterpretation. Guidelines state moderate consumption of biscuits, muffins and baked foods is healthy but there is no clear definition of what comprises a moderate amount. As little as 100 grams of muesli bar, muffins or biscuits constitutes excessive sugar consumption. Given the unlikelihood of people perceiving these quantities as excessive, it can be discerned that nutritional guidelines encourage overconsumption of sugar. Furthermore, food marketing is more likely to influence perceptions of healthy eating (Clapp, 2016). The Big Food lobby's influence on policy making has led to the marketing of some packaged, ultra-processed food as healthy (Scrinis, 2020). This presents a further barrier to people making dietary choices which promote health.

Popularising the belief that whole grains are good for health is a vicarious endorsement of processed foods. This has led to the widespread belief that some ultra-processed foods, such as breakfast cereals and muesli bars are beneficial to health because of their grain content. This overlooks the health detriments of high sugar content, and that the nutritional value of grains is significantly reduced through processing (Moubarac, 2014). The research base for nutritional guidelines needs to be reconsidered. They will remain biased while subject to the Big Food lobby's influence (Nestle, 2013). Populations are generally unaware of the therapeutic potential of diet, while assuming chronic disease is an inevitable facet of life.

Summary

A healthy diet is crucial for mental health; however, diet is understated as a risk factor for mental illness in current public health literature. Consequently, there is a lack of awareness of how mental wellbeing can be maintained through healthy eating. This is compounded by misleading information about what constitutes a healthy diet in nutritional guidelines. Moreover, nutritional guidelines vicariously endorse excessive consumption of ultra processed foods because they do not give clear guidance on how much can be eaten while maintaining a healthy diet. Further research is urgently needed to determine nutritional requirements for mental wellbeing which factor in additional requirements to mitigate stress. Such research could provide the basis for revised nutritional guidelines which consider physical and mental wellbeing.

How Guidance Counsellors Support Adolescent Mental Wellbeing

The Role of School Guidance Counsellors

Guidance counsellors are based in schools and work within the framework of youth mental health care provision (Hughes, 2019). They work as part of a multidisciplinary team, including school nurses and deans, to improve student wellbeing in the interests of academic achievement. They deal with a broad spectrum of issues facing adolescents, including substance abuse, peer related issues, bullying and poor mental health (Hughes, 2019). To do this, they offer one-to-one counselling to students, peer support programmes and deliver school wide programmes. These programmes focus on issues such as gender identity, consent, cyberbullying, and sexting. They also offer staff training to ensure there is a consistent school-wide approach to promoting wellbeing, and teachers understand issues facing adolescents.

Although the guidance counsellor service was not established to deal specifically with adolescent mental health issues, increasing rates of adolescent mental illness has meant that most cases referred to them in recent years have been mental health related (Hughes, 2019). This has proved challenging for guidance counsellors because their training has not kept up with the changing nature and complexity of cases (Manthei, 2020). Recent surveys suggest several factors limit guidance counsellors' effectiveness in dealing with adolescent wellbeing issues (Baukley, 2010; Hughes, 2019; Manthei, 2020). Hughes (2019) found this is due to under resourcing and subsequent excessive workload. Surveys indicated that guidance counsellors believed they could not effectively support adolescents with emotional difficulties when they themselves were stressed (Hughes, 2019; Manthei, 2020).

Are Guidance Counsellors Effective?

Measuring the effectiveness of guidance counsellors is problematic when significant numbers of adolescents with mental wellbeing issues are unable to access services. Guidance counsellors indicated students are triaged by risk, meaning students with less serious issues are put on waiting lists and less likely to be seen (Hughes, 2019). Subsequently, students with less serious issues worsen while waiting, and are deterred from seeking help. This reflects the underlying problem that the mental health system is inadequately funded in NZ for mild to moderate mental health issues. Although guidance counsellors can offer a genuine contact point for an increasing problem, infrastructure is lacking in this age group.

Despite poor funding and difficulties with service access, surveys indicated a high percentage of adolescents using guidance services were satisfied; however, a significant percentage were unsatisfied (Manthei, 2020). Those unable to access guidance services were not included in the surveys. Furthermore, most students seeing guidance counsellors were self-referring. This suggests caseloads do not reflect need. Therefore, it is likely many students with wellbeing issues are not receiving help (Hughes 2019; Manthei, 2020). This limits the accuracy of survey data on guidance service effectiveness (Hughes 2019; Manthei, 2020). Gibson (2018) found that adolescents valued their interactions with guidance counsellors. Therefore, when adolescents accessed therapies, they were satisfied. It can be discerned from this finding that access to service is the problem with current mental health provision, rather than context.

As with mainstream mental health provision, the government's solution is to provide extra funding for school guidance services (Manthei, 2020). Increasing funding for strategies which focus on treatment, rather than prevention, increases dependency and exacerbates the resourcing problem (Geurtzen, 2018). While adolescents value talk-based therapies with guidance counsellors, research suggests that these therapies may not always be effective in addressing mental health issues.

What Support do Guidance Counsellors offer?

How guidance counsellors treat adolescent mental health depends on their level of expertise (Bukeley, 2010). Most guidance counsellors are teachers who have undergone additional training to meet the requirements of the role. Others are professional counsellors who have worked within the public health system (Hughes, 2019). Therefore, guidance counsellors' individual expertise differs according to their training (Bulkeley, 2010). This determines the type of support they offer students and the type of issues they can deal with. Support ranges from one-to-one counselling to high level interventions such as cognitive behaviour therapy, interpersonal therapy, and psychodynamic therapy (Hughes, 2019). Where students present with issues that go beyond their scope of practice, guidance counsellors refer them to other agencies, such as Youth and Adolescent Mental Health Services (Hughes, 2019).

The NZ Ministry of Education's (MoE) Te Pakiaka Tangata, Strengthening Student Wellbeing for Success (2017), provides guidelines for professional practice expectations and standards for secondary school

wellbeing and achievement. From these guidelines, schools can develop individual plans for providing high-quality pastoral care, guidance and counselling for their students, and for integrating this care into its own culture. Te Pakianga Tangata's (MoE, 2017) recommendations on what guidance counsellors should be doing to improve the wellbeing of adolescents does not go far enough, as there is a lack of guidance on how this can be achieved. School leadership teams have autonomy over their wellbeing strategy, which means it is not standardised throughout mainstream education. This means those implementing school wellbeing initiatives may not have the relevant skills and competence. Research into guidance counsellors' skills and knowledge of improving adolescent mental wellbeing would be helpful in determining how school wellbeing provision can be effective and consistent.

Could Guidance Counsellors Incorporate Dietary Intervention into their Therapeutic Practice?

Dietary intervention is an effective therapeutic and preventative mechanism for mental health issues. The potential for dietary intervention to reduce demand on health services has already been explored in current research. Current research suggests dietary intervention has the potential to significantly reduce the burden of mental illness on health care (Rucklidge, 2018a). Likewise, it could reduce the pressure on guidance services. Pressure of excessive workload is acknowledged as compromising the effectiveness of guidance practice (Hughes, 2019). Therefore, implementation effectiveness research would be useful in determining how guidance counsellors could incorporate dietary intervention into their practice. This could enable them to become more effective practitioners if such interventions prove successful in reducing case numbers and subsequent workload burden. Their work, however, is largely informed by evidence-based practice (MoE, 2017), which does not incorporate therapeutic dietary intervention; this could be a potential barrier to guidance counsellors using dietary intervention in their therapeutic practice.

Evidence is emerging that nutrition is a determinant of mental wellbeing (Jacka, 2017; Kulkarni, 2015) and can put many psychiatric disorders into remission (Hinchliffe, 2016; Opie, 2018; Rucklidge, 2013). Training in implementing therapeutic dietary intervention would be useful to guidance counsellors in treating adolescents with mental health issues. Furthermore, they could be instrumental in delivering school-wide nutritional approaches to improving student well-being.

How far guidance counsellors encourage healthy eating to improve mental wellbeing is likely to be determined by each counsellor's individual knowledge (Bulkeley, 2010). Current government dietary guidelines are the most available source of information for guidance counsellors (MoH, 2023). Recent studies have shown these guidelines may not be conducive to mental wellbeing (Rucklidge, 2018b). Nutritional advice in wellbeing programmes currently offered in schools is not comprehensive (TKI, 2021). The contentiousness of dietary approaches to improving mental wellbeing might deter health professionals from using them.

Dietary intervention is not standard therapeutic practice (Fonargy, 2015), therefore supporting adolescents in adopting healthy eating habits is not, currently, within guidance counsellors' scope of practice. In line with best practice guidelines (BPAC, 2018), guidance counsellors may suggest adolescents adopt a healthy diet, however, the onus is on the adolescent to make the necessary dietary change. Evidence that adolescents with mental health issues are more likely to engage in health compromising behaviours (Booth, 2017) suggests efforts by guidance counsellors to encourage adolescents to adopt a healthy diet would not be effective. This would require specialist intervention. It is not clear how far guidance counsellors existing knowledge and skill base could facilitate this. Therefore, implementation effectiveness research is needed to determine ways in which guidance counsellors can better support adolescents in eating a healthy diet to improve mental wellbeing.

Beyond Talk-Based Therapies: Exploring the Role of Nutrition in Adolescent Mental Health and Resilience

Surveys indicate guidance counselling services are not adequately meeting the needs of adolescents with mental wellbeing issues; however, this is consistent with evidence that overall mental health provision in NZ is inadequate (He Ara Oranga, 2018). Te Pakianga Tangata (MoE, 2017) outlines practice principles, ethics, and values with the aim of more consistent provision of safe, high-quality pastoral care, guidance and counselling for secondary school students. Encouraging schools to incorporate therapeutic dietary intervention into wellbeing initiatives could be challenging when it is not considered in Te Pakianga Tangata's (MoE, 2017) recommendations. Instead, the recommendations focus on cognitive behaviour change with emphasis on talk-based therapies. Its findings are based on the 2013 Education Review Office (ERO) report, 'Improving Guidance Counselling for Students in Secondary Schools', which recommend a

preventative approach; however, the ERO (2013) report suffered from a lack of understanding of how prevention works in a mental health context and that many of the causative factors of poor mental health fall outside the school environment making it challenging for schools to address. Both Te Pakianga Tangata (MoE, 2017) and the ERO report (2013) lacked an understanding of what constitutes poor mental health and confused risk factors with mental health conditions.

Te Pakianga Tangata (MoE, 2017) and the ERO report (2013) may prove ineffectual in their view that developing coping strategies through talk-based therapies are sufficient to build resilience to the exogenous stresses that cause adolescent mental illness. The rationale behind talk-based therapies is that it is possible to build resilience to mental illness through positive thought processes. Emphasis is placed on developing coping strategies and increasing resilience to risk factors through thought; however, positive thought requires cognitive control which relies on neurological systems within the brain functioning well. Positive thought is a questionable strategy, therefore, because mental illness is characterised by lack of cognitive control (Fales, 2008; McTeague, 2017), which results from poor functioning of neurological mechanisms within the brain. Lack of cognitive control in those with poor mental health may explain why talk-based therapies are often ineffective.

Negative or positive thought processes are indicators of mental health, therefore, changing thought processes, as a means of therapy, does not address underlying neurological causes. In current practice, pharmacological intervention is used to mitigate this; however, its efficacy is in doubt (Karanges, 2011). Nutrition affects the neurological mechanisms underlying cognitive control and is a viable alternative to pharmacological intervention in improving the success of talk-based therapies. Te Pakianga Tangata (MoE, 2017) neglects the role of nutrition in enhancing cognitive functioning and developing resilience. This reflects the poor status of nutrition in mental health therapeutic intervention within public health.

Bridging the Gap: Integrating Community Engagement for Adolescent Wellbeing and Dietary Intervention

Prevention strategies are focused within the school context and although they acknowledge students' mental wellbeing is more likely to be affected by wider social issues, there is a lack of engagement with the wider community in resolving them (MoE, 2017). Successive education review office (ERO) surveys have

indicated that increased guidance counselling provision has led to a reduction in adolescents turning to caregivers or people within their wider communities for support with mental wellbeing issues. This is at odds with He Ara Oranga (2018) which acknowledges the importance of community in addressing the mental health crisis.

Acknowledging the types of connections adolescents make with the wider community is an important aspect of therapeutic dietary intervention. As such, behaviour change takes place both within and outside the school environment and requires the involvement of those who engage with adolescents outside their school communities. With respect to dietary intervention, adolescents' social status prevents them from having autonomy over their dietary choices (Jacka, 2017). Greater exploration of how guidance counsellors can engage with the wider community to improve adolescent wellbeing through dietary intervention is needed.

3. Study 1

Rationale

The purpose of this paper is to determine whether school guidance counsellors have the skills and knowledge to incorporate dietary intervention into their therapeutic practice to improve adolescents' mental wellbeing. WHO (2020) statistics show adolescents currently have the highest rates of mental illness, globally, with 25% being diagnosed. Actual figures are estimated to be higher because of non-diagnosis. Mental illness can have a serious impact on adolescents' quality of life and places a burden on society (Merikangas, 2010). If unresolved, mental illness rates are likely to increase in subsequent generations and further escalate the burden on society.

The increasing prevalence of adolescent mental illness, in recent years, suggests current approaches to preventing and treating mental illness do not work. Lack of resourcing means it is hard for adolescents to access counselling and other services (Radez, 2020). There is also an increasing over-reliance and inappropriate use of antidepressants as first-line treatment. It is recognised that antidepressants have limited efficacy and often have significant negative outcomes for young people (Almohammed, 2022; Maroun, 2018).

Poor diet characterised by excessive ultra-processed, or junk food consumption is known to be a significant cause of poor mental health (Hinchliffe, 2016; Opie, 2018; Rucklidge, 2013). Adolescents typically eat more junk food than other age-groups (Bauer, 2009) which may partially explain why they experience higher rates of mental illness (Malmir, 2022).

Several pathologies link poor diet to poor mental health and wellbeing. The brain is the most metabolically active organ. If poor metabolism prevents it from meeting its nutritional needs, this disrupts neural functioning (Teesdale, 2017). Insufficient intake of essential amino acids, fatty acids and micronutrients, required for the synthesis of neurotransmitters, disrupts neural signalling and affects mood regulation (Muscaritoli, 2021).

Excessive consumption of sugar, especially from junk foods, can lead to a high glycaemic load. This can lead to hypoglycaemia, which can induce long-lasting disturbances in glutamatergic signalling and neural damages, causing depressive behaviours (Baek, 2022). Such disturbances can easily be remediated by eliminating junk food from diets in favour of foods that have a lower glycaemic load. (Firth 2019; Opie, 2017). Mainstream healthcare lacks the infrastructure to implement these services.

Dietary interventions can be a highly effective alternative to mainstream treatment of mental illness, due to their emphasis on dietary behaviour change. (Fulkerson, 2003; Hinchliffe, 2016; Opie, 2018; Rucklidge, 2013). Some experts, including the Australia-New Zealand College of Psychiatrists, believe those should be the frontline treatment before pharmaceuticals (Malhi, 2020). Recent research has shown nutritional approaches using micronutrient supplementation have been more effective than pharmacological approaches for mental health issues, without psychotherapy (Rucklidge, 2013; 2018). The research base is still relatively low compared to RCTs on antidepressants. It is difficult to get them endorsed in mainstream medical practice. Therefore, pharmacology and psychotherapy remain first-line therapeutic practise for mental health.

Although promising as an alternative to pharmacological treatments for mental illnesses (Rucklidge, 2013, 2018), micronutrient supplementation is unlikely to provide a long-term solution. It could be economically difficult for mental health sufferers or their families to meet costs, especially as lower socioeconomic status increases the risk of mental illness (Shields-Zeeman, 2022). Improving diet quality could be a more sustainable way of improving mental health outcomes for adolescents if they are shown cost-effective ways of eating a healthy diet through a lifestyle intervention (Hoying, 2015; Melnyk, 2015; 2017; Rucklidge, 2021).

Although current research has shown there is a connection between poor diet and mental illness, few studies have been done to show how dietary intervention can remedy poor mental health. The SMILES (Jacka, 2017) and COPE (Melynk, 2015, 2017) intervention strategies showed dietary intervention can achieve positive outcomes for early teens and adults with mental illness. Evidence of real-world application of dietary intervention is still lacking, therefore more implementation science is needed. This formative work is critical in this.

Ultimately, the intention is to conduct a dietary intervention with adolescents to determine whether healthy eating can ameliorate symptoms associated with poor mental health. Primarily, it needs to be determined who could support the intervention and potential settings. In NZ, guidance counsellors employed within schools' student support services provide therapeutic solutions for adolescents with mild to moderate mental health issues, especially mood disorders. They could be instrumental in implementing dietary intervention for adolescents with mood disorders in school settings. For this to happen, formative research is required to ascertain how far guidance counsellors understand the therapeutic role of nutrition in ameliorating mood disorders, and how far their professional learning supports the implementation of dietary interventions.

A formative qualitative study on the role and experience of guidance counsellors in supporting adolescents with mood disorders would be a useful addition to current knowledge about how behaviour change could be encouraged in the interest of adolescent mental health. This could inform subsequent implementation research to determine how dietary intervention could work in mental health practice.

Abstract

Evidence is emerging that poor mental health in adolescents is linked to eating excessive amounts of ultra-processed food. Improving diet could help adolescents with poor mental health. Changing adolescents' dietary habits could be challenging when dietary therapies are rare in healthcare settings. Adolescents tend to make impulsive decisions. This drives unhealthy dietary choices and is hard to remedy when unhealthy food is readily available.

Adolescents with mental health issues value support from school guidance counsellors. School guidance counsellors could encourage adolescents to eat a healthy diet to promote mental wellbeing. To understand this, we conducted interviews to discover whether guidance counsellors believe a healthy diet could be used to treat mood disorders, and to understand how far their professional learning would help them to implement dietary change.

The following themes (in bold) were constructed using thematic inductive analysis:

Guidance counsellors' **knowledge** of the relationship between diet and mental health was based on **inherent beliefs** and there was **inconsistency** between inherent beliefs and professional practice; however, they were unwilling to use therapeutic dietary intervention because it was not a prescribed **therapeutic modality** within their **scope of practice**. They also believed that approaching sensitive issues, such as diet, may adversely affect their **therapeutic relationships**.

Guidance counsellors identified that **multiple factors influenced adolescent diet**. The **influence of food marketing** and **cost** were significant barriers to healthy eating. Guidance counsellors believed eating **'bad' food was better than no food** and it was acceptable to eat **everything in moderation.**

Overall, guidance counsellors did not have the necessary skills and knowledge to implement a therapeutic dietary intervention to improve adolescent mental wellbeing.

A significant finding was that therapeutic dietary intervention was not within guidance counsellors' scope of practice. Lack of training and professional development meant they were not ready, and lacked a remit to give such advice. Therefore, **school wide approaches** should be used for dietary intervention.

This study recommends that further implementation effectiveness research should be conducted to determine how adolescents can be encouraged to eat a healthy diet to improve their mental health.

Introduction

Adolescent mental health is a growing concern for society. Substantial evidence is emerging that this is linked to eating ultra-processed food. Dietary intervention could be part of the solution to the mental health crisis (Jacka, 2017; Kulkarni, 2015.). Low efficacy of current treatments suggests alternative approaches, such as therapeutic dietary intervention, could reduce the socio-economic burden of adolescent mental illness (Rucklidge, 2018a). Dietary change is challenging when unhealthy foods are readily available to adolescents. Therefore, implementation effectiveness research is needed to determine how adolescents could be encouraged to change their diet to promote mental wellbeing.

Current New Zealand (NZ) Ministerial guidelines (MoH, 2017) on supporting student wellbeing in pastoral care, guidance and counselling, mention active and healthy lifestyles; however, they do not mention diet or offer specific advice on how to lead a healthy active lifestyle.

School guidance counsellors play an important role in supporting adolescents with mental health issues. We conducted formative research to determine whether they could encourage adolescents to adopt a healthy diet to improve their mental wellbeing. The research enabled us to discover how far guidance counsellors understand the therapeutic role of nutrition in improving mood disorders, and how far their professional learning would enable them to put in place therapeutic dietary intervention.

The findings from this research could inform further implementation effectiveness research on how dietary change can be effected to improve mental well-being. This study is the first to examine the possibility of

school guidance counsellors using therapeutic dietary intervention to support adolescents with mild to moderate mood disorders. This work represents an important step in implementation science practice.

Aims

To determine how far school guidance counsellors understand the potential of nutrition in treating mood disorders.

To see how guidance counsellors can promote healthy eating to promote mental wellbeing.

To provide formative work for a further intervention study.

Methods

Participants

The participants in this study were student support services employees in schools throughout New Zealand (NZ). Data for this analysis was drawn from qualitative interviews with 10 school guidance counsellors, a Head of Student Support, a dean, and a school nurse. Although other student support personnel were included in the study, the focus was on the role of guidance counsellors. Participants were recruited by letter of invitation sent via email. Twenty-five schools were approached.

The research was approved by AUT's Ethics Committee (AUTEC #21/147). One-to-one interviews were conducted over Zoom. They were recorded and transcribed using Microsoft Word software. Transcripts were checked against the recordings to ensure accuracy. Recordings were then deleted, and participants were deidentified in transcripts and further research outputs. Transcripts were stored on the secure AUT server.

Data Analysis

The theoretical framework for this study is interpretivist (Levers, 2013). Thematic inductive analysis (Braun and Clarke, 2014) determined guidance counsellors' understanding of how lifestyle affects mental health. Data were interpreted in relation to recent cohort studies in this field (Jacka, 2017; Kulkarni, 2015). Thematic inductive analysis (Braun and Clarke, 2014) determined common themes relating to guidance

counsellors' knowledge of how diet affects mental health, and how willingly adolescents would change their diet, to improve their mental health.

The researcher acknowledged how she positioned herself in relation to the research through reflexivity (Pitard, 2017). This study and research journey was informed by quantitative findings (from clinical trials), personal experience as a teacher and caregiver for people of this age-group suffering poor mental health, her own nutrition and health journey, and a desire to effectively translate trial findings into real world action which will be measured quantitatively.

Results

1) Inherent Beliefs

1a) Therapeutic Modalities

> *I think mental health and diets are strongly related … but more so I think with adolescence because, because their brains are growing and developing, they need the high nutritional content of food.*

Guidance counsellors were unanimously aware that poor diet can harm adolescents' mental wellbeing. Their beliefs about diet were based on their inherent beliefs, rather than professional training. When adolescents present with low mood, some guidance counsellors indicated they would suggest eating a healthy diet to improve their symptoms but would not actively support adolescents' in changing their dietary behaviour. Guidance counsellors use expressive modalities, which are solution focused. They encourage adolescents to find solutions to their psychological issues from within and express their thoughts and emotions through talk or role-play; the guidance counsellor is a listener, rather than an adviser. Therefore, their current practice does not support therapeutic dietary intervention, which is prescriptive and does not fit with expressive modalities.

1b) Influence of Food Marketing.

Overall, guidance counsellors were concerned about adolescents consuming high amounts of ultra-processed food. Their beliefs about healthy eating tended to align with nutritional guidelines, although most of the participants did not acknowledge official sources, such as best practice guidelines.

Well, bread grains, certain amount of carbs, lots of vegetables, nuts, good fat oil.

Food companies tend to use nutritional guidelines to promote their foods as 'healthy'. Therefore, food marketing is most likely to have influenced guidance counsellors' beliefs about healthy diets.

1c) Inconsistency

Data showed practice delivery in schools was different from clinical settings. Interview data suggested this was because guidance counsellors are employed by the Ministry of Education rather than the Ministry of Health. Lack of awareness of best practice guidelines, or nutritional information through government outlets suggested guidance counsellors are not guided to health publications through their professional bodies. Even though guidance counsellors' practice mimics clinical practice, they are guided by Ministry of Education policy and practice guidelines. Participants working in healthcare settings had greater awareness of public health literature. They had more accurate knowledge of nutritional guidelines and were more confident that following them was better for health. Only one guidance counsellor had heard of MoH best practice guidelines.

Guidance counsellors were aware that alternatives to government dietary recommendations may be better for mental wellbeing, but knowledge was not consistent. They were cautious about recommending alternatives, even when they believed they benefitted mental wellbeing. This was because these beliefs came from general knowledge rather than official guidelines. Most guidance counsellors believed a healthy diet mainly comprised fresh fruits and vegetables. One guidance counsellor believed ketogenic diets benefitted mental health. This had been informed by personal experience; therefore, they were not confident it was suitable for adolescents.

I'm not sure if [keto is] suitable for adolescents.

Guidance counsellors who had gained nutritional knowledge through professional training were more confident about giving dietary advice. These findings suggest guidance counsellors will always work within their scope of practice, even if it conflicts with their inherent beliefs.

1d) Therapeutic Relationships

Guidance counsellors were reluctant to recommend dietary change to adolescents because discussing diet could undermine positive therapeutic relationships. Successful mental wellbeing outcomes rely on positive therapeutic relationships. Diet can be an emotionally sensitive issue for adolescents. Eating disorders can be linked to anxiety and depression. Consequently, guidance counsellors refer adolescents with risky eating behaviours to nutritionists or dieticians. They would not take this approach for generalised anxiety and depression.

> *No, I would recommend them to a nutritionist or a dietician. I'm not trained in that.*

Furthermore, client relationships are based on trust. Lack of training and professional knowledge limit what guidance counsellors can offer in terms of nutritional advice. Official guidelines justify eating some ultra-processed food. Therefore, it is difficult to recommend eliminating ultra-processed foods from their diet. Adolescents could challenge guidance counsellors' advice on this basis. Again, this could undermine therapeutic relationships.

One guidance counsellor had taken a nutritional approach to treating an adolescent with depression, through Vitamin B12 supplementation. This approach had been learned through voluntary training outside NZ. This suggests NZ is falling behind other countries in training practitioners to use nutrition to treat mental illness.

> *I used to attend a series of conferences. There are massive convention centres in Las Vegas, and Salt Lake and Phoenix all around the United States … And so that's how I came about learning about nutrition and mental health as well as others in many others.*

2) Multiple factors affect adolescent dietary choices

2a) 'Bad food is better than no food'

Guidance counsellors generally believed that 'bad food was better than no food'. Carbohydrate was seen as a nutritional requirement for adolescents. Guidance counsellors saw some benefit to ultra-processed food

because of its high carbohydrate content; they did not distinguish between complex and simple carbohydrates when discussing how adolescents' energy requirements could be best met.

Most believed dietary behaviour was governed by emotional responses to social influences. Their beliefs were largely based on what they observed students eating at school. They observed that adolescents were mainly eating ultra-processed food. This was reported across all school deciles, which showed ultra-processed food consumption was not affected by socio-economic status. Their main concern was energy drink consumption, which they believed significantly affected emotional regulation. Some adolescents were having energy drinks for breakfast and consumed them until they were able to have a solid meal at lunchtime. Guidance counsellors believed this was happening because parents were leaving for work before adolescents got up to go to school and not making them breakfast. Adolescents would purchase energy drinks from local dairies as it was more convenient than making themselves breakfast. Having food outlets close to school influenced poor food choices.

> *Takeaways and dairy and hot chips and fizzy drinks are very close by. And so, when you've got five bucks for lunch, you can buy two giant energy drinks. Or you can buy yourself a sushi and an apple and are likely to make poor decisions.*

Guidance counsellors also reported that many students were not eating and therefore going hungry throughout the day. One guidance counsellor reported that adolescents saw food as an enemy because it prevented them achieving an idealised body image. This was causing them to restrict their calorie intake. Although this mainly concerned females, it has been seen increasingly in males. Some students avoided eating or drinking during the day, so they did not have to use the toilet. Toilets were limited to break times, which did not always allow sufficient time for all students to use toilets. This meant that they might have to use the toilet during lesson time, which was not always permitted by the teachers. Therefore, needing the toilet could be a cause of distress for some students, which caused them to avoid eating and drinking.

Poverty was another contributing factor. Often adolescents arrived at their guidance meetings hungry because they could not afford food. Muesli bars were offered to help adolescents 'get through the day' and focus on learning. Muesli bars were seen as a healthier alternative to ultra-processed food generally eaten by

adolescents, although guidance counsellors believed there were healthier options available. Energy requirements were seen as more important than nutritional content because this would help them concentrate in lessons.

Sustenance was also cited as the main priority in the delivery of the Food in Schools Programme. Guidance counsellors working in the schools providing free meals believed this would help reduce the consumption of ultra-processed food. Although they had not been involved in the roll out of the programme, they believed the meals were healthy because of their wholegrain and pulse content. Again, this showed their beliefs about healthy eating aligned to nutritional guidelines. Although guidance counsellors were concerned about the overall quality of adolescents' diets, they were more worried about them not eating at all. Therefore, they believed it was better to be eating something, even if the nutritional quality of the food was poor.

2b) Everything in Moderation

Another guidance counsellor suggested a more moderate approach where the focus should not be eliminating unhealthy food, but ensuring sufficient healthy foods were eaten to meet nutritional needs.

> *Don't get too taken about what's good or bad or what's healthy and unhealthy. Eat when you're hungry; drink when you're thirsty. Everything in moderation, you know. I might eat a piece of chocolate because first thing in the morning. I might have a coffee and fancy a piece of chocolate. I know it's not great and it's not ideal but that's what I feel like. Ahh, yeah, but you know, five a day, five plus a day. If everyone can remember that I guess those are my benchmarks.*

3) Scope of Practice

3a) School-wide Approaches

Overall, guidance counsellors did not believe it was their responsibility to change adolescents' dietary behaviour in the interests of mental wellbeing. They believed it was the responsibility of other adults, such as teachers and parents, who should role model healthy dietary behaviour. Generally, guidance counsellors believed educating young people about healthy eating was key to changing their dietary behaviour. Meal plans and food bags, from which adolescents could prepare healthy meals, were seen as a possible

educational drive. Government initiatives were also seen as potential instruments of change. This might include WINZ subsidies for low-income families to buy healthy food.

Overall, data showed that the profile of student welfare is being raised in schools through wellbeing curricula. Dietary intervention should be included in wider school wellbeing initiatives and be part of a school wide approach.

Discussion

A key finding was that therapeutic dietary intervention was not in guidance counsellors' scope of practice. Although guidance counsellors were aware of the relationship between diet and mental wellbeing, they did not use therapeutic dietary intervention because they did not have sufficient nutritional knowledge through training and professional development. Ministry of Education governance affected their professional knowledge. Consequently, they were not advised of Ministry of Health literature, and only aware of best practice guidelines if they sought the information for themselves.

Therapeutic modalities offered by guidance counsellors fall within the experiential and behavioural psychological framework (Perlman, 2018). Therapeutic dietary intervention has a neurological basis which is not compatible with guidance counsellors' client centred and solution-focused modalities. Therapeutic dietary intervention is prescriptive (Anderson, 2017; Hamlin, 2016). It does not fit with the modality of adolescents finding solutions for their psychological issues from within themselves (Perlman, 2018).

Behaviour change is more effective if it is client driven (Fitzgerald, 2010). Greater social awareness of the therapeutic potential of diet could, therefore, drive behaviour change. The profile of nutrition in health promotion is low and dietary intervention is not used for mental health issues (He Ara Oranga, 2019). Advocacy for therapeutic dietary intervention would be challenging for guidance counsellors. If they do not have relevant professional knowledge, they cannot claim more expertise than the adolescents they are treating. Therefore, there is a potential conflict of interests if adolescents do not accept that diet affects their mental wellbeing. This could undermine their therapeutic relationships, which are essential to adolescents overcoming mental health issues.

Furthermore, diet is an emotive issue for adolescents (Hoying, 2015). Guidance counsellors were reluctant to address dietary issues with adolescents because it may cause them emotional distress. This creates a paradox which prevents guidance counsellors addressing a fundamental causal factor of mental illness. Emotivity around diet indicates diet is causing a psychological issue; however, if adolescents do not relate diet to their psychological issues, they are unlikely to acknowledge the need to address their dietary behaviour (Hoying, 2015).

Although nutritional psychiatry is becoming more recognised, insufficient research has been done to support its use in mainstream medicine. Therapeutic dietary intervention is a psychiatric modality and an alternative to pharmacological treatments (Jacka, 2017). Guidance counsellors believed it was not compatible with their treatment modalities; however, dietary intervention is within school nurses' and dieticians' scope of practice. Therefore, dieticians and school nurses could support a dietary alternative to pharmacological intervention, which complements guidance counselling. For this to be effective, professionals working with adolescents need to understand how nutrients affect neurological functions which influence mood. It is evident that dietary intervention is not supported by current health literature.

Guidance counsellors' choice of modality may be limited through lack of training options in NZ. This further hinders therapeutic dietary intervention. Unless guidelines are revised in accordance with new findings about the importance of saturated fat (Teicholz, 2023), and risks associated with UPFs, implementing a brain health diet as a therapeutic strategy could be challenging.

School nurses, employed by the Ministry of Health, and guidance counsellors who had a background in health, were more likely to follow nutritional guidelines when giving nutritional advice. Current research shows these guidelines do not meet the requirements to resolve mental health issues (Rucklidge, 2018). Health practitioners following nutritional guidelines could be a barrier to therapeutic dietary intervention. Until there is sufficient research to justify changing nutritional guidelines, implementing therapeutic dietary intervention in school mental health services will be challenging.

A further challenge is that mainstream medicine does acknowledge that diet is a key determinant of mental wellbeing (He Ara Oranga, 2019). Although guidance counsellors were aware that diet affects mental

wellbeing, they did not acknowledge that poor diet may cause mental illness. Furthermore, they did not acknowledge the need to address food addiction to promote mental wellbeing. This demonstrates the need for better understanding, in the wider medical field, of how food addiction relates to mood disorders. This needs to be translated into medical practice, so that adolescents are referred to medical specialists who can use diet to improve their mental wellbeing. To be effective, medical practitioners need to adopt a dietary framework based on recent findings on nutritional requirements for optimal brain health (Firth, 2020; Sarris, 2019).

Guidance counsellors' responses in this study suggested there is a mindset bias towards nutritional guidelines in their beliefs about what constitutes a healthy diet. Despite having not consulted nutritional guidelines, guidance counsellors tended to name plant-based foods as healthy, while excluding dairy. They referred to common narratives on diet when stating their beliefs about what was best for adolescents. Even when guidance counsellors had experienced benefits when following diets which deviated from MoH guidelines (2023), such as ketogenic diets, they perceived it may be potentially risky for adolescents. This showed official narratives about fat consumption have strongly influenced the popular mindset.

Several guidance counsellors stated the common missive, 'everything is okay in moderation.' 'Everything in moderation' is highly subjective. Very small amounts of ultra-processed food are harmful to physical and mental health; ultra-processed food should not exceed 10% of daily calorie intake (Wardak, 2022). This amounts to a small muffin or a few squares of chocolate. Perceptions of moderation are likely to be based on portion size in relation to the rest of the diet, rather than calorie content and nutritional values. Furthermore, ultra-processed food is typically sold in quantities that have more than 10% of recommended daily caloric requirements. Putting forward the view that everything is okay in moderation is more likely to encourage unhealthy dietary habits.

Dietary guidelines suggest perceptions of moderate unhealthy food intake may exceed healthy limits of ultra-processed food (MoH, 2021). This study did not explore adolescent perceptions of moderate ultra-processed food intake. Including this in subsequent research on adolescents' beliefs and attitudes to diet would be a useful addition to current knowledge.

This research was consistent with findings that socio-cultural influences determine adolescents' food choices. Guidance counsellors believed the proximity of dairies to schools affected adolescents' unhealthy dietary choices. They perceived buying food from a dairy on the way to school was more convenient than having breakfast at home. Evidence that adolescents are more impulsive (Arain, 2013) suggests that this is more likely to be a consequence of them not giving forethought to breakfast choices. Prioritising social engagement may also influence these decisions as adolescents often congregate near dairies prior to going to school. Logistically, this cannot account for poor dietary choices entirely, considering dairies serve relatively small numbers of adolescents relative to school populations. Furthermore, this is not consistent with findings that poor diet corresponds with poverty (Gerritsen, 2020). Although poverty may restrict adolescents' access to healthy foods, affluence does not necessarily lead to healthy dietary behaviours. Further research, involving adolescents, would elicit a better understanding of what influences adolescents' dietary choices.

School structures and culture were believed to further contribute to adolescents' poor dietary choices. The finding that adolescents do not eat to avoid needing the toilet, shows school breaks and lunchtimes significantly impact adolescents' diet, and subsequently, mental health. It is likely that students are consuming ultra-processed foods because they are not allocated sufficient time or resources to consume nutritious foods. This suggests school structure and practice conflicts with school wellbeing policies. The wellbeing curricula do not acknowledge that poor nutrition possibly causes mental health issues. Some guidance counsellors spoke about the food in schools programmes addressing hunger. They were unable to determine whether mental health had been considered in the planning and delivery of the programmes. Likewise, they were unable to comment on the wellbeing curriculum having not been involved in its delivery or implementation.

Strengths and Limitations

A strength of this research was that guidance counsellors were recruited from a wide demographic. This enabled us to determine how factors such as school policy and decile affected the way guidance counsellors were able to work with adolescents. Interviews generated rich data, which was both a strength and a limitation, as it was not possible to disseminate all the data within the scope of the analysis. The research was limited by the relatively small cohort. Including a school nurse and dean in the cohort was advantageous as it enabled us to understand the interdisciplinary nature of guidance counsellors' roles. School nurses and

Deans are a point of contact for adolescents with mental well-being issues and their role in supporting them can involve counselling. School nurses and deans can also refer adolescents to other service providers other than guidance counsellors. They could therefore be a useful point of contact if a therapeutic dietary intervention was developed without the support of school guidance counsellors.

Positionality Statement

The researcher acknowledges her positioning as a teacher and caregiver for adolescents suffering poor mental health, her own nutrition and health journey, and a desire to effectively translate trial findings into real world action. Through her own experience, the researcher has come to understand the barriers in the current mental health system to achieving positive outcomes for adolescents with mental health issues. Her own research background has embedded the belief that good nutrition could significantly reduce the burden of adolescent mental illness on society, as well as providing positive outcomes for adolescents.

In twenty-seven years of working with adolescents, she has observed declines in overall student well-being and how this has corresponded to changes in schools' dietary provision and subsequent adolescent dietary-linked behaviour. She has had personal involvement in school wellbeing initiatives, and while she believes raising the profile of mental wellbeing in schools is positive, the importance of dietary intervention is being overlooked.

Conclusion

This study's findings suggest guidance counsellors are not well-positioned to offer therapeutic dietary intervention for adolescents with mood disorders. Although guidance counsellors demonstrated awareness of the relationship between poor diet and mental illness, currently, their training and professional knowledge does not support this therapeutic modality. Guidance counsellors practise within a behavioural and experiential paradigm. Dietary intervention is neurobiological, which falls within a different therapeutic modality.

Guidance counsellors are educational rather than health-care professionals. This means they are not necessarily directed to health resources available to healthcare workers. Their knowledge of the relationship between nutrition and mental health is gained from outside the scope of their profession. Consequently, guidance counsellors are reluctant to offer dietary advice because their knowledge is not professionally endorsed. School nurses or dieticians would be better positioned to offer therapeutic dietary intervention.

Current nutritional guidelines upon which they base their practice are not designed to support mental health. Furthermore, dietary intervention is not universally recognised as a treatment pathway for mental illness.

Guidance counsellors believed education and providing healthy foods would be the most effective way to encourage adolescents to eat a healthy diet; however, dietary information in the public domain is confusing. This study finds that further implementation effectiveness research is needed to determine how adolescents can be encouraged to eat a healthy diet to improve their mental health.

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4. Study 2

Rationale

The purpose of this study is to explore the feasibility of a lifestyle intervention for adolescent mental health. WHO (2020) statistics show adolescents currently have the global highest rates of mental illness, with 25% of them being diagnosed. Actual figures are estimated to be higher because of non-diagnosis. Mental illness can have a serious impact on adolescents' quality of life and places a burden on society (Merikangas, 2010). If unresolved, mental illness rates are likely to increase in subsequent generations and further escalate the burden on society.

The increasing prevalence of adolescent mental illness, in recent years, suggests current approaches to preventing and treating mental illness do not work. Lack of resourcing means it is hard for adolescents to access counselling and other services (Radez, 2020). There is also an increasing over-reliance and inappropriate use of antidepressants as first-line treatment. It is recognised that antidepressants have limited efficacy and often have significant negative outcomes for young people (Almohammed, 2022; Maroun, 2018).

Poor diet characterised by excessive ultra-processed, or junk food consumption, is known to be a significant cause of poor mental health (Fulkerson, 2004; Hinchliffe, 2016; Opie, 2018). Adolescents typically eat more junk food than other age-groups, which may partially explain why they experience higher rates of mental illness (Malmir, 2022).

Several pathologies link poor diet to poor mental health and wellbeing. The brain is the most metabolically active organ and if poor metabolism prevents it from meeting its nutritional needs, this disrupts neural functioning (Teesdale, 2017). Insufficient intake of essential amino fatty acids and micronutrients, required for synthesis of neurotransmitters, disrupts neural signalling and affects mood regulation (Muscaritoli, 2021).

Excessive consumption of sugar, especially from junk foods, can lead to a high glycaemic load. This can lead to hypoglycaemia, which can induce long-lasting disturbances in glutamatergic signalling and neural

damages, causing depressive behaviours (Baek, 2022). Such disturbances can easily be remediated by eliminating junk food from diets in favour of foods that have a lower glycaemic load. (Firth 2019; Opie, 2017). Mainstream healthcare lacks the infrastructure to implement these services (Glanz, 2016).

Lifestyle interventions can be a highly effective alternative to mainstream treatment of mental illness, due to their emphasis on dietary behaviour change. (Fulkerson, 2003; Hinchliffe, 2016; Opie, 2018; Rucklidge, 2013). Some experts, including the Australia-New Zealand College of Psychiatrists, believe these should be the frontline treatment before pharmaceuticals (Malhi, 2020). Recent research has shown nutritional approaches using micronutrient supplementation have been more effective than pharmacological approaches for mental health issues, without psychotherapy (Rucklidge, 2013; 2018). The research basis for micronutrient supplementation is still relatively low compared to RCTs on antidepressants. Consequently, it is difficult to get them endorsed in mainstream medical practice. Pharmacology and psychotherapy, therefore, remain first-line therapeutic practise for mental health.

Although promising as an alternative to pharmacological treatments for mental illnesses (Rucklidge, 2013, 2018), micronutrient supplementation is unlikely to provide a long-term solution. It could be economically difficult for mental health sufferers or their families to meet costs, especially as lower socioeconomic status increases the risk of mental illness (Shields-Zeeman, 2022). Improving diet quality could be a more sustainable way of improving mental health outcomes for adolescents if they are shown cost-effective ways of eating a healthy diet through a lifestyle intervention (Hoying, 2015; Melnyk, 2015; 2017; Rucklidge, 2021).

Although current research has shown there is a connection between poor diet and mental illness, few studies have been done to show how dietary intervention can remedy poor mental health. The SMILES (Rachelle, 2018) and COPE (Melynk, 2015; 2017) intervention strategies showed dietary intervention can achieve positive outcomes for early teens and adults with mental illness. Evidence of real-world application of dietary intervention is still lacking, therefore more implementation science is needed. The formative work in this study is critical in this.

Implementation science could establish how dietary intervention could help older adolescents (16- to 18-year-olds) overcome mental health issues and the best way to support them in healthy eating. Studies suggest dietary interventions are more effective when implemented in community settings with parental supervision (Hoying, 2015). This presents a further challenge because adolescents over 16 are more autonomous than younger children from adults and therefore may be reluctant to engage with an intervention under adult supervision. Effective formative research needs to be done to determine barriers and motivators to adolescent healthy eating, which respects their autonomy.

Understanding why junk food consumption is high in this age-group, through formative qualitative research, would be an important step in implementation science practice. Furthermore, a qualitative study could develop understanding of how adolescents respond to exogenous influences on dietary behaviours, such as marketing, school health curricula, and socio-economic influences.

The rationale for the research is that we know very little about the intentions and knowledge of this age-group with respect to dietary behaviour. The implementation of effective interventions to improve adolescent diet and mental health requires a thorough understanding of the context and needs of the target population. Formative research is essential to inform implementation science, as it helps identify the barriers and facilitators to behaviour change, as well as the cultural, social, and environmental factors that influence dietary and mental health behaviours among adolescents.

This type of research can provide insights into the attitudes, beliefs, and practices of adolescents, their families, and their communities. Formative research can also help identify the most appropriate strategies for delivering interventions that are acceptable and feasible for adolescents. Without this valuable information, interventions may fail to be effective, sustainable, or scalable. Therefore, formative research is a crucial step in the implementation of successful interventions to promote healthy diets and mental health among adolescents.

Abstract

In recent years there has been an exponential rise in adolescent mental illness. Consequently, adolescents are overrepresented in current global mental health statistics. Research on the use of micronutrient supplements, in the treatment of mental illnesses, suggests improving the nutritional quality of diet is likely to improve adolescent mental health; however, current therapeutic strategies overlook the contribution of poor diet to mental illness in this age group. This may account for the low efficacy of current treatments.

Ultra-processed or junk food consumption is known to be high in this age-group. This is believed to be driven by impulsive decision making, which is typical in adolescents due to their stage of neurological development. It can be discerned from this evidence that dietary behaviour change could be difficult for adolescents if they are unable to make rational dietary choices. This assumption has been contradicted by recent neurological research that has found that the same neurological mechanisms that cause adolescent impulsivity can also govern prosocial behaviour. Therefore, it is possible that when incentivised, adolescents could engage in a dietary intervention to improve their mental health.

Little is known about the intentions of this age-group regarding dietary behaviour. Therefore, we conducted formative interviews to learn more about adolescents' attitudes, beliefs, and motivators with respect to healthy eating in the interests of mental wellbeing. This helped determine the feasibility of a dietary intervention to promote adolescent mental wellbeing and how this could be designed and implemented.

This formative, quantitative study aimed to determine:

Whether an intervention to promote healthy eating for mental health and wellbeing in adolescents is feasible.
If feasible, what are the important structural and delivery points as identified by adolescents?

The following themes (in bold) were constructed using thematic inductive analysis.
Adolescents showed they would make autonomous (**autonomy)** healthy dietary choices when they were empowered (**empowerment)** through **knowledge** and **experience** about how diet could

improve their mental wellbeing. **Connecting** negative experience to unhealthy eating steered them towards healthier eating.

Ethics and **heteronomy** were also the basis of autonomous choices. Adolescent rebellious tendencies could be directed towards positive dietary behaviour, provided adolescents believed it was beneficial.

Autonomous dietary behaviour change was not entirely possible, however, because they were still subjected to **parental influence**. Dietary behaviour change depended on and how willing or able parents were to support them.

The study showed dietary intervention was a feasible therapeutic strategy for adolescents with mild to moderate mood disorders. Although adolescents demonstrated they could be motivated to make autonomous healthy dietary choices, overcoming heteronomous barriers to healthy eating was not entirely possible without the support of parents.

Introduction

Current health statistics show adolescents are more likely to suffer poor mental health than other age-groups (WHO 2021). The increase in mental illness in this age group, in recent years, suggests current treatments are not working. This negatively affects their quality of life and achievement in school.

Evidence suggests poor diet increases adolescents' vulnerability to mental illness (Hinchliffe, 2016; Opie, 2018; Rucklidge, 2013). Therefore, lifestyle interventions could be effective treatments (Jacka, 2017). Encouraging adolescents to change their diet to improve their mental health could be difficult due to unhealthy eating being driven by impulsivity and susceptibility to media marketing of junk foods (Jacka, 2017; Romeo, 2017); however, recent research has shown that mechanisms in the brain which cause impulsivity can also cause prosocial behaviour (Schreuder, 2021). This could translate into healthy eating.

Formative research is essential to inform implementation science, as it helps identify the cultural, social, and environmental factors that influence dietary behaviours, as well as the barriers and facilitators to behaviour change among adolescents. Learning what adolescents know about healthy eating and what influences their food choices, would be useful in devising an intervention to improve adolescent mental wellbeing through healthy eating.

A qualitative study could further increase knowledge of how adolescents respond to influences on dietary behaviours, such as marketing, school health curricula and socio-economic influences. As most mental health research has targeted vulnerable youth (Jacka, 2017; Kulkarni, 2015), conducting interviews with a broader cross-section of adolescents may give greater insights into how barriers to healthy eating can be overcome.

Aims

This formative, qualitative study aimed to determine: Whether an intervention to promote health eating for mental health and wellbeing in adolescents is feasible. If feasible, what are the important structural and delivery points as identified by the adolescents?

Methods

Participants

Participants in this study were adolescents aged 16-18 in South Auckland and North Waikato, New Zealand (NZ). Data for this analysis was drawn from focus group interviews in groups of three to five (n=15) participants. Participants were recruited via advertisements in school newsletters. Three schools were approached.

The research was approved by AUT's Ethics Committee (AUTEC #21/147). Focus group interviews were conducted. They were recorded and transcribed using Microsoft Word. Transcripts were checked against the recordings to ensure accuracy. Recordings were then deleted and participants disidentified in transcripts and further research outputs. Transcripts were stored on the secure AUT server.

Data Analysis

The theoretical framework for both studies was interpretivist (Levers, 2013). Data were interpreted in relation to recent cohort studies in this field (Jacka, 2017; Kulkarni, 2015). Thematic inductive analysis (Braun and Clarke, 2014) determined common themes relating to adolescents' knowledge of how diet affects mental health, and how adolescents could overcome barriers and be motivated to eat a healthy diet to improve their mental health. Findings were used to determine whether an intervention to promote healthy eating for mental health and wellbeing in adolescents is feasible and what the structural and delivery points would be for such an intervention.

Results

Two themes were constructed from the data: empowerment and autonomy.

1) Empowerment

The data showed that empowerment played a crucial role in driving dietary changes among adolescents. Adolescents who felt empowered and in control of their choices were more likely to take responsibility for their dietary habits. Empowerment stemmed from knowledge and connecting experience to dietary behaviour. These attributes could be fostered to promote dietary change in the interests of mental wellbeing.

1a) Knowledge

Knowledge was a key factor in determining how far adolescents felt empowered to adopt a healthy diet. Adolescents who had better knowledge of how poor diet affected health were more likely to adopt a healthy diet and avoid junk food. They did not have sufficient knowledge to plan meals which would optimise their nutrient intake for good health. Most knew about macronutrients but did not know the specific requirements and how to obtain them. Adolescents emphasised the importance of maintaining calories from carbohydrate and protein, while minimising fat intake. Most of them emphasised fruits and vegetables as the best sources of nutrition.

Participants had not heard of any nutritional guidelines. Nonetheless, their nutritional knowledge reflected nutritional guidelines. This suggested nutritional information was filtering through to them from other sources. This was reflected in their limited knowledge of micronutrients; some knew the specific functions of single micronutrients but none of the adolescents knew the importance of obtaining the full range of micronutrients through diet. They focused more on diet meeting energy needs; this justified eating some junk food. Although they knew junk food was unhealthy, they believed if they could offset harm by burning calories through physical activity.

We think that we can do whatever we want at this age … I run around; I'll burn all those fats.

Physical health and weight management were the main drivers of healthy eating. They linked poor diet to anxiety and depression through the negative effects of weight gain on body image.

You can get fat and get anxiety.

Adolescents who said they suffered from anxiety were making more effort than others to incorporate healthy foods into their diet. All participants acknowledged they were eating too much junk food; their perceptions of excessive junk food consumption varied from eating one unhealthy meal or snack daily, to eating them weekly. This shows either that accurate and reliable information about healthy eating is lacking, or they are misinterpreting healthy eating advice.

Overall, findings suggested adolescents' knowledge of the relationship between diet and mental wellbeing would need to improve if they were to successfully participate in a dietary intervention. Most of the adolescents in this study were consciously attempting to incorporate some healthy foods into their diet; however, they had not received sufficient education to know what they should be eating for good health. This meant that their beliefs about healthy eating did not necessarily reflect what was good for health.

I'm on a diet; I've got to eat [perceived] healthy sandwiches.

Although the adolescents were making conscious decisions to avoid junk food, alternative choices, such as sandwiches, still contain excessive refined carbohydrates in favour of healthy fats and protein.

In part, the reason adolescents were unable to make informed decisions about healthy eating was that schools were not adequately covering nutrition in curricula. Knowledge about diet depended on what subjects the adolescents took in school and how well they engaged in them. Nutrition was only covered in biology and health, meaning adolescents only learnt about nutrition if they took those subjects. One participant had learnt how diet affects mental health in health class. This was because the school had decided to cover it.

> *I think we did something about that in health class, but I can't remember.*

Schools did not give the adolescents the best advice on nutrition. Much of the health curriculum was based on the food pyramid, which is misleading in its recommendations on safe amounts of junk food consumption. The adolescents showed they could be discerning, however, and would challenge information if they believed they had been better informed elsewhere.

> *We learn about this and (sic) outdoor ed(ucation). If you go on a hike you wanna have like more lolly or something and that boosts your glucose levels, but they also drop down really quick(ly) …. so, what you want to do is eat a something that has a slow build up.*

This showed that adolescents could be open to an intervention, which offered an alternative approach to diet, provided they were given credible advice and information.

Higher levels of engagement in outdoor education compared to health education showed that experiential learning would be a more effective way of teaching adolescents about nutrition. An intervention is more likely to be effective if kinaesthetic methodologies are adopted.

1b) Experience

Although knowledge and experience of the negative effects of unhealthy eating on physical health were drivers of dietary behaviour change, adolescents were not motivated to change their diet to improve mental health. This is most likely because they were not connecting what they ate to long-term mental health problems. Instead, they linked mental health issues to social problems or trauma because this is what they learn through health information channels. They were unaware of how healthy eating can make them more resilient to stress and trauma.

Some participants noticed junk foods made them less alert and caused physical discomfort. They noticed they felt unmotivated after eating unhealthy food but did not know this could cause long-term mood disorders.

> *When you eat junk food it does start to make you feel like (sic) a lower well-being … when I eat healthy food, I feel like motivated to get going and work.*

This led them to avoid junk foods prior to situations where they needed to be on form, physically or mentally. This suggested that when adolescents had connected a bad experience to poor dietary choice, they were more likely to avoid that food. Furthermore, when adolescents had seen family members suffer poor health due to poor diet, they were more likely to avoid junk food. This enabled them to resist peer pressure and parental influence when making dietary choices.

> *My dad convinces me to try and taste one cheeseburger; I eat the [perceived healthy] sandwich.*

A further structural and delivery point in a dietary intervention would involve connecting negative experiences to diet.

In addition to resisting peer and parental pressure, adolescents were not influenced by food marketing which targeted them. Adolescents knew the information the food industry gives about the healthiness of the foods they produce is misleading.

They'll put in big letters, low fat or high in protein … They won't look for the sugars or the calories or any of the bad stuff as long as they've advertised the good stuff.

They knew unhealthy foods are marketed to look healthy through the promotion of single nutrients or ingredients, while downplaying high sugar content. They believed processed food marketing preys on lack of knowledge. Conversely, lack of advertising of healthy foods discourages healthy eating.

I'm not going to eat something because of an advert.

2) Autonomy

2a) Ethics

The data showed that ethical considerations can motivate autonomous healthy eating and empower them to resist peer pressure and parental influence. Some participants were vegetarian or would avoid fast-food outlets due to concerns for the environment or animal welfare, even if their friends bought food there.

I've kind of created this stigma against McDonald's or KFC. I'd just not go there at all.

Responses from vegetarian participants suggested ethical considerations were also a barrier to healthy eating. They were prepared to sacrifice health for morals where they believed environmental concerns and animal welfare were more important than their own health. If the dietary intervention includes vegetarians, it must include guidance on meeting their nutrient requirements while also respecting their ethical considerations.

Vegetarian participants had greater awareness of nutritional needs and took steps to address nutritional deficits in the diet.

I am a vegetarian, so we are usually iron deficient and I'm mindful of that.

This suggests that when adolescents are aware of specific health issues associated with deficits in key nutrients, they will take steps to remedy them. A structural and delivery point in a dietary intervention would

need to include educating adolescents about the importance of balanced nutrient intake and how to obtain them through diet. This would enable them to make autonomous dietary choices to optimise nutrient intake.

2b) Heteronomy.

Even when adolescents showed a desire to adopt a healthy diet, several constraining factors made it difficult. Lack of affordable healthy options in the external environment meant that participants were only able to eat healthy food when it was provided for them by their parents at home. The adolescents' ability to eat healthy food depended largely on what was available at home or whether their parents could afford healthy food.

School and work commitments increased junk food consumption because it was easier to fit round them. School break times did not give them enough time to eat proper meals, so they snacked to keep them going until they had a proper meal at home. Low appetite in the morning also led to snacking or fasting during the day. Having working parents increased junk food consumption during school time because they did not have enough time to make them breakfast.

> *I'll be having home cooked food pretty much every night. Maybe Friday, Saturday, I'll have something else.*

Most adolescents said cost was the biggest barrier to eating a healthy diet. They bought junk food, while knowing it was bad for them, because they could not afford healthy food.

> *If I don't have the money, or if I don't have the time to actually eat or to actually buy the food, I can have all the information in the world, but I won't eat any better.*

Greater wealth did not stop adolescents eating junk food, however, because it tasted better, and it was convenient when 'on-the-go'.

> *I can buy certain foods that maybe other people would like but I'd rather just go to McDonald's.*

Adolescents from wealthier backgrounds were more likely to eat a healthier diet because their parents bought and prepared it for them. Some participants said they ate more junk food because they had part-time jobs and could buy food independently. These were also influenced by the belief that junk foods were treats.

Discussion

The findings from this research gave insights into what motivates adolescents' eating behaviour and what they know about how diet affects mental health. This enabled us to determine the structural and delivery points of a dietary intervention to improve adolescent mental wellbeing. We showed a dietary intervention would be feasible because adolescents can resist exogenous influences on dietary behaviour such as peer pressure, parental influence and media marketing which targets adolescents. Our findings challenged previous research that linked poor diet to impulsivity and risky behaviours (Romeo, 2017).

Our research also contradicted findings that poorer emotional regulation would make it harder for adolescents with anxiety and depression to adopt a healthy diet. Participants who reported symptoms of anxiety and depression also reported avoiding junk food. A possible explanation is that they were more socially isolated (Christiansen, 2021) and therefore less exposed to negative peer influence. They would also be less vulnerable to junk food marketing which targets adolescents because they would not positively identify with the target group. This would be advantageous in a dietary intervention because it would appeal to their sense of 'otherness' and individuality.

A fundamental aspect of a successful intervention would be connecting unhealthy eating to low mood, and negative social outcomes, while showing adolescents that healthy eating can reverse these effects. Adolescents were previously thought to be unable to think of the consequences of their actions and prone to emotional decision making (Romeo, 2017). This was thought to be driving unhealthy eating choices. Findings from our research were more in line with recent findings that the same neurological mechanisms which cause risky behaviour are also responsible for prosocial behaviours (Schreuder, 2021). This suggests that both healthy and unhealthy eating are emotionally driven. Therefore, an aspect of dietary intervention would involve adolescents connecting their low mood to eating excessive amounts of ultra-processed food.

Although our research found adolescents could overcome psychological barriers to healthy eating and respond well to a dietary intervention, external barriers could prevent successful implementation. Although adolescents have greater autonomy in their dietary choices, they are not entirely independent from their parents and a significant proportion of their diet is influenced by what their parents provide at home. This could be a barrier to a successful dietary intervention if parents are unwilling to change the dietary culture in the home, especially when there are economic constraints.

This is consistent with findings that adolescents are more likely to engage in risky behaviour if their parents took risks (Ratliff, 2021). Where a culture of healthy eating existed in the family environment, adolescents were more likely to avoid junk food. Adolescents also associated junk food with treats. Again, this is likely to have been learnt from their parents at an early age. Reward systems are highly active in the adolescent brain (Harris, 2020), which shows that how parents reward young children could influence how they seek rewards in adolescence.

Parental influence also overrode peer pressure, especially when parents had sufficiently informed adolescents about the harmful effects of poor diet; however, parents, could negatively influence adolescents' eating behaviours. Adolescents who had gained knowledge or experience of the detrimental effects of unhealthy eating resisted negative parental influence and peer pressure. Again, this is consistent with findings that adolescents can make rational choices and that the neurological mechanisms which cause impulsivity can promote healthy eating behaviour (Schreuder, 2021). A successful dietary intervention would involve parents learning why a healthy diet is important for mental well-being.

Lack of guidance was a significant barrier to adolescents eating a healthy diet. They knew little about how diet affected mental wellbeing or how they could meet the nutritional requirements for brain health. It was clear that their beliefs were based on nutritional guidelines, and this had filtered through to them through school curricula, what influential adults had told them, and through the wider media. Consequently, they were more focused on the importance of food meeting energy needs rather than nutritional needs. This justified eating some junk food because the adolescents did not know how much they could eat within healthy limits. This demonstrates that nutritional guidelines and school health education can encourage risky eating behaviours in adolescents. The intervention should include an educational component which focuses

on what foods give participants micronutrients and macronutrients in the right balance and why this is important for mental wellbeing. They should also learn why it is important to eat healthy fats, including saturated fats, for mental wellbeing.

It could be difficult convincing them it is okay to eat saturated fats when public health advice recommends avoiding them. This is especially difficult when this information is given to them through trusted sources such as schools. Our research showed that adolescents will question dietary advice given to them by teachers if they have learnt differently from more reliable sources. Again, it is important for the research team to demonstrate the information is reliable by showing that it is based on credible research.

Although this research showed adolescents could be motivated to change their dietary behaviour in the interest of mental wellbeing, heteronomy made this difficult. Adolescents are frequently exposed to unhealthy food options in their external environment, such as fast-food restaurants, vending machines, and convenience stores. As part of a dietary intervention to promote healthy eating habits, it is important to teach adolescents how to navigate these choices and make healthier decisions. The educational component of the intervention should teach them where they can purchase healthy foods while they are away from home and how they can substitute their usual choices for healthy options.

Cost was shown to be a significant factor in determining whether adolescents chose healthy food or junk food. It is widely perceived that healthy food is significantly more expensive than junk food. Rucklidge (2021) and Walburg (2019), showed that healthy eating could be more cost effective than eating junk food. This is because the low nutrient density of junk food leads to food cravings and therefore overeating. In the long run, this leads to more spending on food. Also, popular junk foods, such as crisps, are sold in smaller portions than healthier options such as a piece of fruit or nuts. This means junk foods are often more expensive per gram and less likely to satisfy appetite. The educational component of the intervention therefore should examine food costs in relation to nutrient content. Adolescents would need to be taught that both nutritional and energy needs cause hunger. A healthy diet satisfies hunger better because nutritional needs are met with less food (Burchi, 2011). Learning how nutritional needs can be met more cost effectively through healthy eating would be another important delivery point in the intervention.

This research showed adolescents are unaware of how diet affects mental wellbeing because it is not covered in school curricula. Previous research we conducted with guidance counsellors suggests this is not addressed at Ministerial level. Formative research could help to inform policy and practice at governmental level, which would allow schools to improve the delivery of health information related to diet and mental wellbeing.

Positionality Statement

The researcher acknowledges her positioning as a teacher and caregiver for adolescents suffering poor mental health, her own nutrition and health journey, and a desire to effectively translate trial findings into real world action. Through her own experience, she has come to understand the barriers in the current mental health system to achieving positive outcomes for adolescents with mental health issues. Her own research background has embedded the belief that good nutrition could significantly reduce the burden of adolescent mental illness on society.

In twenty-seven years of working with adolescents, she has observed declines in overall student well-being and behaviour in schools, which corresponded to a decline in the overall nutritional quality of adolescent diets. Being a single working mother made her aware that it is increasingly difficult to encourage adolescents to adopt healthy eating habits as they become more autonomous, especially with the abundance of fast-food outlets in external environments. Findings to this effect concurred with her own beliefs, however, she was careful not to let this bias her judgements.

Having worked with adolescents for many years, the researcher is aware of the diversity of beliefs, attitudes and behaviours of this age-group with respect to many aspects of their lives. She was aware that prejudgement could have biased her finding that adolescents could make informed, rational dietary choices, as she had already observed this in adolescents.

Strengths and Limitations

A strength of this study is that it provided comprehensive data. The qualitative approach allowed an in-depth exploration of the participants' attitudes, beliefs, and motivators relating to diet and uncovered a range of factors that could influence dietary behaviour. The findings provided additional insights into other studies in this field and built on current knowledge. They also identified areas for future research which would be needed to further inform a dietary intervention.

Including participants from mixed ethnic groups and socio-economic backgrounds, enabled the study to explore the intersectionality of factors that influence attitudes, beliefs, and motivators regarding diet. Recruiting a small sample from two regions of New Zealand, however, may have limited the generalisability of the findings to other populations.

Using qualitative methodology had its limitations. The exploratory nature of the questions meant they were open to misinterpretation. This varying ability of adolescents to articulate their ideas or contextualise questions, due to their stage of cognitive development, meant participants did not always provide precise enough detail in some areas.

Conclusion

This research showed that a dietary intervention would be feasible for adolescent mental wellbeing and helped determine how it could be delivered. An effective strategy would involve adolescents connecting poor mental health to eating behaviours. Increasing knowledge of how unhealthy eating affects mental wellbeing could also help adolescents make rational food choices, as this is within their developmental capability. Adolescents showed they could be resilient to peer pressure and parental influence when given the right knowledge and motivation to eat a healthy diet, even when they experienced symptoms of anxiety and depression. This could be a powerful mechanism in a dietary intervention.

Cost may be a more difficult barrier to overcome, especially when affordable healthy food options are scarce in external environments. Therefore, adolescents would need to be taught cost-effective ways of eating

healthy food and how to navigate healthy food choices away from home. Adolescents currently are not adequately educated about the effects of poor diet on overall health. Consequently, they eat too much junk food. Those who know more about the effects of unhealthy eating act on what they know. Therefore, a dietary intervention would need to include an educational component.

Currently, schools are not adequately educating adolescents about the effects of diet on mental wellbeing. Implementation science could help to inform policy and practice at governmental level, which would allow schools to improve the delivery of health information related to diet and mental wellbeing.

Overall, we found the adolescents were keen to adopt a healthy diet but struggled to navigate exogenous constraints on healthy eating. A dietary intervention, therefore, would need to focus not only on adolescents avoiding junk food, but also showing them how they can make healthy choices in a pathological food environment. Enhancing their knowledge of how diet affects mental wellbeing and connecting poor diet to low mood could empower them to make autonomous healthy dietary choices in the interest of mental wellbeing.

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5. Discussion

The aim of this thesis is to present two distinct but related studies that explore the feasibility and perspectives of using diet as a therapeutic intervention for adolescent mental well-being. Qualitative interviews were used to explore the beliefs and attitudes of guidance counsellors and adolescents with respect to diet, and its potential to promote mental wellbeing. Study 1 examined their role of guidance counsellors and the broader school environment, to determine whether delivering dietary intervention was within their scope of practice, knowledge and skill base. Study 2 focused on how receptive adolescents would be to dietary change in the interest of mental wellbeing. Both studies explored participants' knowledge of the relationship between diet and mental wellbeing. Additionally, they determined motivators and barriers to healthy eating and how dietary change could be effected in adolescents in the interest of mental wellbeing.

Both studies used the interpretivist theoretical framework (Levers, 2013). Data were interpreted in relation to recent cohort studies in this field (Jacka, 2013; Kulkarni, 2015). Thematic inductive analysis (Braun and Clarke, 2014) determined common themes relating to guidance counsellors and adolescents' knowledge of how diet affects mental health. Additionally, both studies explored ways in which adolescents could overcome barriers and be motivated to eat a healthy diet to improve their mental health. Findings were used to determine whether an intervention to promote healthy eating for mental health and wellbeing in adolescents would be feasible, what the structural and delivery points would be for such an intervention, and whether guidance counsellors could be involved in its delivery.

Overall, the two studies provided formative data for further implementation effectiveness research on the therapeutic potential of dietary intervention for adolescents with mental health issues. Although the studies aimed to determine how dietary behaviour change could be effected in adolescents, it was important to interview guidance counsellors because they offer front-line treatment for adolescents with mental health issues and could use dietary intervention as a therapeutic strategy.

Several themes (in bold) were constructed from the data using thematic inductive analysis:

Study 1:

The results of Study 1 identified several factors that affected guidance counsellors' ability to deliver a dietary intervention. These factors included **therapeutic modalities**, **the influence of food marketing, inconsistency** in the diet and mental health relationship, and the importance of **therapeutic relationships.**

Counsellors also considered that **multiple factors affect adolescent dietary choices,** and that **'bad' food is better than no food**. They emphasised the importance of **moderation** in dietary practices. Regarding **scope of their practice**, counsellors recognised the potential benefits of **school-wide approaches** to promoting healthy dietary habits among students.

Guidance counsellors were aware of the relationship between diet and mental wellbeing. This was based on **inherent beliefs** which were formed outside their professional learning. Inherent beliefs conflicted with their professional responsibilities, which were determined by the remit of their governing bodies. Dietary intervention did not exist in this remit; therefore, it could not be used in their practice. Guidance counsellors' scope of practice is limited by Ministry of Education directives.

The professional remit for guidance counsellors is generally focused on providing talk-based therapies, such as cognitive-behavioural therapy or solution-focused therapy. These therapeutic modalities are based on the premise that individuals can overcome their psychological difficulties by changing their thoughts, beliefs, and behaviours. By contrast, dietary intervention is a more prescriptive approach that involves changing an individual's eating habits to improve their mental health. While they recognised that diet had an impact on mental health, guidance counsellors were hesitant to use dietary interventions with adolescents as it was not considered part of their scope of practice. Therefore, it was not feasible for guidance counsellors to incorporate dietary intervention into their therapeutic modalities.

At present, using school settings for dietary intervention appears unworkable. There would need to be substantial changes in the way guidance counsellors are trained, supported, and develop their therapeutic modalities for this to become feasible within their scope of practice.

The findings from Study 2 highlighted the perspectives of adolescents on the relationship between diet and mental health. Dietary change relied on adolescents being **empowered** by **knowledge** and experience. They believed that sufficient knowledge about the impact of diet on mental health was essential for making informed choices. Change was reliant on supportive family members, however, particularly parents, and other trusted adults. Additionally, personal experiences played a significant role in shaping their beliefs about the **connection** between diet and mental health. When adolescents made a psychological connection between diet and negative experience, they were emotionally driven to make healthier food choices. The study determined this was key to successful engagement in a dietary intervention.

The adolescents in Study 2 also expressed a desire for **autonomy** in their dietary decisions. Being told to eat a certain way by parents might produce the opposite effect, suggesting rebelliousness determined dietary behaviour. **Ethics** and **heteronomy** were also the basis of autonomous choices and therefore should be considered when introducing dietary interventions for mental health. Study 2 showed adolescents are receptive to information on diet and health, including mental health, but it would need to be pitched and delivered in a way that is credible.

Overall, the results of these two studies provide valuable insights into the potential use of diet as a therapeutic intervention for mental health in adolescents and the factors that may facilitate or hinder its implementation. Taken together, the results of these studies showed dietary intervention was a feasible therapeutic strategy for adolescents with mild to moderate mood disorders. Although delivery was not within guidance counsellors' scope of practice, the study did not rule out conducting a dietary intervention in a school setting. This could involve other professionals working in schools, such as teachers and deans, who would be less restricted by their professional remit.

The data showed that dietary behaviour change could be initiated by the adolescents themselves, provided they were empowered with the knowledge and resources to make autonomous dietary choices. Furthermore, if adolescents could connect low mood to poor diet, the neurological mechanisms which are responsible for impulsive dietary decision making, could be redirected to healthy eating behaviours. This is compatible with guidance counsellors' therapeutic modalities because they emphasised adolescents finding solutions within themselves. Therefore, guidance counsellors could suggest to adolescents that they adopt a healthy diet to

improve their mental wellbeing and direct them to resources that would empower them to make healthy dietary choices; however, they could not advise adolescents on healthy eating or direct a dietary intervention as this is outside their scope of practice.

With respect to dietary behaviour change, if adolescents understand the importance of nutrition in supporting resilience to stress, this could reinforce dietary behaviour change in the same way CBT affects emotional responses to stress. Failure to consider diet as a therapeutic strategy largely came down to lack of knowledge. Although some guidance counsellors and adolescents were aware of the connection between diet and mental wellbeing, it was given little importance compared to other factors, such as resilience to stress. This was mainly due to diet's relationship with mental wellbeing being poorly emphasised in public information.

The data from both studies showed, at Ministerial level, there was a systemic failure to provide guidance counsellors with the relevant professional development or knowledge foundation to consider diet as a therapeutic strategy. This could be addressed through additional training and professional development; however, it would require greater acceptance at Ministerial level, that dietary intervention is a feasible therapeutic strategy for mental illness. This, in turn, could influence policy directives which determine what guidance counsellors learn in their training and professional development.

Likewise, there was a failure at curriculum level to provide knowledge which empowered adolescents to remediate their own mental health through dietary choices. While the profile of student wellbeing is being raised in school policy, diet, as both a causal and remediating factor, is missing from the curriculum. Compulsory learning about the relationship between diet and mental health, especially in years 9 and 10, is needed to help avert a mental health crisis. Current nutritional guidelines are, a significant barrier, however, because they do not align to current research on what is required for mental wellbeing. Both studies found that adolescents and guidance counsellors were reluctant to make changes that involved adopting a diet which went against nutritional guidelines. Therefore, changes are needed at government level.

Although knowledge was a common underlying theme in both studies, both adolescents and guidance counsellors were unaware of how they had acquired their knowledge. Neither guidance counsellors nor adolescents had consulted official sources of dietary information, yet both groups' beliefs about healthy

eating conformed to government guidelines. This suggested the information permeated vicariously through media marketing of foods, including food labelling. Both adolescents and guidance counsellors were aware that media marketing could be misleading; they were able to distinguish between accurate and misleading nutritional information, but it was unclear how their discernment had occurred.

A further common finding in both studies was that healthy eating was hard to navigate in a pathological food environment. The high availability of ultra-processed foods, in addition to the higher cost of healthy food, was driving up unhealthy eating. Guidance counsellors found it hard to meet the costs of healthy foods for their families. Likewise, adolescents only ate healthy foods if their parents could provide them at home. In external settings where adolescents could make autonomous choices, they tended to make unhealthy choices. This suggested increasing autonomy led adolescents to eat more ultra-processed foods.

Results from both studies showed adolescents are not fully autonomous from adults. Therefore, dietary behaviour change could not be effected without the involvement of trusted adults. Parents, especially, would need to be involved in a supportive role, as they would be required to meet costs. Both studies supported the finding that family economic circumstance could be a potential barrier to parental support for adolescents eating a healthy diet.

What Did this Research Add to Current Knowledge?

Research into adolescent attitudes, beliefs, and motivators in relation to diet is lacking. While extensive research exists on dietary behaviours and their association with health outcomes, there is still much to be learned about the underlying factors that shape eating beliefs and then behaviours. The two studies in this thesis offered fresh insights into adolescents' attitudes, beliefs and motivators in relation to dietary behaviour, while building on previous research.

The findings from the two studies contradicted the view that adolescents' unhealthy eating behaviours are impulsive and governed by emotional decision making. Study 2 showed that adolescents could make informed, rational dietary choices based on well-informed belief systems, even when they experienced symptoms of anxiety and depression. How far they adopted a healthy diet was determined by their knowledge and understanding of what constituted a healthy diet. Risky eating

decisions were also shown to be influenced by inherent beliefs. This suggested that changing adolescent belief systems could be an effective strategy in a dietary intervention.

Currently, dietary intervention strategies aimed at adolescents are informed by Neumark-Sztainer's (1996) theoretical framework. This has proved useful in identifying influences which need to be addressed to elicit adolescent dietary behaviour change; however, findings from the two studies in this thesis suggest the framework has some limitations. These specifically relate to key motivators for dietary behaviour change in adolescents.

The additional insights from the two studies in this thesis showed adolescents could be far more instrumental in their own behaviour change if they were empowered through knowledge to make autonomous choices. This centred upon developing belief systems which governed dietary choices. Furthermore, when belief systems are endemic to adolescents' sense of self, they become more resistant to heteronomous influences, such as peers, parents or media marketing. This overrides impulsivity.

The studies also considered the influence of social and cultural factors, such as peer and media influences, on adolescent dietary behaviour. The findings indicate that the relationship between these influences and dietary behaviour is more complex than previously thought, with adolescents being more likely to be influenced by peers, parents, or media if they perceive the influence to be beneficial. Adolescents would resist influences if they believed they were not beneficial. Previous research suggested adolescents were more likely to adopt unhealthy eating habits if parents were controlling in their enforcement of healthy eating (Savage, 2007). Study 2 highlighted a potential opposite effect when parents tried to enforce unhealthy eating habits. This suggested perceived rebelliousness could motivate healthful, as well as risky behaviours. This creates a dilemma, as we know adolescents need support to achieve measurable benefits, but if it is enforced too heavily, it has the reverse effect.

A further addition to current knowledge was that adolescents act on discernible information. They will question information given to them by influential adults if it contradicts information they perceive they have gained from more reliable sources. Again, this tends to make them act independently of heteronomous influences. This sheds new light on findings from neuroimaging research that showed adolescent behaviour

is impulsive and emotionally driven due to their stage of neurological development (Arain, 2013). Instead, the findings align to more recent research that centres of the brain that are responsible for impulsive behaviour can also promote prosocial behaviour (Schreuder, 2019). Findings from the studies in this thesis provided an explanation for how this could occur; when adolescents connected negative experiences to poor health, it would elicit dietary behaviour change. This suggests a new approach should be taken to dietary intervention which focuses on connecting positive mood to healthy eating.

How Did this Research Reinforce Current Research?

The two studies conducted for this thesis support findings from previous research into influences on adolescent dietary behaviour. Findings were consistent with other studies that highlight the need for a comprehensive approach to promoting healthy dietary behaviours among adolescents that considers various individual, familial, and environmental factors, as well as attitudes and personality traits.

The findings of both studies bore some resemblance to Neumark-Sztainer's (1996) theoretical framework, emphasising the significance of individual, familial, and environmental factors in shaping adolescent dietary behaviour. The studies support the finding that family meal frequency, parental involvement in food choices, and the availability of healthy food options are positively associated with better dietary quality among adolescents. Additionally, both studies supported Neumark-Sztainer's finding that accessibility and availability of healthy food options at home, school, and in the community plays a crucial role in promoting healthy eating habits among adolescents.

Findings from the two studies showed family had less influence on adolescent dietary behaviour as adolescents sought autonomy from parents. This tended to lead to higher consumption of ultra-processed food. These findings aligned to Reicks (2015) findings that adolescent diet quality is reduced when they become autonomous from parents. The two studies also supported findings that adolescent autonomy increases other risky eating, such as calorie restriction. This is connected to body image and aligns to Story's (2008) finding that individual factors, such as body image concerns and weight-related teasing, were associated with poorer dietary quality especially among adolescent females.

In line with Gibson (2016), an important finding from the two studies was that even when adolescents seek autonomy from parents, they value respectful relationships with other adults. Gibson's (2016) study suggests that guidance counsellors could influence adolescent dietary behaviour; however, this could not be done proactively as dietary intervention is not within their scope of practice.

Lack of understanding among adolescents and guidance counsellors about the link between diet and mental health were found to be a significant barrier to eliciting dietary behaviour change. Again, this was consistent with Gibson's (2016) findings. The two studies found that current school curricula were inadequate in promoting healthy eating in adolescents. Raising the profile of nutrition's role in improving mental wellbeing in school curricula, therefore, would be necessary in changing adolescent dietary behaviour. This was consistent with Arahmids's (2019) study that found nutrition education programs and interventions should consider the multitude of influences on adolescents eating habits and use theory-based and behavioural-focused approaches.

How far dietary behaviour was influenced by peers, parents and environmental factors came down to the individual. This aligned to MacNicol's (2003) study on the relationships between personality, attitudes, and dietary behaviour in Scottish adolescents aged 13 to 15 years old, which found that personality traits and attitudes towards healthy eating and dieting were significantly associated with dietary behaviours. The study also highlighted the importance of addressing specific attitudes towards dieting in interventions aimed at promoting healthy dietary behaviours among adolescents. Again, this was supported by findings from the two studies in this thesis.

Strengths

One of the strengths of these studies is the comprehensive data they provide. The qualitative approach used in both studies allowed for in-depth exploration of the participants' attitudes, beliefs and motivators, relating to diet. The studies uncovered a range of factors that could influence dietary behaviours, including cultural beliefs and practices, peer pressure, taste preferences, and perceptions of health. The findings provided additional insights into other studies in this field and built on current knowledge. They also identified areas for future research which would be needed to further inform a dietary intervention.

The inclusion of guidance counsellors from schools all over New Zealand in the first study allowed researchers to see how regional differences in school policy affected their roles within schools. This may affect how dietary intervention can be implemented in different schools and how far guidance counsellors are involved.

The wide demographic of adolescents in the second study enabled researchers to determine how socio-economic factors affected dietary behaviour. This is an important consideration because socio-economic status has been found to be a significant predictor of dietary behaviours and health outcomes. By including participants from mixed ethnic groups and socio-economic backgrounds, the study was able to explore the intersectionality of these factors and how they may influence attitudes, beliefs, and motivators regarding diet.

Although ultimately, future dietary intervention informed by these studies will aim to remediate mild to moderate mood disorders in adolescents, findings showed the potential of diet to support adolescents in areas of cognitive debilitation outside the spectrum of mental illness. This could facilitate a rethink of how we view mental illness in adolescents.

Limitations

The studies also have limitations. Limited sample size, particularly in the case of the second study, which only recruited participants from two regions of New Zealand may limit the generalisability of the findings to other populations. Another limitation is the potential bias introduced by the inclusion of guidance counsellors in the first study. Guidance counsellors may not be representative of the wider population of school staff, and their views and experiences may not reflect those of other staff members who could potentially be involved in delivering a dietary intervention. The inclusion of a dean, school nurse and head of learning support in the study helped to provide a broader view of student support services in schools, and provided insights into how other members could support therapeutic dietary intervention if this could not be supported by guidance counsellors; however, they were significantly underrepresented in the study.

Using qualitative methodology also had its limitations. The exploratory nature of the questions meant they were open to misinterpretation or did not always provide precise enough detail in some areas. Specifically,

data relating to the structural and delivery points of a dietary intervention was not as precise as data relating to attitudes and beliefs about diet. In study 2, this was hindered by the varying ability of adolescents to articulate their ideas or contextualise questions, due to their stage of cognitive development.

Future Research

Why is an Intervention Study Needed?

The two studies in this thesis showed that a dietary intervention to improve adolescent mental wellbeing was feasible; therefore, the next step would be to translate these findings into the real world through implementation effectiveness science.

Previous lifestyle interventions have been successful in ameliorating mental health disorders (Jacka, 2017; Melnyk, 2017) however, they did not exclusively use diet as a therapeutic strategy for mental health issues. Other factors which are known to improve mental health were examined alongside diet included sleep, exercise and mindfulness. It is not clear which of these factors has the greatest impact on mental health. It is well known that diet affects sleep quality, ability to exercise and the cognitive focus required for mindfulness (Zuraikat, 2021). This suggests diet could work in isolation. An intervention study, using diet only to ameliorate mental health issues, therefore, could make important additions to current knowledge in this field.

The two studies in this thesis identified potential barriers to healthy eating. Furthermore, the studies found that the ability to navigate these barriers differed in individuals. How far these barriers can be overcome can only be properly tested if an intervention is carried out in a variety of settings with adolescents with differing mental health issues.

Who Delivers the Intervention?

Study 1 aimed to determine whether guidance counsellors could be instrumental in delivering a dietary intervention for adolescents with mental health issues. Results showed guidance counsellors were not likely to incorporate dietary intervention into their therapeutic modalities. The initial objective of this formative work was to explore the possibility of using guidance counsellors to facilitate nutritional behaviour change within the context of low mood and mild mental health issues; however, it became evident that this goal was not feasible.

Despite this setback, the process was still valuable as it provided insights that can be used to improve future attempts at implementing similar interventions. By acknowledging our limitations and learning from our failures, we can avoid blindly starting an intervention that is destined to fail. Ultimately, although we did not achieve our desired outcome, the experience helped us to progress and gain a better understanding of how to approach such challenges in the future.

Study 2 suggested the adolescents themselves had sufficient agency to self-manage dietary behaviour change, provided they were given the knowledge and resources. Involving adolescents themselves in delivering the intervention, either as peer mentors or as part of a leadership program, could help promote engagement and encourage buy-in from the target population. Parental support would still be needed because they would be meeting the bulk of the costs associated with buying speciality foods. Therefore, more research is needed to determine how willing or able parents are to support their adolescent offspring's dietary change.

Although the adolescents in study 2 indicated they could self-manage dietary behaviour change, participants were not wholly representative of adolescents. These findings do not negate previous research findings that adolescent impulsivity makes them prone to risky eating behaviours (Jacka, 2017). Some may struggle more than others with the dietary change and therefore may need adult support. Adolescents suffering from more severe mood disorders may have more difficulty, although study 2 suggested this would be determined by the individual.

Based on previous research, if a dietary intervention targets adolescents with moderate or severe mood disorders, it is likely that more support would be required from professionals with relevant experience working with this age-group. Options include dieticians and school nurses; however, findings from study one suggest the conventions of the dietary intervention may not be compatible with their scope of practice. Another option would be parents, teachers or community leaders who are not restricted by their scope of practice.

The dietary conventions for mental wellbeing may also challenge parents' own beliefs about healthy eating. This is because they do not conform to nutritional guidelines which are substantially embedded in many people's beliefs. Further formative research should focus on ascertaining parents' beliefs about diet.

Who supports the dietary intervention will determine the research parameters. This will influence the severity of mood disorders in the target group and the dietary strategy adopted.

Settings

Who delivers the intervention will determine where the intervention takes place. Different settings may be more appropriate depending on the provider. If the intervention is delivered by a school or community organisation, it may be most effective to conduct the intervention in a classroom or community centre setting. On the other hand, if the intervention is delivered by a mental health professional, it may be more appropriate to conduct the intervention in a clinical or outpatient setting.

Study 1 showed school settings may not be feasible. School policy on wellbeing is determined by the Ministry of Education and this currently does not endorse therapeutic dietary intervention. Also, food in schools programmes have been widely rolled out in New Zealand. Meals conform to nutritional guidelines and do not meet the nutritional profile determined by this thesis for mental wellbeing. Therefore, there is a possible conflict of interest. Further investigation is needed to determine whether school settings are viable in this context and whether it could be incorporated into the health curriculum.

Additionally, the size and scope of the intervention may also influence the setting. For a smaller, more targeted intervention, a one-on-one setting may be appropriate, while a larger intervention may require a group setting. In addition to in-person settings, online options should also be considered as a potential setting for dietary intervention. Online platforms such as virtual classrooms or social media could offer a convenient and accessible way to reach adolescents and provide support throughout the intervention.

Target Group

The two studies in this thesis indicated that adolescents experience a broad spectrum of emotional imbalances, not all of which could be subsumed under the category of mental illness. These include cognitive function, irritability, memory and mental alertness, which the adolescents acknowledged were affected by diet. Although the diet primarily aims to improve mental health outcomes for adolescents, the intervention should also aim to improve generalised emotional regulation and cognitive ability. It should also be a preventative therapeutic strategy which educates adolescents about maintaining brain health throughout life. There should be several interventions which are fully inclusive, targeting adolescents with varying severity of mood disorders in different settings.

The initial stage interventions should be formative and translational. Recruitment for study 2 suggested targeting adolescents generically would attract some participants with mild to moderate mood disorders. The study design would be quantitative and mood scores would be measured against diet quality. Results are likely to give an indication of how the extent of mood disorders are affected by the degree of dietary change. Primarily focusing on adolescents with mild mood disorders and lesser emotional imbalances would be an important step in implementation effectiveness science, which could inform subsequent interventions with adolescents suffering from moderate mood disorders.

Diet

Mental wellbeing depends on the health and integrity of neuronal structures and neurotransmitter function in the brain (Gomez-Pinilla, 2008). The brain requires a significant amount of energy to carry out its many functions, including cognitive processing, neural signalling, and maintaining cellular homeostasis. Mitochondria are essential for brain function and integrity because they are the primary source of energy for

neurons. They also play an essential role in the production of neurotransmitters by providing the energy required for their synthesis, and their release into neurological pathways (Palmer, 2022).

High glucose intake can lead to mitochondrial dysfunction through reactive hypoglycaemia and oxidative stress, the formation of AGEs, and the activation of signalling pathways that impair mitochondrial function. This can lead to impaired cellular energy production, the accumulation of damaged mitochondria, and ultimately, cellular damage and death. This is exacerbated by psychological stress. Overtime, this can lead to permanent neurological distortions which underlie mental illness (Palmer, 2022).

As the brain is the most metabolically active organ in the body (Karabowsky, 2007), the diet used for the intervention needs to meet brain energy and nutritional requirements to optimise brain function and resilience to stress. The NOVA classification system could be used to assess diet quality by categorising foods based on their degree of processing and the extent to which they align with a minimally processed and whole foods-based diet. This could provide a useful framework for evaluating the overall healthfulness of an individual's dietary intake.

Replacing ultra-processed foods, which compromise healthy nutritional status, with higher nutrient density whole foods should be prioritised. Carbohydrate intake should be lowered in favour of healthy fats, including Omega-3 and saturated fats which are known to promote brain health.

Including fats, especially saturated fats, could prove contentious because they are considered risky for cardiovascular health in nutritional guidelines. Sourcing healthy fats from fish, nuts, seeds and avocados is more likely to be acceptable because it is widely accepted in mainstream healthcare. In this respect, the Mediterranean diet is viable as a therapeutic dietary strategy. Furthermore, the Mediterranean diet has a strong research base underlying its recommendation for brain health. Other diets, such as ketogenic and low-fat high carbohydrate LCHF diets, may not be acceptable because they are not recommended in official guidelines due to their high fat content. This is despite known benefits of nutritional ketosis for metabolic health and brain health (Greco, 2016); however, the full effects of these changes in practice in adolescents with mild to moderate issues is yet to be fully understood, especially in a real-world setting.

Data from Study 1 suggested health professionals are reluctant to adopt therapeutic strategies outside their professional remit, even when they know the benefits of alternative approaches and use them themselves. Using the ketogenic diet may deter health professionals from supporting the intervention. Furthermore, it may also be contentious among the adolescent target group if they share the perception that the ketogenic diet is risky; however, it is, possible to achieve nutritional ketosis and its physiological benefits without following a strict ketogenic diet. Therefore, it might be more prudent to adopt a dietary strategy that emphasises the healthful aspects of nutritional guidelines while eliminating refined carbohydrate and UPFs.

Aligning dietary intervention to nutritional guidelines would have several limitations in ensuring the diet adopted for the intervention met the nutritional requirements for brain health. Primarily, guidelines give greater emphasis to macronutrients while understating the importance of a balanced micronutrient intake. Micronutrient requirements are significantly higher than RDI because they do not consider brain health, especially for a developing brain (Rucklidge, 2018b).

Although, precise micronutrient quantities required for brain health are unknown, studies using micronutrient supplementation indicate higher doses improve mental health outcomes; however, these studies did not consider diet quality and the possibility of poor diet compromising participants' nutritional status. This may account for high doses of micronutrients being required to achieve better outcomes. Such high doses may not be achievable through diet without excessive calorie intake. It is unlikely that a dietary intervention could achieve the same nutritional profile as interventions using supplementation; however, the intervention study could be useful in determining whether dietary nutrition is more effective than supplementation in remediating mental health issues. To control for this variable, participants should not take nutritional supplements during the intervention.

Engaging Adolescents

Engaging adolescents in a dietary intervention to improve mental wellbeing requires a tailored approach that considers their unique needs and motivations. Adolescents place a high value on autonomy and independence, which can be leveraged in the intervention. Providing options and allowing them to make choices about the foods they eat can foster a sense of control and ownership over their health.

Adolescents may be more likely to engage with an intervention that aligns with their sense of autonomy and rebellion against authority. Framing the intervention as a way to resist the control of 'big pharma' and 'big food' companies that prioritise profits over public health could channel rebelliousness into activism for social justice. Study 2 showed adolescents were already aware that the food industry's marketing tactics may manipulate their food choices. Additionally, highlighting the potential harm of relying on pharmaceutical interventions could be a powerful motivator for adolescents to make healthy dietary choices. This could foster a sense of community and purpose among participants, further increasing their motivation to engage with the intervention and make positive changes to their diet.

Highlighting the potential benefits of a healthy diet beyond mental wellbeing can also be effective in engaging adolescents. For instance, emphasising how a nutritious diet can enhance athletic performance or improve skin health can appeal to their desire for aesthetic improvements. The two studies in this thesis showed body image and sports performance can motivate dietary behaviour change. By framing the intervention in a way that aligns with the interests and values of adolescents, it is more likely to be successful in motivating behaviour change.

Fostering a sense of community and purpose among adolescents could further increase their motivation to engage with the intervention, especially if the intervention takes place in a community setting. This can facilitate peer support and social reinforcement, which can be a powerful motivator for adolescents. Additionally, incorporating social media platforms into the intervention can allow for ongoing support and connection among participants.

Further Implications

The two studies in this thesis have further implications beyond informing a dietary intervention to improve mental wellbeing in adolescents. Firstly, the findings address a mismatch between healthcare provision and effective strategies to address mental health issues in adolescents. Study 1 strongly highlighted the lack of resourcing for counselling therapies which has led to the over prescription of psychotropic drugs (Cipriani, 2018). Psychotropic drugs are meant for short term use, while coping strategies are developed through

counselling therapies (Mulder, 2018). Their intended use is only as a last resort to ameliorate symptoms until other therapies take effect.

As a consequence of lack of resourcing for counselling therapies, psychotropic drugs have now become a first line treatment (Barczyk, 2019). It is increasingly common for doctors to prescribe medications to adolescents who present with symptoms of poor mental health without being referred to a counsellor or psychiatrist. Furthermore, the referral process for counselling or psychotherapy can be lengthy (Gibson, 2016), which increases long-term dependency on psychotropic medications.

For adolescents, guidance counsellors can serve as first line therapy in schools, but the time-limited nature of this counselling may not provide sufficient time to fully address their mental health issues (Gibson, 2016). Guidance counsellors may refer these individuals to doctors who can prescribe medication as a quicker and more convenient solution. Such reliance on medication without adequate access to counselling services can perpetuate a dependency on pharmacological treatments.

Long-term use of psychotropic medications is known to cause neurological distortions through mitochondrial damage (Allen, 2018). Perversely, what is intended to be a treatment, is exacerbating the problem because psychotropic medications have the same effect on the brain as excessive sugar consumption and stress. This is especially concerning for adolescents because they are going through a critical stage of neurological development (Konrad, 2013).

The main problem with current mental health care is that it takes a traditional view of causation which emphasises stress and trauma (Perlman, 2018); diet is not considered to be causative and proven to date. Neurological evidence has shown that mental illness is caused by neurological distortions which manifest in behavioural disturbances (Gomez-Pinilla, 2007). Medical practitioners consider that stress and trauma are uniquely responsible for mood disorders, even though there is a significant body of evidence which shows poor diet is the main cause, even when stress and trauma are not present (Firth, 2020).

Study 1 highlighted that governing bodies do not keep medical professionals up to date with current findings that diet is important for mental wellbeing (Dray, 2021) and widespread use of pharmaceuticals is risky

(Karanges, 2011). This, perhaps, is because diet's application has not been studied, even though the research is there to support diet's causation. Implementation effectiveness research is urgently needed to address this mismatch between therapeutic practice and therapeutic need.

It appears that in mainstream medicine the focus is on medication rather than lifestyle changes, which is a concerning trend. Furthermore, the infrastructure for providing proper mental health care is virtually non-existent, making it a challenging task to solve the problem. Although guidelines are in place for mild to moderate mental health issues, it is crucial to exhaust all lifestyle interventions before resorting to medication. Thus, addressing the problem of mental health in this age group requires a massive undertaking, encompassing a broader perspective that prioritises lifestyle changes and a robust infrastructure for mental health care.

Ultimately, the use of therapeutic dietary intervention in mainstream medical care will be driven by government policy. The government's focus is currently on pharmaceutical solutions which has led to an overreliance on medications for mental health conditions, which could more effectively be treated through lifestyle behaviour change, specifically diet.

There is a general lack of awareness in society regarding the detrimental effects that ultra-processed foods can have on mental health, and governments have not been proactive enough in addressing this issue through targeted campaigns. As a result, there is a growing trend in modern society where individuals rely heavily on pharmaceuticals (Bowden, 2020) to solve their health problems, rather than taking responsibility for their own health through proper nutrition and lifestyle choices. This trend is not sustainable and it is imperative that we break this cycle by promoting dietary interventions for mental wellbeing and raising awareness about the risks of ultra-processed foods. Changing government policy and investment would require a much stronger research base for alternatives. Therefore, ongoing, credible intervention studies need to be conducted in a range of settings, for varying degrees of mood disorders.

Conclusion

The two studies in this thesis collectively showed that dietary intervention is a feasible therapeutic strategy for adolescents with mild to moderate mood disorders; however, it is unlikely that guidance counsellors would incorporate this into their therapeutic modalities because it is not within their current skills and knowledge base.

The studies show that some adolescents can initiate dietary behaviour change themselves even when they experience mood disorders, provided they have the knowledge and resources to make autonomous choices. They can redirect impulsive dietary decision making towards healthy eating behaviours when they connect low mood to poor diet; however, findings from other studies suggest that some adolescents with poorer emotional regulation may need additional support from health professionals.

It is also important to note that any dietary intervention would require parental support, as parents would be facilitating much of the dietary change. Adolescents are not fully autonomous from adults, and family support is essential for dietary behaviour change. Moreover, family economic circumstances can be a potential barrier to parental support for healthy eating.

Both studies highlighted that knowledge plays a significant role in dietary behaviour change, and lack of knowledge is a barrier to that change. Both the guidance counsellors and adolescents in the studies knew what constituted unhealthy eating but were unaware of how they had acquired this knowledge. Their beliefs conformed to government guidelines, suggesting that the information permeated vicariously through media marketing of foods.

This highlights the need for accessible and reliable sources of information about nutrition and its relationship to mental health. Without accurate and accessible information, individuals may continue to rely on misleading or incomplete information from unreliable sources, which can hinder their ability to make healthy dietary choices.

Misleading information can also come from official sources, and this can pose a significant challenge when conducting a dietary intervention in public settings like schools or health centres. This can create a potential

conflict of interest when implementing dietary interventions for mental health because the dietary prescriptions may conflict with existing nutritional guidelines.

To overcome this challenge, it may be more viable to conduct initial interventions in community settings that are independent of government policy. This would allow for a more flexible approach to dietary interventions that can be tailored to the individual needs of participants without being constrained by existing guidelines.

The aim of this thesis is to raise the profile of dietary intervention for mental wellbeing in government policy. As the two studies have shown, there is currently a lack of knowledge and emphasis on the importance of diet in mental health at Ministerial level. This systemic failure means that guidance counsellors are not equipped with the necessary knowledge to consider dietary intervention as a therapeutic strategy, and adolescents are not empowered with the knowledge and skills to remediate their mental health problems through dietary choices.

Mental illness is a significant burden on NZ's healthcare system, and the government's lack of action in discouraging ultra-processed food consumption and promoting healthy lifestyles is exacerbating the problem. The increasing prominence of mental health issues and the societal expectation that pharmacology will resolve them perpetuates a cycle that needs to be broken. Intervention science is needed to promote the use of dietary interventions as a viable therapeutic strategy for mental wellbeing, and ultimately, to raise the profile of dietary intervention in government policy.

Professionally, the researcher has had little involvement with guidance counsellors. Prior to this study she was unable to evaluate their potential involvement in a school-based dietary intervention. She believes this positionality has enabled her to be objective in her analysis of guidance counsellors' role, nutritional knowledge, and their knowledge of barriers and motivators to adolescents eating a healthy diet to improve their mental wellbeing.

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7. Appendices

Appendix 1: Ethics Approval (Study 1)

Auckland University of Technology Ethics Committee (AUTEC)
Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

14 June 2021

Grant Schofield
Faculty of Health and Environmental Sciences

Dear Grant

Re Ethics Application: **21/147 Adolescent Lifestyle and Mental Wellbeing.**

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

Your ethics application for the focus group phase has been approved for three years until 18 August 2025.

Standard Conditions of Approval

1. The research is to be undertaken in accordance with the Auckland University of Technology Code of Conduct for Research and as approved by AUTEC in this application.
2. A progress report is due annually on the anniversary of the approval date, using the EA2 form.
3. A final report is due at the expiration of the approval period, or, upon completion of project, using the EA3 form.
4. Any amendments to the project must be approved by AUTEC prior to being implemented. Amendments can be requested using the EA2 form.
5. Any serious or unexpected adverse events must be reported to AUTEC Secretariat as a matter of priority.
6. Any unforeseen events that might affect continued ethical acceptability of the project should also be reported to the AUTEC Secretariat as a matter of priority.
7. It is your responsibility to ensure that the spelling and grammar of documents being provided to participants or external organisations is of a high standard and that all the dates on the documents are updated.
8. AUTEC grants ethical approval only. You are responsible for obtaining management approval for access for your research from any institution or organisation at which your research is being conducted and you need to meet all ethical, legal, public health, and locality obligations or requirements for the jurisdictions in which the research is being undertaken.

Please quote the application number and title on all future correspondence related to this project.

For any enquiries, please contact ethics@aut.ac.nz. The forms mentioned above are available online through http://www.aut.ac.nz/research/researchethics

(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: Kxg2724@autuni.ac.nz;authorhannahgraham@gmail.com; ccrofts@aut.ac.nz

Appendix 2: Ethics Approval (Study 2)

Auckland University of Technology Ethics Committee (AUTEC)

Auckland University of Technology
D-88, Private Bag 92006, Auckland 1142, NZ
T: +64 9 921 9999 ext. 8316
E: ethics@aut.ac.nz
www.aut.ac.nz/researchethics

18 August 2022

Grant Schofield
Faculty of Health and Environmental Sciences

Dear Grant

Re Ethics Application: **21/147 Adolescent Lifestyle and Mental Wellbeing.**

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Please quote the application number and title on all future correspondence related to this project.

For any enquiries, please contact ethics@aut.ac.nz. The forms mentioned above are available online through http://www.aut.ac.nz/research/researchethics

(This is a computer-generated letter for which no signature is required)

The AUTEC Secretariat
Auckland University of Technology Ethics Committee

Cc: **Kxg2724@autuni.ac.nz; authorhannahgraham@gmail.com; ccrofts@aut.ac.nz**

Appendix 3. Participant Information Sheet (Study 1)

Participant Information Sheet

Principal: *(name to be inserted)*

School: *(name to be inserted)*

Researcher: Miss Christine M Wardle

Supervisors: Professor Grant Schofield / Dr Catherine Crofts

Title of Research: Adolescent Lifestyle and Mental Wellbeing

Date: /2021

Dear *(name to be inserted)*

My name is Miss Christine Wardle and I am a current Masters student at Auckland University of Technology. I am looking for guidance counsellors, currently working in NZ secondary schools, to assist me with a research project I am conducting as part of the requirements for my Master of Philosophy degree under the supervision of Professor Grant Schofield and Dr Catherine Crofts. I am also an English Teacher, with 25 years' experience of working with secondary students and for this reason, I am interested in researching the role of Guidance Counsellors in improving the wellbeing of young people. The purpose of writing to you is to gain your consent to participate in this research.

This research will be looking at how school-based Guidance Counsellors support students with mental wellbeing issues and how this is supported through on-going professional learning. The reason I want to do this research is because I have worked with adolescents for many years, and I have always been interested in finding ways to improve their mental well-being. I believe this research will be useful in identifying specific areas which could be improved within the service and how this could be incorporated into professional learning. It is reasonable to suppose that schools and colleges could also benefit from this approach, by association.

I therefore seek your consent to take part in an interview to discuss the ways in which your service supports students with mental well-being issues. The interview will be sound recorded but you will be given a code so it would be impossible to tell who you are from the recording. Only myself and my research supervisors will be able to listen to the recording and once we have written up the interview, the sound recording will be deleted.

Your participation is entirely voluntary, and you can withdraw at any time without question, even if that means leaving the interview. If that is the case, your voice recording will be deleted, and information will not be used for the research.

All data collected during the research will be stored securely on passworded USB drives and the AUT server; identifying materials (including key words, codenames, and consent forms) will be kept separate from the coded data. The data may be used later for my PhD research and will be deleted in 10 years after it is last used.

Once your data has been transcribed, you will be disidentified. Your confidentiality will be maintained at all times, and I ask in return that you sign to say you will not discuss the research with anyone, including colleagues, friends and family.

At the completion of the study, you and the other participants will be invited to view the research findings and will also receive a PDF of the summary of findings of the research.

If you have any further queries, please contact me or my supervisor. I do hope you will agree to participating in this research. If so, I would appreciate you signing the Consent Form and returning it to me.

Yours sincerely

Christine Wardle

My contact details are:
Miss C M Wardle
MPhil Student
AUT FHES
KXG2724@autuni.ac.nz
Phone: +64 21 08709613

My supervisor is:
Professor Grant Schofield
AUT Human Potential Centre
grant.schofield@aut.ac.nz
+6421481489 (Mobile)

Appendix 4: Consent Form (Study 1)

Project title: ***Adolescent Diet and Wellbeing***

Project Supervisor: ***Grant Schofield/Catherine Crofts***

Researcher: ***Christine Wardle***

- I have read and understood the information provided about this research project in the Information Sheet dated dd mmmm yyyy.
- I have had an opportunity to ask questions and to have them answered.
- I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.
- I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.
- I understand that if I withdraw from the study then I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.
- I agree to take part in this research.
- I wish to receive a summary of the research findings (please tick one): Yes ☐ No ☐

Participant's signature:
……

Participant's name:
……
….....Participant's Contact Details (if appropriate):
……
……..
……
……..
……
……..
……
….....Date:

Approved by the Auckland University of Technology Ethics Committee on ***type the date on which the final approval was granted*** ***AUTEC Reference number*** ***type the AUTEC reference number***

Note: The Participant should retain a copy of this form.

Appendix 5: Participant Information Sheet (Study 2)

Principal / Chair of Board of Trustees - Participant Information Sheet

Principal: *(name to be inserted)*

School: *(name to be inserted)*

Researcher: Miss Christine M Wardle

Supervisors: Professor Grant Schofield / Dr Catherine Crofts

Title of Research: Adolescent Brain Health and Diet

Date: /2022

Dear *(name to be inserted)*

My name is Miss Christine Wardle and I am a current Masters student at Auckland University of Technology. I am writing to ask if you would kindly assist me with a research project I am conducting as part of the requirements for my Master of Philosophy degree under the supervision of Professor Grant Schofield and Dr Catherine Crofts. I am also an English Teacher, with 25 years' experience of working with adolescents. For this reason, I am interested in researching ways to improve student well-being through diet. I require the participation of fifteen students from your school, aged 16 to 17, interviews to determine what they know about the relationship between diet and wellbeing. The purpose of writing to you is to gain your approval to approach them to participate in this research.

The research is motivated by my teaching experience, which has piqued my interest in finding ways to help improve their well-being. It is well-known that poor diet quality is linked to poor health, however, more needs to be known about how adolescents can be motivated to make healthy food choices in the interests of well-being. I believe a more in-depth and focused research study will bring forth valuable insights into the relationship between diet and mental health.

In your role as the principal / Board of Trustees, I seek your consent:

- To invite a focus group of 15 students to be interviewed about their dietary choices.

- For focus groups to take place in a space convenient to participants within the school.

With your consent, I wish to approach your school's Student Support team to identify suitable participants who will be sent a written invitation to participate in the research. The invitation will include a Participant Information Sheet, Parent Consent Form and Student Assent Form, which will be sent to both, potential students and their parents/caregivers in the same envelope. In addition, I wish to have your consent to ask an Administrator in the school's Student Centre to be willing to receive the sealed envelopes on my behalf and to number them in the order that they arrive. This will avoid bias in the selection of the research sample to protect the integrity of the study. Those selected will be contacted to further discuss what is required of them for the research.

The focus groups will be audio recorded and transcribed by the researcher. The information gathered in these instances will be analysed by the researcher to identify themes relating to participants' dietary choices.

Participation is entirely voluntary. The focus groups do not have to answer questions during interviews and have the right to withdraw from the research at any time without explanation. Participants can withdraw their data before the focus groups begin and have it deleted until the stage of data analysis which will commence one month after the focus groups. However, once focus group discussions have begun, can only withdraw their participation by declining to contribute to the discussion or leaving the room. Contributions they have already made to the discussion cannot be deleted from a recording of a focus group discussion, though their data will not be used.

All data collected during the research will be stored securely on the AUT server and identifying materials (including key words, codenames and consent forms) will be kept separate from the coded data. The data may be used for subsequent doctorate research and will be deleted in 10 years from its last use.

Confidentiality of all participants, including the school, will be maintained by replacing all names with codes before analysing any transcripts or documentation and by deleting/masking any identifying information, for example, place names. While every attempt will be made to protect the identity of your school and participants, anonymity cannot be guaranteed. I also seek your assurance that students' decisions to participate will not affect their enrolment status or relationship with the school.

A Kuia, Catherine Tamehere, from Pukekohe High School will be supporting me to ensure the research process is culturally sensitive to Maori participants.

At the completion of the study, you and the participants will be invited to view the research findings in separate meetings and will also receive a PDF of the summary of findings of the research.

If you have any further queries, please contact me or my supervisor. I do hope you will agree to the students and parents/caregivers in your school participating in this research. If so, I would appreciate you signing the Consent Form and returning it to me in the envelope provided.

Yours sincerely

Christine Wardle

My contact details are:
Miss C M Wardle
MPhil Student
AUT FHES
KXG2724@autuni.ac.nz
Phone: +64 21 08709613

My supervisor is:
Professor Grant Schofield
AUT Human Potential Centre
grant.schofield@aut.ac.nz
+6421481489 (Mobile)

Appendix 6 Consent Form to Access Schools

Consent Form

· I have read the Participant Information Sheet and understand the nature of the research and why I have been asked to assist. I have had the opportunity to ask questions for clarification and have them answered to my satisfaction.

· I give my permission for the researcher (Christine Wardle) to approach Student Support in the first instance to identify potential participants for this study, and then use this information to contact students their respective parents/caregivers to invite them to be the participants of this research project.

· I understand that this research will involve fifteen students aged 16 - 17.

· I understand that the focus group will be with fifteen students selected from the cohort and they will be interviewed in groups of three.

· I understand that participation in this research is voluntary. I understand that once students have taken part in the focus group discussions, they will not be able withdraw their oral contributions to discussions as this omission would lose the sense of the discussion. However, they retain the right to cease contributing by declining to contribute any further or leaving the group without negative consequence.

· I give my assurance that students' participation or non-participation will have no effect on their relationship with the College.

· I will allow an administrator in the Student Centre to volunteer to receive and number the sealed envelopes containing the returned Student assent forms and Parent consent forms as they arrive. The envelopes are to remain sealed to protect the identity of the research participants and will be collected by the researcher (Christine Wardle).

· I understand that data gathered in the research will be stored securely on the Auckland University of Technology server and identifying material (including key words, code names, and consent forms) will be stored separately from coded data, and that this data will be destroyed after six years.

· I understand that data will be used in the researcher's Master of Philosophy thesis, other publications and in conference presentations.

· I understand that every measure will be taken to ensure confidentiality, but that anonymity cannot be guaranteed. Pseudonyms will be used for any names in any reporting and other identifying material will be masked or deleted.

· I wish to receive a summary of the research findings: YES / NO

Name: _____

Role in School: _____

Signature: _____

Appendix 7: Participant Information Sheet Students (Study 2)

Participant Information Sheet

2022

Adolescent diet and Wellbeing

Participant Information Sheet
Students

Principal: *(name to be inserted)*

School: *(name to be inserted)*

Researcher: Miss Christine M Wardle

Supervisors: Professor Grant Schofield/Dr Catherine Crofts

Title of Research: Adolescent Brain Health and Diet

Date: /2021

Dear *(name to be inserted)*

I write to ask if you would kindly assist me with research, I am conducting for my Master of Philosophy degree under the supervision of Professor Grant Schofield and Dr Catherine Crofts.

This research will be looking at why you choose to eat the foods in your diet and how you could be encouraged to eat healthy food to improve your well-being.

I therefore seek your consent to take part in a group interview with two other senior students at your school. You will be told who these other students are, and you can change group if you prefer to be with someone else. The interview will be sound recorded but you will be given a code so you can't tell who you are from the recording. Only myself and my research supervisors will be able to listen to the recording and once we have written up the interview, the sound recording will be deleted.

If at any time you feel uncomfortable about participating in the research, you can talk to your dean. Your participation is entirely voluntary, and you can withdraw at any time without question, even if that means leaving the interview. If that is the case, your voice will remain on the recording, but your information will not be used for the research.

All data collected during the research will be stored securely on the AUT server and identifying materials (including key words, codenames and consent forms) will be kept separate from the

coded data. The data may be used later for my PhD research and will be deleted in 10 years after it is last used.

Once you have sent me your data, you will be disidentified. This means nobody will be able to tell who you are from the information you have provided. Your confidentiality will be maintained at all times, and I ask in return that you sign to say you won't discuss the research with anyone, including your teachers, friends and family.

At the completion of the study, you and the other participants will be invited to view the research findings in separate meetings and will also receive a PDF of the summary of findings of the research.

If you have any further queries, please contact me or my supervisor. I do hope you will agree to participating in this research. If so, I would appreciate you signing the Consent Form and returning it to your Guidance Counsellor in the envelope provided.

Yours sincerely

Christine Wardle

My contact details are:
Miss C M Wardle
MPhil Student
AUT FHES
KXG2724@autuni.ac.nz
Phone: +64 21 08709613

My supervisor is:
Professor Grant Schofield
AUT Human Potential Centre
grant.schofield@aut.ac.nz
+6421481489 (Mobile)

Appendix 8: Assent Form Students (Study 2)

Assent Form

Project title: Adolescent Diet and Brain Health
Project Supervisor: Professor Grant Schofield
Researcher: Christine Wardle (AUT Student)

- ○ I have read and understood the information provided about this research project in the Information Sheet dated dd mmmm yyyy.
- ○ I have had an opportunity to ask questions and to have them answered.
- ○ I understand that identity of my fellow participants and our discussions in the focus group is confidential to the group, and I agree to keep this information confidential.
- ○ I understand that notes will be taken during the focus group and that it will also be audio-taped and transcribed.
- ○ I understand that taking part in this study is voluntary (my choice) and that I may withdraw from the study at any time without being disadvantaged in any way.
- ○ I understand that if I withdraw from the study then, while it may not be possible to destroy all records of the focus group discussion of which I was part, I will be offered the choice between having any data that is identifiable as belonging to me removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.
- ○ I agree to take part in this research.
- ○ I wish to receive a summary of the research findings (please tick one): Yes○ No○

Participant's signature : ……

Participant's name: ……
Participant's Contact Details:
……
……
……
……
Date:
Please retain a copy of this assent form for your records

Approved by the Auckland University of Technology Ethics Committee on type the date on which the final approval was granted AUTEC Reference number type the AUTEC reference number

Appendix 9: Consent and Release Form (Study 2)

Consent and Release Form

- ○ I have read and understood the information provided about this research project in the Information Sheet dated dd mmmm yyyy.
- ○ I have had an opportunity to ask questions and to have them answered.
- ○ I understand that my child taking part in this study is voluntary (their choice) and that they may withdraw from the study at any time without being disadvantaged in any way.
- ○ I understand that if they withdraw from the study then they will be offered the choice between having any data that is identifiable as belonging to them removed or allowing it to continue to be used. However, once the findings have been produced, removal of my data may not be possible.
- ○ I permit the researcher to use the photographs taken by my child that are part of this project.
- ○ I understand that the photographs will be used for academic purposes only and will not be published in any form outside of this project without my written permission.
- ○ I understand that any copyright material created by the photographs being produced is deemed to be owned by the researcher and that I do not own copyright of any of the photographs.
- ○ I agree to my child taking part in this research.

Appendix 10: Interview Schedule (Study 1)

Interview Schedule (Study 1)

1) Could you please tell me about your role?
2) What are the reasons students access the guidance service?
3) What programmes do you currently offer adolescents with mood disorders?
4) What do you think are the most effective interventions for adolescents with mood disorders?
5) Are you aware of what Best Practice Guidelines say about medication, talk therapies and other lifestyle interventions, especially nutrition?
6) I'd like to talk more about diet and mood, and what the barriers are to doing more within the diet space? (Hoping to explore training and resources and whether adolescents would willingly engage

Appendix 11: Interview Schedule (Study 2)

1) What do you notice about how diet makes you feel?
2) What do you think is a healthy diet?
3) Do you think you have a healthy diet?
4) What would make you eat a healthy diet?
5) What do you know about the way diet affects your wellbeing?