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**“Easing the Transition: The Role of Physical Activity and Social Support in
Managing Stress, Mood, and Cognition During Perimenopause.”**

A thesis presented in partial fulfilment of the requirements for the degree

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Abstract

Perimenopause is characterised by hormone fluctuation and rapid change. These changes can result in a collection of physiological and psychological symptoms. While for some women the menopausal transition is a non-event or mild discomfort for others this time can be extremely distressing. This thesis aimed to explore the relationships that indicators of physical activity and social support have with the frequency and severity of key negative mood and cognitive symptoms of perimenopause in women aged between 45 and 55 years. Also examined was whether increases in physical activity and social support decreased perceived stress, which may inform how perimenopausal symptoms are interpreted. This was achieved via an online survey utilising the following self-report scales; the Multidimensional Scale of Perceived Social Support, the Perceived Stress Score, the International Physical Activity Questionnaire, and a perimenopausal symptom screen. Of the 75 participants 80% reported they experienced moderate to high stress, with the top three symptoms being waking throughout the night (77.3%), Irritable mood (61.3%), and memory problems (56%). This survey study was among the first of its kind within the Aotearoa/ New Zealand context. Although univariate analysis indicated a significant association between the independent variables of physical activity and social support and the dependent variables of stress and perimenopause symptoms, linear regression analysis did not reveal a significant relationship. The cyclical relationships formed between sleep, stress, perimenopause, and mood add to the difficulty of research in this area and the results indicate that more complex relationships may exist. Raising awareness of the importance of physical activity for good mental health during the menopausal transition could improve health outcomes for symptomatic women. Both physical activity and social support buffer against stress which contributes to informing the perimenopausal experience.

Keywords

Perimenopause, menopausal transition, menopause and cognition, menopause and sleep, menopause and culture, perimenopause and stress, physical activity and menopause, social support mid-age, social support and perimenopause, stress and physical activity, stress and social support, menopausal symptoms, perimenopause symptoms.

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Contents

Abstract	ii
Acknowledgments.....	iii
List of Figures	vii
Introduction	1
What are Perimenopause and Menopause? And Why Do They Matter?.....	1
Perimenopausal Symptoms.....	1
Midlife Stress	2
How is Perimenopause/ Menopause Viewed?	3
Treatment Options	4
Factors to Consider in the Menopausal Transition.....	5
Literature Review	6
Mood Distress and Perimenopause	6
Depression and Perimenopause.....	8
Anxiety and Perimenopause.....	10
The Relevance of Stress to Perimenopause	11
Cognition and Perimenopause	14
Sleep and Perimenopause.....	16
Cultural and Societal Factors Can Inform the Experience of Perimenopause.....	18
Physical Activity and Perimenopause.....	21
Social Support and Perimenopause	24
The Reasoning Behind This Thesis	26
Statement of Positionality	26
Aims and Objectives	26
Methodology.....	30
Participants.....	30

Materials.....	31
Section One: Demographic Questions.....	31
Section Two: Social Support Questions	31
Section Three: Stress Questions	32
Section Four: Physical Activity Questions	33
Section Five: General Health Questions	34
Section Six: Perimenopausal Symptoms.....	35
Procedure	35
Data Analysis	36
Results.....	37
Demographics.....	37
Within Group Descriptive Statistics.....	39
Inferential Statistics	44
Regression Analysis	46
Discussion.....	47
Summary of Key Findings	48
Comparison With Previous Research	50
Theoretical Implications	53
Practical Implications.....	53
Considerations and Future Directions.....	55
Conclusion And Summary	57
References.....	58
Appendix B: Information Sheet	78
Appendix C: Questionnaire	81
Appendix D: Cultural Considerations Letter	87
Appendix E: Ethics Approval.....	88

List of Tables

Table 1.1 Commonly Reported Perimenopause/Menopause Symptoms	1
Table 1.2 Summary of Key Literature Used in This Thesis, Examining Relationships Between Stress, Physical Activity, and Social Support with Mood and Cognitive Peri/Menopausal Symptoms	20
Table 2.1 Analysis Used to Evaluate Relationships Between Variable Pairs	30
Table 3.1 Demographics of Participants	31
Table 3.2 Proportions of Participants Scoring in Binary Forms of Key Variables	34
Table 3.3 Summary of Continuous Distribution of Variables	37
Table 3.4 Simple Linear Regression Predicting Stress	39
Table 3.5 Simple Linear Regression Predicting Perimenopausal Symptoms	40

List of Figures

Figure 1.1 Possible Etiological Model of Mood Disorder with the Onset of Perimenopause	5
Figure 1.2 The Diathesis-Stress Theory (Model)	10
Figure 1.3 The Differential Susceptibility Theory (Model)	11
Figure 1.4 How Menopause Can Be Viewed in the Context of a Social Health Model	20
Figure 3.1 Perimenopausal Symptoms Percentages of Those who Selected Frequently or Always	32
Figure 3.2 Physical Activity Categorical Score Distributions	33
Figure 3.3 Social Support Categorical Score Distributions	33
Figure 3.4 Perceived Stress Categorical Score Distributions	33
Figure 3.5 Perimenopause Symptom Frequency Categorical Score Distributions	34
Figure 3.6 Histogram of MET Minutes Per Week for Physical Activity	35
Figure 3.7 Histogram of Social Support Mean Scores	35
Figure 3.8 Histogram of Perceived Stress Raw Scores	36
Figure 3.9 Histogram of Perimenopausal Symptoms Score	36

Introduction

What are Perimenopause and Menopause? And Why Do They Matter?

Menopause is the permanent cessation of regular ovulatory menstrual cycles and marks the end of reproductive capability (Gordon et al., 2021; Rautenberg et al., 2023). Approximately one-third of a woman's life will be in menopause (Marvi et al., 2024) The World Health Organisation predicts by 2030 one billion and two hundred million women will be in menopause worldwide (Marvi et al., 2024). Menopause can occur naturally or can occur early as a result of surgery or certain health conditions (Daly et al., 2024). Individuals who reach menopause before 45 years of age are classified as premature or early menopause whilst, individuals who reach menopause over the age of 55 are classified as late menopause (Strelow et al., 2024). The clinical definition of menopause is the absence of menses for twelve consecutive months (Daly et al., 2024; Dar et al., 2020; Strelow et al., 2024).

Perimenopause, also known as the menopausal transition, precedes menopause and is usually experienced by women aged between 45 and 55 years with a highly variable duration between individuals typically between two and eight years (Dar et al., 2020; Zhao et al., 2022). Perimenopause is the gradual decline of ovarian function that leads to erratic oestrogen, progesterone, and androgen production (Nguyen et al., 2022). The onset of irregular menstrual cycles characterises the early menopause transition due to fluctuating hormones (Strelow et al., 2024). As perimenopause progresses, folliculogenesis (maturation of ovarian follicles) occurs and oestrogen production slows, resulting in deficiency until menopause is complete (Daly et al., 2024; Strelow et al., 2024).

Perimenopausal Symptoms

The fluctuating effect that perimenopause has on hormone production leads to periods of hormone withdrawal and rapid change (Daly et al., 2024; Troia et al., 2021). These changes have been associated with various psychological and physical symptoms among women during this time (ChoiJamts et al., 2022; Daly et al., 2024; Nguyen et al., 2022). Daly et al. (2024) add not all symptoms experienced during perimenopause can be directly attributed to hormone shifts as a ripple effect can cause one symptom to result in another. Decreases in life quality and increases in the need for health care have been reported for women who experience problematic menopausal symptoms (Money et al., 2024).

While not all women will experience symptoms, it is estimated that up to 70% of women in Aotearoa will experience symptoms, and 40% will seek medical attention (Healthify He Puna Wairoa, 2025). Troia et al. (2021) explain perimenopause is a unique experience with some women experiencing little to no discomfort at all whilst others experience symptoms that directly interfere with day-to-day functioning. Along with physical symptoms of hot flushes, night sweats, headache, and vertigo, psychological symptoms are commonly reported including anxiety, depression, brain fog, irritability, memory loss, cognitive difficulties, and mood swings (See Table 1.1, Stute & Loza-Fiacco, 2022; Zhao et al., 2022). Zhang et al. (2021) refer to this collection of symptoms as “perimenopausal syndrome” triggered by a hormone imbalance that promotes autonomic nervous system and endocrine dysfunction.

Table 1.1

Commonly Reported Perimenopause/Menopause Symptoms

Psychological/Cognitive	Physical
Low motivation	Uncomfortable intercourse
Feelings of hopelessness	Dry vagina
Difficulty with memory and concentration	Low libido
Irritability	Crawling sensations under the skin
Depression	Dry skin
Unloved feelings	Facial hair growth
Anxiety	Muscle pain
Moodiness	Joint pains
Disrupted sleep	Backache
Fatigue and tiredness	Weight gain
Brain fog	Headaches
	Hot flushes
	Lightheaded feelings

Note. Collated from (Strut & Loza-Fiacco, 2022; Zhao et al., 2022)

Midlife Stress

Strute and Loza-Fiacco (2022) caution against allocating perimenopausal symptoms to simply hormone fluctuations alone and ignoring other stress factors present in midlife that may contribute to how symptoms are perceived. When considering women's

perimenopausal experiences it is important to acknowledge the unique stressors that present themselves in this life stage.

Midlife can be defined as the period between the ages of 40 and 65 (Sood et al., 2019). For women, this life stage can be characterised by increased levels of responsibility (Li, 2024). Li (2024) outlines that sandwich caregiving is a term used to describe the situation some adults in midlife find themselves in when caring for children and older parents simultaneously. Increases in the demand to provide caregiving can contribute to increases in stress and the diminishing of resources such as time and financial stability (Sood et al., 2019).

Other midlife stressors such as divorce, sole parenting, changes to family structure, and increased work pressure that coincide with menopausal transition can all work to lower life satisfaction and deplete stress coping mechanisms that impact the menopausal experience (Dennerstein et al., 2002; Marvi, et al., 2024; Sood et al., 2019). Marvi et al., (2024) state in addition commitments in midlife often take priority over spending time on personal health and self-care. If the burden of responsibilities is beyond a person's capacity to cope mental health declines can follow (Marvi et al., 2024; Sood et al., 2019).

How is Perimenopause/ Menopause Viewed?

Perimenopause is a time of physical change. Loss of muscle tone, muscle strength, skin elasticity decrease, and weight gain can occur (Young & Kotea, 2022). Racziewicz et al. (2021) explain perimenopause promotes increases in adipose tissue, particularly in the abdominal area which may impact physical health, self-esteem, and self-confidence in women. Studies have reported poorer quality of life scores amongst perimenopausal women who have expressed feeling limited in their physical capacities and decreases in emotional health (Li et al., 2022; Wariso et al., 2017). Western social norms value slim body shapes, youth, and beauty, in contrast with the physical changes and symptoms associated with menopause that can affect one's appearance (Thompson & Barsone, 2019).

Biomedical discourse and marketing campaigns contribute to a narrative that menopause is the commencement of age-related depletion and decline (Daly et al., 2024). Western social constructs shape the menopausal experience as a time of poor mental and physical health that is not a temporary stage in time but endures beyond the perimenopausal stage (Clarke, 2017; Daly et al., 2024). It signals the commencement of the

ageing process (Milgrom et al., 2016). Collectively societal influences stereotype perimenopause as the diminishing of a woman's place in society with reductions in relevance, attractiveness, and emotional stability (Sergent & Rizq, 2017). Daly et al. (2024) found what they termed the taboo of menopause, a silence surrounding the topic and the transition as something to fear. Daly et al. (2024) also found women tended to take personal responsibility for dealing with what they viewed as their out-of-control body.

Treatment Options

Symptomatic perimenopausal women may look to alleviate or manage symptoms using a wide range of commercial and medical products, and hormone replacement therapy (HRT) is a popular choice. Between July 2018 and June 2019 in Aotearoa/ New Zealand the highest usage of HRT was found amongst women aged 50-59 years (5%) followed by those aged 40-49 years (3.5%), and 60-69 years (2%) (Best Practice Advocacy Centre New Zealand, 2019). Women of European ethnicity are approximately 1.5 times more likely to seek HRT prescriptions than Māori women (Best Practice Advocacy Centre New Zealand, 2019). Pharmac have reported a rise in women during perimenopause seeking oestradiol supplementation placing significant strain worldwide on supply chains resulting in availability issues due to shortages (1news.co.nz., 2024).

The choice to pursue HRT treatment does not come without risk, however. According to Bennett and Mathur (2024), HRT can result in a range of side effects that mimic the symptoms of perimenopausal syndrome, and increase the risk of blood clots, strokes, and in some cases breast cancer. The net result is HRT is not suitable for everyone, this is particularly applicable to women aged over 60 years as beneficial factors are outweighed by studies that have shown an increased risk of dementia (Best Practice Advocacy Centre New Zealand, 2019; Vigneswaran & Hamoda, 2022). The connection between HRT and cognitive decline in this age group is not understood (Vigneswaran & Hamoda, 2022).

Transdermal oestradiol or HRT patches are recommended as a secondary treatment after primary options, such as antidepressants and psychotherapy have been exhausted (Musial et al., 2021; Swaminathan et al., 2023). Antidepressants which can be effective in some cases also come with potential side effects that dismiss them as a possible treatment for others (Glynn et al., 2023). When considering Aotearoa/ New Zealand's Indigenous population, it is important to note unique cultural constructs surrounding general wellbeing

and health status. Although little is known about the Indigenous concept of perimenopause, it is clear that health and well-being are protected primarily using natural and traditional methods instead of seeking medicalised forms of treatment (Bullivant Ngāti Pikao et al., 2022). Given the cost and limitations of these current mainstream treatments, there is a need to look at alternative lifestyle factors that may decrease the impact of perimenopausal distress.

Factors to Consider in the Menopausal Transition

The world population's mean age is on the rise, currently, globally 850 million women are aged between 40 and 60 years (Zhang et al., 2021). A century ago, menopause occurred around age 40, and life expectancy was limited to within 6 years of that, now on average menopause is reached at 51 years with a life expectancy of 30 years beyond that (Caliskan et al., 2022). Along with an ageing population, we have moved into an era of prolonged life (Nguyen et al., 2022; Muhammad et al., 2023). There is an increasing need for women and society at large to improve not only our understanding of menopause transition but also to actively seek non-pharmacological methods to aid in managing potentially distressing perimenopausal symptoms (Swanson et al., 2023). Lifestyle factors such as physical and social well-being during midlife could potentially ease the transition.

How a person reacts to stress is important in understanding individual emotional responses to discomfort, distress, or pain (McHugh et al., 2020). Stress tolerance or distress intolerance informs our perceived ability to cope with negative affect and our vulnerability (McHugh et al., 2020; Rogers et al., 2018). Stress can be defined as a cognitive appraisal of situations we perceive as uncontrollable and unpredictable (Geva et al., 2023). Kuck and Hogervorst (2024) suggest the high prevalence of mood disorders among women undergoing menopause transition could be explained by psychosocial factors and stressors that commonly present in midlife such as managing work and family life. Higher stress tolerance levels could result in increased resilience to perimenopausal changes and contribute to successful adjustment (Kuck & Hogervorst, 2024). Therefore, a better understanding of the factors that mediate stress during perimenopause is vital.

Physical activity and social support have been identified as key considerations in relation to informing tolerance to stress (Brockmann & Ross, 2020; Mahindru et al., 2023; Walsh et al., 2023). Another potential factor that could influence the perimenopausal

experience is social support. Having and maintaining social support (protection) from an evolutionary standpoint is essential to survival (Pieritz et al., 2017). The assignment of physical pain terms to social exclusion is a testament to its importance to humans, it is even suggested that emotional and physical pain processes may share the same neurocognitive networks (Pieritz et al., 2017). Positive social and emotional environments contribute to our sense of overall well-being and can inform our ability to cope with stress by increasing resilience (Augoulea et al., 2021).

Given this evidence, this study aimed to explore the relationship that indicators of physical activity and social support have with the frequency and severity of key negative mood and cognitive symptoms of perimenopausal women in Aotearoa/ New Zealand. Sleep distress, as well as social and cultural factors, are also discussed when looking at key contributors that shape the interpretation and inform the experience of menopause transition.

Literature Review

The following literature review will highlight common perimenopausal symptoms reported by women and explore their relationship with stress. Potential mechanisms underlying these symptoms will be discussed, and the role of physical activity and social support in potentially moderating them will be examined. A table summary of key literature and study findings used in this thesis will conclude this chapter.

Mood Distress and Perimenopause

Mood distress can be defined as a state of emotional suffering or difficulty in managing mood (Zhao et al., 2022). Mood distress and emotional dysregulation are frequently reported psychological symptoms of perimenopause (Gordon et al., 2021; Wang et al., 2022). Despite evidence connecting mental distress with perimenopause, the relationship with mood is not well understood (Gordon et al., 2021; Zhang et al., 2021).

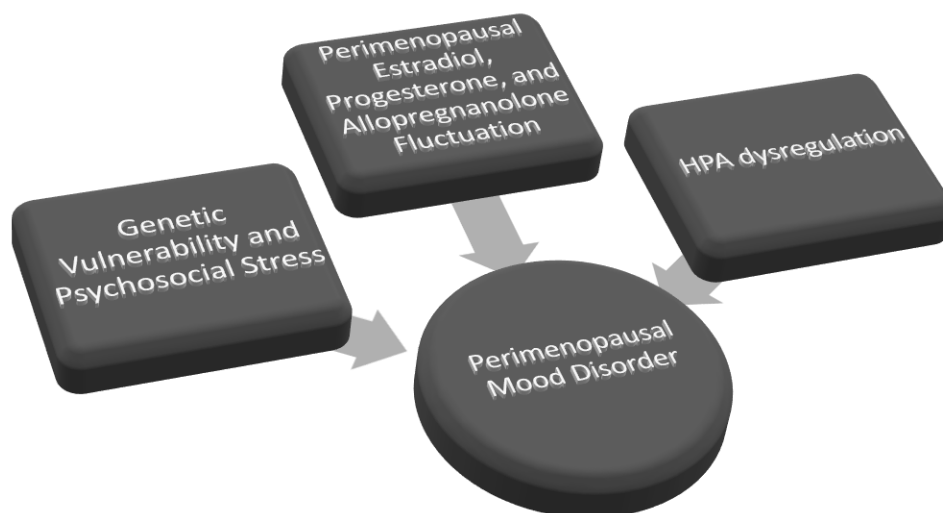
Not all women in perimenopause will experience mood distress and there is growing evidence to suggest that individuals may vary in their sensitivity to the hormone oestrogen (Bromberger et al., 2022; Gordon et al., 2021; Lozza-Fiacco et al., 2022). Differences in sensitivity to oestrogen among individuals are also seen during other key reproductive stages such as puberty, pregnancy, and postpartum (Wang et al., 2022). Furthermore,

evidence suggests variability in sensitivity to not only oestrogen decline but also increases that may amplify mood experiences (Lozza-Fiacco et al., 2022).

The degree of sensitivity to oestrogen alone may not predict susceptibility to developing mood disorders. Timing may also be a factor, with the earlier periods of menopause transition being identified as a more vulnerable time due to greater fluctuations in hormones (Gordon et al., 2021). While the mechanisms are not fully understood, several theories have been suggested for how reducing reproductive hormones may impair psychological processes including mood (Musial et al., 2021). One such theory is the HPA axis dysregulation model as depicted in Figure 1.1.

Figure 1.1

Possible Etiological Model of Mood Disorder with the Onset of Perimenopause.



Note. Figure self-drawn inspired by Gordon et al., (2015). HPA = Hypothalamic-Pituitary-Adrenal axis

In this model, the suggestion is that depression is a result of allopregnanolone (a progesterone-derived neurosteroid, ALLO) fluctuation that alters GABA-ergic functioning which results in HPA axis dysregulation (Gordon et al., 2015). This HPA dysregulation combined with increases in sensitivity to stress, and genetic vulnerability results in mood disorder (Gordon et al., 2015).

Interactions between oestrogen and the serotonin neurotransmitter pathway have been postulated to be behind the sharp rise in low mood experienced among women in the

menopause transition (Vigneswaran & Hamoda, 2022). However, the presence or withdrawal of hormones is an oversimplified explanation of mood distress that overlooks more complex dynamics that occur during the perimenopausal stage (Bromberger et al., 2022.) Structural brain changes such as the shrinking of grey matter in perimenopausal women have been found in areas of the brain that regulate not only hormonal functioning but also the autonomic nervous system, and higher cognitive functions (Musial et al., 2021). Mood disorders decrease life quality and impair stress resilience and coping mechanisms essential in everyday life (Zhao et al., 2022). Two of the most reported and debilitating complaints associated with perimenopause syndrome are depression and anxiety (Gordon et al., 2021; Wang et al., 2022).

Depression and Perimenopause

Although depression and anxiety can coexist, they are distinctly different disorders. Depression albeit a common psychological complaint is one of the most etiologically complex of mood disorders (Meijssen et al., 2023). Depression presents as low mood which can be expressed as fatigue or a loss of interest in daily activities and is accompanied by feelings of hopelessness, worthlessness, and unjustified guilt (Pitsillou et al., 2020; Swaminathan et al., 2023). Anhedonia and changes in affect characterise depression (Pitsillou et al., 2020).

Although several theories exist on the potential cause of depression, there is little known about the exact mechanisms involved (Chu et al., 2022; Meijssen et al., 2023). Pitsillou et al., 2020 state there is a strong heritability component to depression, but biopsychosocial factors also contribute. Beck and Bredemeier (2016) present a unified model to describe the etiology of depression that integrates evolutionary, biological, and cognitive perspectives. The unified model proposes depression may manifest as an adaptation to conserve energy in circumstances where a loss is perceived (Beck & Bredemeier, 2016) this results in maladapted cognitive appraisals that promote biological reactions informed by individual genetics (Beck & Bredemeier, 2016).

Wang et al. (2022) explain that studies have shown that women experience both anxiety and depression at higher rates than men, particularly from menarche and beyond. Higher rates of depression and anxiety are found amongst women in Aotearoa/ New Zealand compared to men (Ministry of Health, 2020). However, it is crucial to recognise that men

often hesitate to seek help for mental distress because of the associated stigma, this could explain differences in reporting (Li & Gal, 2022).

Symptomatic perimenopause is considered a risk factor for first-time experiences of depression in women with figures of 11.4 % for psychiatric disorder diagnosis versus 5.6 % in asymptomatic perimenopausal women (Musial et al., 2021). The perimenopausal transition brings with it increases in the risk of depressive mood disorder development (Bromberger et al., 2022; Dar et al., 2020; Gordon et al., 2021; O'Reilly et al., 2023). A relationship between depressive episodes and menopause transition is established (Musial et al., 2021; Swaminathan et al., 2023). The extent to which hormones play a role in mood is not clear (Gordon et al., 2021). Caliskan et al. (2022) point out depression may contribute to the negative experience of natural menopausal symptoms. O'Reilly et al. (2023).

The Diagnostic and Statistical Manual of Mental Disorders (5th ed; DSM-5; American Psychiatric Association, 2013) suggests there is an increased vulnerability for women who experience premenstrual dysphoric disorder to hormonal fluctuations during perimenopause. The DSM-5 also alludes to confounding psychosocial factors increasing the complexity of the menopausal transition (Musial et al., 2021). Studies have highlighted an even greater risk of developing major depressive disorder during perimenopause for those identified as having a history of diagnosed psychiatric disorder (Gordon et al., 2021). In contrast, Musial et al. (2021) state observations of increases in depression prevalence over longer periods of transition show physiological causation in opposition to independent mental health history.

Levine (2024) undertook a review of 12 prospective studies that examined depressive symptoms of women during menopause and concluded that there was no evidence of increased risk for depression during transition. Caliskan et al. (2022) undertook a study looking at depression prevalence among 827 perimenopausal and postmenopausal women aged 40 to 60 years utilising the Beck Depression Inventory. Results indicated higher levels of depression were experienced by women who were not in a meaningful relationship and experienced economic hardship (Caliskan et al., 2022). Chu et al. (2022) found the prevalence of depression to be 47.43% amongst 1748 menopausal women aged 40-65 years in China utilising the modified Kupperman Menopausal Index and Hamilton Rating Scale for Depression. But noted the majority of women had mild to moderate depression.

Anxiety and Perimenopause

Anxiety symptomology is experienced by up to half of all perimenopausal women, this is a three-fold increase compared to premenopause (Lozza-Fiacco et al., 2022). Anxiety is a common term for a collection of disorders that share the following features extreme fear, irrational rumination, with catastrophising of present or future events (Swaminathan et al., 2023; Zhao et al., 2022). Anxiety can present in several forms including panic disorder, social anxiety, specific phobias, agoraphobia, or generalised anxiety disorder (Strute & Lozza-Fiacco, 2022; Zhao et al., 2022).

A potential cause for the manifestation of anxiety can be explained by the Intolerance of Uncertainty Model (Chigwedere & Moran, 2022). This model suggests that increases in intolerance for uncertainty produce excessive worry that is used as a coping mechanism to retain control in times of uncertainty (Allan et al., 2018). Excessive worry produces cognitive avoidance to avoid a perceived threat (Ouellet et al., 2019). However, avoiding threats tends to reinforce and maintain anxiety as exposure to a perceived threat is an effective cognitive behavioural approach to treating and overcoming anxiety disorder (Ouellet et al., 2019).

The link between depression and the perimenopausal transition is well documented and accepted however the link with anxiety is less clear confounded by bidirectional relationships and sleep disturbances (Strute & Lozza-Fiacco, 2020; Swaminathan et al., 2023). Lifetime dispositional anxiety (trait anxiety) is expressed by some individuals who show neurotic tendencies and react with fierce emotional intensity to what others might consider benign and unthreatening circumstances (Muslic & Jokic-Begic, 2016).

Anxiety sensitivity (AS) is also a unique experience with responses dependent on an individual's history of anxiety that shapes interpretation based on the belief of the level of harm that can eventuate from potentially overwhelming or fearful situations (Jaeger et al., 2021). Those with elevated AS have been identified as being hypervigilant not only to their surroundings but to internal sensations and experiences (Wang et al., 2022). There is a body of increasing evidence linking menopausal women and gonadal hormones, with anxiety disorders (Wang et al., 2022). Perimenopausal women are reporting anxiety as one of the symptoms experienced during the transition, this is particularly prevalent in women considered high in AS versus those considered low AS (Jaeger et al., 2021).

Wang et al. (2022) note similarities between the physical symptoms of anxiety and perimenopause such as hot flushes and increased heart rate and question whether confusion between the two could arise. Physical factors associated with age such as an overactive thyroid that can mimic anxiety-like sensations may also account for the observed increases in anxiety distress among middle-aged women (Strute & Lozza-Fiacco, 2022). Women with high AS tend to examine and inspect body sensations with more vigour this focus can result in the normal physical experiences of perimenopause being misinterpreted as a disorder, or disease in need of remedy (Muslic & Begic, 2016).

Rates of distress increase during perimenopause irrespective of mental health history with an increase of significant life events and ovarian hormonal disruption amplifying mood experiences (Lozza-Fiacco et al., 2022). Together this evidence suggests mood disorders such as anxiety and depression may arise for some during perimenopause, however, it is important to consider the impact of midlife stress.

The Relevance of Stress to Perimenopause

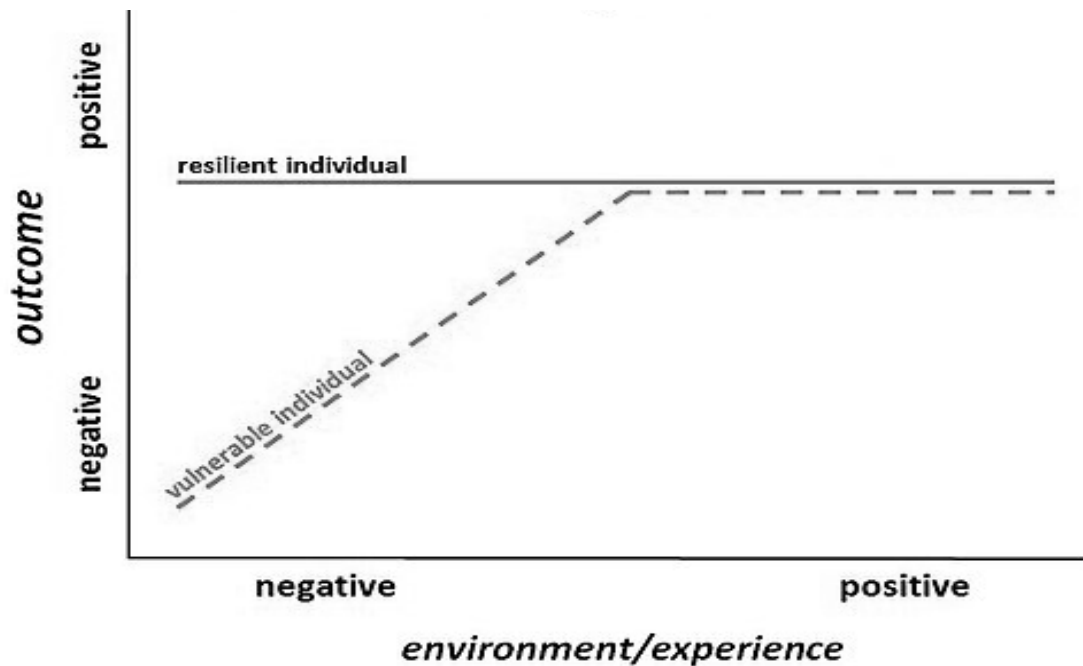
Stress and anxiety are both emotional responses with similar symptoms but differ in triggers (American Psychology Association, 2022). Stress is triggered externally and is an immediate and short response to a pressing issue such as confrontation, work stress, or study deadline, Anxiety can be defined as excessive worry or dread that is persistent and remains present even in the absence of a stressor (American Psychology Association, 2022). Both anxiety and stress share a set of symptoms: irritability, problems concentrating, muscle tension, fatigue, and increased heart rate (American Psychology Association, 2022) Prolonged stress can result in the development of generalised anxiety (Belsky & Pluess, 2009; American Psychology Association, 2022).

The diathesis-stress model is a psychological theory put forward by psychologist Paul Meehl in the 1960s to describe the development of mental disorders (Belsky & Pluess, 2009; Ungvarsky, 2024). It is used to help explain how a stressor such as a major life event, or threat to psychological homeostasis intersects with an individual's predetermined vulnerability to stress known as a diathesis (Muhammad et al., 2023). A diathesis can be described as a predisposed vulnerability that may be informed by genetics, trauma, or environmental factors (Ungvarsky, 2024). This model suggests that everyone has a fixed threshold that when met or overshoot results in the development of physical and/or mental

health disorders (Belsky & Pluess, 2009, Pluess & Belsky, 2011, see Figure 1.2). Individuals present with differing vulnerabilities which accounts for individual variability in tolerating stress (Cui & Yang, 2021). The shortcoming of this model is that it offers no mechanism or potential for one to improve their vulnerability to stress.

Figure 1.2

The Diathesis-Stress Theory (Model)

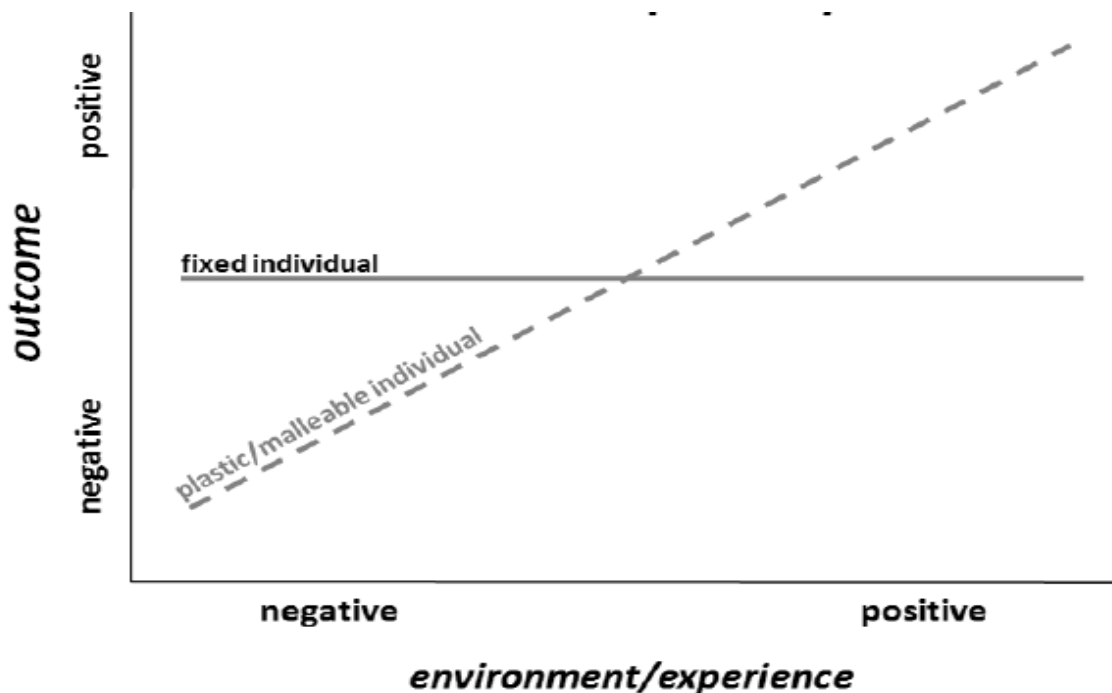


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The differential susceptibility hypothesis as depicted in Figure 1.3 expands on the diathesis-stress model suggesting an individual's stress threshold is not fixed but instead is moveable in both directions with positive or negative environmental influences raising or lowering the threshold (Belsky & Pluess, 2009; Pluess & Belsky, 2011). The differential susceptibility hypothesis presents a possibility that even those who experience elevated levels of stress and who may be considered vulnerable have an opportunity to increase their threshold which could increase stress tolerance (Belsky & Pluess, 2009). Lifestyle factors such as physical activity and social support have been shown to be protective in maintaining good mental health by decreasing stress perception and increasing resilience to stress (Pieritz et al., 2017; Walsh et al., 2023). Such lifestyle factors are key considerations for this thesis and are discussed in more detail below.

Figure 1.3

The Differential Susceptibility Theory (Model)



Note. adapted by (Pluess & Belsky, 2011, p.111) this figure is in the public domain and no copyright permission is needed.

It is hypothesised that hormonal fluctuations during the menopausal transition increase stress sensitivity (Bromberger et al., 2022). Studies undertaken to examine a potential relationship between stress and menopausal transition symptoms have provided empirical evidence that one exists. Kuck and Hogervorst (2024) found in a study of 287 perimenopausal women using self-report measures for quality of life, perceived stress, and psychological symptoms that women in transition who experienced more stress indeed felt more bothered by psychological symptoms.

Garcia et al. (2023) examined the impacts on mental and reproductive health during the first year of the COVID-19 pandemic by undertaking a population-based online retrospective survey on 4171 women, finding that those with higher perceived stress scores experienced more perimenopausal symptoms. Sozer et al. (2022) also investigated the relationship between perceived stress and menopause symptoms during the COVID-19 pandemic utilising a cross-sectional online study with 239 menopausal women and found a positive correlation existed between menopausal symptom scores and perceived stress ratings. Augoulea et al. (2021) undertook an evaluation of a stress management program

with 61 menopausal women aged between 40 and 65 years with varying stress levels and symptoms and concluded stress management may offer an alternative approach to symptom management.

Midlife is a time of increased responsibility, significant life events, and change which can promote increases in stress (Hedgeman et al., 2018). Many women in midlife find themselves busy balancing partnerships, family, career, teenage children leaving home, and caring for older relatives (Kuck & Hogervorst, 2024). If environmental demands exceed a person's resources to cope with a situation the imbalance results in stress (Stute & Lozza-Fiacco, 2022). Stress initiates physiological and behavioural responses to mitigate the perceived threat (Augoulea et al., 2021).

Although stress that diminishes with time is a useful protective mechanism chronic enduring stress and maladaptive coping styles can lead to both physiological and psychological fatigue (Stute & Lozza-Fiacco, 2022). Enduring stress overwhelms the stress adaptation system and can result in constant vigilance and scanning for potential threats (Bromberger et al., 2022; Li et al., 2022). The presence of hypervigilance to threat may impact how a woman interprets her perimenopausal experience during this phase of change (Bromberger et al., 2022). The maintenance of homeostasis is key to keeping stress levels in check this is maintained by subjective well-being and emotional stability (Li et al., 2022). Erosion to homeostatic mechanisms results in increases in negative emotions such as fear, anger, and low mood which can lead to clinically significant conditions such as anxiety and depression (Strute & Lozza-Fiacco, 2022).

Cognition and Perimenopause

Maki and Jaff (2022 p.570) define cognition as "all forms of knowing and awareness, such as perceiving, conceiving, remembering, reasoning, judging, imagining, and problem-solving". Problems with memory recall, learning of new information, attention, and executive functioning have been widely reported by women going through perimenopause (Hayashi et al., 2022; Maki & Jaff, 2020; O'Reilly et al., 2023; Page et al., 2023). In self-report studies, it has been suggested up to 60% of transitioning women are concerned about their memory (Zhu et al., 2022). Forgetting important dates, losing keys, distractibility, absent-mindedness, mental fatigue, and struggling to recall people's names are a few of the complaints shared by women (Makki & Jaff, 2022). The non-medical term brain fog is often

used to describe the collection of cognitive complaints that some women experience (Maki & Jaff, 2022).

Domains of cognition thought to be disrupted during menopausal transition include attention/focus, processing speed, working memory, verbal memory, and verbal fluency (Page et al., 2023; Zhu et al., 2022). Page et al. (2023) undertook a cross-sectional study with 1971 women between the ages of 35-65 years, participants were asked to self-report on executive functioning using the Brown Attention Deficit Disorder Scale (BADDs). Participants were divided into four groups premenopause, perimenopause, natural post menopause, and surgical post menopause. Results indicated elevated BADDs scores (increased cognitive difficulties) in the perimenopausal and surgical menopausal groups (Page et al., 2023).

Hayashi et al. (2020) state significant research connects oestrogen with efficient cognitive functioning. Oestrogen and testosterone have been found to play important roles in brain function (Dean, 2023; Frizell & Dumas, 2018; Maki & Jaff, 2022). Oestrogen receptors can be found in various areas throughout the brain including the prefrontal cortex, thalamus, amygdala, hypothalamus, and hippocampus (Maki & Jaff, 2022). Decreases in oestrogen can interrupt multiple domains of cognition (Jaff & Makki, 2021; Maki & Jaff, 2022; Singh & Paramanik, 2022) Although how fluctuating sex hormones produce cognitive changes is not understood, it is a feasible hypothesis that the modulation by oestradiol of the prefrontal cortex involved with executive function could be disrupted (Page et al., 2023). Disruption of neurological oestrogen-regulated systems can result in problems with working memory, sensory processing, sleep rhythm, and thermoregulation (Brinton et al., 2015).

Liu et al. (2024) conducted a menopause clinic-based study involving 101 perimenopausal women aged 40-55. The objective was to investigate the relationship between subjective cognitive decline and perimenopausal symptoms using validated scales. A significant association was found (Liu et al., 2024). Kaur (2025) undertook a cross-sectional study of 320 women aged between 45 and 60 years, the study intended to examine cognitive outcomes during the menopausal transition. The findings revealed declining mean scores in many cognitive fields from premenopause to post-menopause (Kaur, 2025).

Cognition is influenced by psychological and physiological conditions and perimenopause brings endocrine changes that in some produce symptoms (Page et al., 2023). Sleep deprivation, anxiety, and depression can contribute to cognitive functioning

impairments, and vice versa cognitive functioning impairments can promote the development of sleep and mood disorders (Page et al., 2023; Zhu et al., 2022).

Hayashi et al. (2022) undertook a four-year follow-up questionnaire of the Japan Nurses' Health study. 12,507 women of all ages responded. It was found that the prevalence of memory difficulties and forgetfulness was highest in perimenopausal women who experienced physiological, vasomotor, and somatic complaints.

Longitudinal studies have observed complaints of cognitive difficulties peaked in the menopause transition but improved post-menopause suggesting hormonal fluctuations are responsible (Maki & Jaff, 2020). Hayashi et al. (2022) state their findings support this with improvements in cognition test scores observed in post-menopause groups. when compared to perimenopause. Some studies, however, dispute these findings instead suggesting no link between menopause transition and cognitive capability and that observed changes are age-related declines (Jaff & Makki, 2021).

Longitudinal cohort studies have produced mixed findings, possibly due to varying windows of vulnerability for cognitive disturbances (Makki & Jaff, 2022). Whilst the majority of women experience improvements to these cognitive symptoms post-menopause; some have been found to remain vulnerable to enduring cognitive decline (Brinton et al., 2015; Jaff & Makki, 2021). The primary focus of this thesis was the distressing mood and cognitive symptoms experienced by some perimenopausal women, it is also important to consider sleep due to its bidirectional relationship with cognition and mood.

Sleep and Perimenopause

"Sleep is a basic human need and is essential for good health, good quality of life, and performing well during the day" (World Health Organisation, 2004) restorative, continuous sleep of between 7-8 hours is considered normal. Sleep researchers have linked sleep disturbances to a variety of health disorders and conditions including weight gain, elevated blood pressure, cognitive impairment, fatigue, immune system depression, and mood disorders (Dolev, 2019). There are a range of sleep disorders, but insomnia is the most common (World Health Organisation, 2004). Insomnia is the umbrella term for the following scenarios: difficulty falling asleep, waking frequently during the night, early waking, and experiencing unrestful sleep (Dolev, 2019; World Health Organisation, 2004).

Sleep disturbances and disorders are often reported as distressing symptoms of perimenopause (Xiangrong et al., 2022; Zhao et al., 2023). The relationship between sleep disturbances, mood disorders, and cognitive complaints needs to be considered when discussing the psychological experiences of perimenopausal syndrome. Zhang et al. (2020) suggest that 47% of women in menopausal transition experience some form of sleep disruption. Such disruptions include difficulty falling asleep, frequent waking, or early morning waking with difficulty getting back to sleep. The National Women's Health Study reveals sleep disorder rates in women increase during the approach to menopause (Zhao et al., 2022).

Although well studied it is still unclear the internal processes that link menopausal status with sleep disorders (Lue et al., 2020). One theory is that it results from ovarian ageing and hormonal fluctuations of endogenous hormones (Luo et al., 2020; Xiangrong et al., 2022). Oestrogen reductions interfere with the normal functioning of the hypothalamic-pituitary-ovarian axis and sleep regulation is disrupted (Zhang et al., 2020). The hypothalamus has also been identified as becoming less able to maintain thermoregulatory homeostasis resulting in up to 80% of perimenopausal women experiencing hot flashes and night sweats disrupting sleep (Swaminathan et al., 2023). Whilst some studies have produced data attributing insomnia and sleep disruption to general ageing, a meta-analysis reveals that incidence increases are particularly pertinent during the menopausal transition (Luo et al., 2020).

Study findings have shown a correlation exists between anxiety irritability, and mood swings with difficulty falling asleep (Dar et al., 2020). While anxiety can sometimes interfere with healthy sleep patterns, sleep disorders can also contribute to the development of anxiety in a bidirectional relationship (Luo et al., 2022; Swaminathan et al., 2021). Depression has also been linked with nonrestorative sleep (Dar et al., 2020). Depression also correlates strongly with insomnia (Dar et al., 2020). Another bidirectional relationship exists here as depression has been found to be more common in those afflicted with a sleep disorder and a sleep disorder can result in the development of depression (Dar et al., 2020). Sleep deprivation experienced over time exerts strong negative influences on mental health and subjective well-being (Luo et al., 2020; Xiangrong et al., 2022). The link between mood, cognition, and sleep means understanding perimenopausal syndrome is challenging. The

collection of symptoms requires a comprehensive approach, which must also consider cultural and societal factors that help to define and inform the experience.

Cultural and Societal Factors Can Inform the Experience of Perimenopause

Societal factors such as stressful life events, low socioeconomic status, low education, and low social support all contribute to an increased risk of developing mental health distress (Lozza-Fiacco et al., 2022). Women in midlife experience a range of life stressors, along with increased family obligations and work-life responsibilities that can contribute to lower life satisfaction (Dannerstein et al., 2002; Sood et al., 2019).

Commitments to others and increased pressure on time and financial resources can erode stress-coping mechanisms, resulting in self-physical and psychological healthcare neglect (Marvi et al., 2024; Sood et al., 2019).

Studies have suggested socioeconomic status and educational background impact the experience of perimenopause. Wise et al. (2002) found in a cross-sectional survey of 603 women tracked from premenopause to post-menopause that the mean age of menopause onset was 1.2 years younger for women who reported economic hardship during childhood and as adults. Low-income and lower-educated middle-aged women have been found to experience more severe menopausal symptoms than women on higher incomes with a higher level of education (Park & Lee, 2024).

Syed Alwi et al. (2021) observed a relationship between tertiary qualifications and positive attitudes around the menopausal transition. This same positive correlation was found by (O'Reilly et al., 2023) with high education came a positive attitude toward menopause in Asian women. Treatment options for distressing perimenopausal symptoms are limited for those in lower socioeconomic brackets, financial privilege allows for greater access to information and resources in aiding management (O'Reilly et al., 2023).

The predominant discourse surrounding menopause promotes suppression of the topic and can carry a weight of guilt, and shame, despite the fact approximately 50% of the global population will experience transition (Tariq et al., 2023). Western culture promotes individual responsibility for one's health. This in combination with the medicalisation and promotion of perimenopause as a disease has left women experiencing symptoms isolated and alone (O'Reilly et al., 2023)

Whilst the hormonal changes experienced by some perimenopausal women may explain a vulnerability for mood, sleep, and cognitive disorders; it does not capture cultural beliefs and attitudes nor encompass the bio-psycho-social interactions that also contribute to such disorders (Muslic & Jovic-Begic, 2016). Cultural expectations, personal belief systems, and a sense of self-worth all contribute to the risk of developing mental distress during the transition (Muslic & Jovic-Begic, 2016). Attitudes towards menopause vary widely across cultures, exerting influence on the personal experience. While some societies celebrate the cessation of fertility as a natural phenomenon, others grapple with the change, which may be marred by stigma and age-related stereotypes (Nair & George, 2021; O'Reilly et al., 2023).

Tariq et al. (2023) explain fewer menopausal symptoms are reported in cultures where menopause is accepted and expected as part of the ageing process. The pathologizing of perimenopause in Western countries moves us away from the perspective of a naturally occurring adaptation to a state of disease or disorder. Attitudes to symptom management depend on the social constructs within the culture for instance women from Bangladesh, Saudi Arabia, and Sri Lanka have been shown to view menopausal transition as natural and resist any medical intervention (Jurgenson et al., 2014).

O'Reilly et al. (2023) discovered that Australian Aboriginal women also view perimenopause as a naturally occurring phenomenon with little need for attention beyond management activities such as friends, music, alcohol, and laughter. A phrase shared by Australian Aboriginals in a qualitative study captures the cultural attitude toward perimenopause "Just put up and shut up, go about your life" (O'Reilly et al., 2023, p.6). In Aotearoa/ New Zealand for example, the Indigenous Māori Kuia (older women) have been noted as placing value on the wisdom and knowledge gained with advancing age in contrast to dominant Eurocentric perspectives, however, perspectives specifically on, perimenopause are missing (Bullivant Ngāti Pikao et al., 2022).

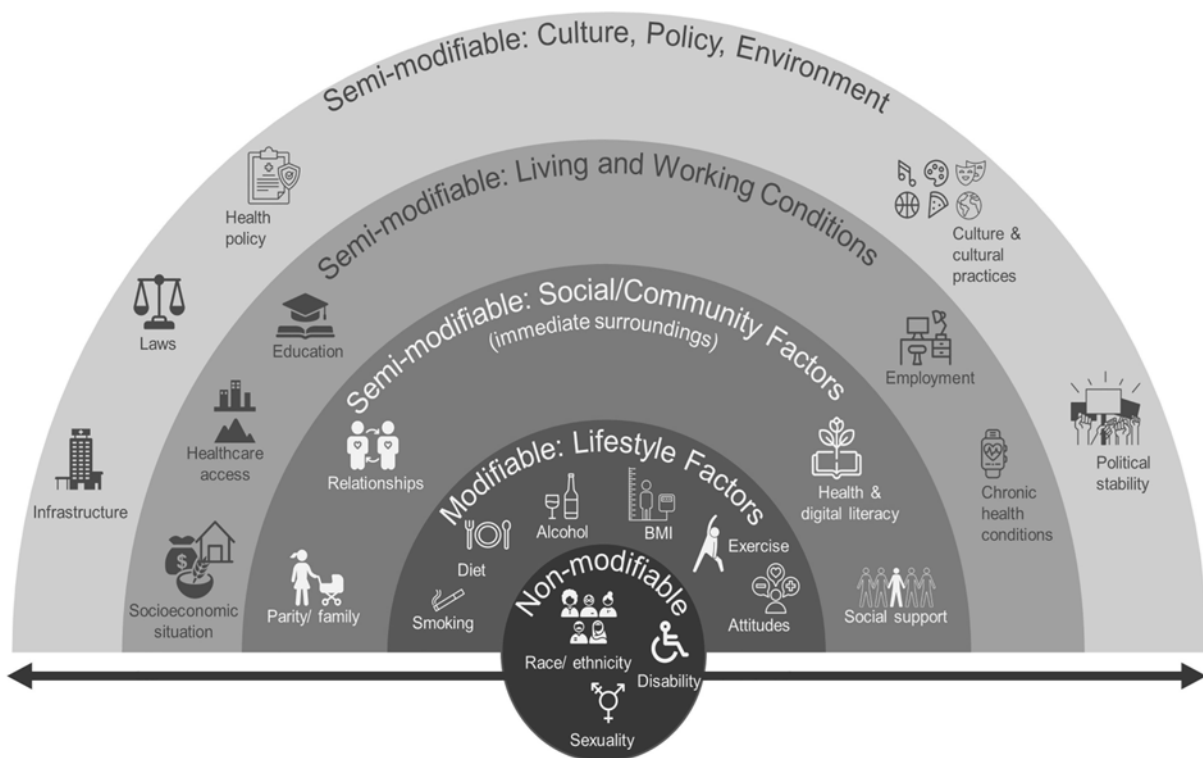
The silence and stigma surrounding menopausal transition within Western cultures contribute to reductions in awareness of the experience (Nair & George, 2021). A person's position within a community shapes self-concept and feelings of being valued by others are key determinants of self-esteem (Kang et al., 2022). Western social practice places value on youth, beauty, and body shape (Thompson & Barsone, 2019). Physical appearance is used to base our assessment of an individual and allows allocation to the correct social position

(Clarke, 2017). The Western concept of beauty is a socially constructed ideal that is impossible to uphold as the progressive effects of aging occur and the resource of attractiveness diminishes (Thompson & Bardone, 2019). Perimenopause marks a time of rapid change in appearance and the cessation of reproductive ability presents another window of vulnerability for women who find themselves having to redefine their roles in society (Clarke, 2017).

Christler et al. (2020) explain negative attitudes toward menopause can be seen in cultures where social norms dictate staying silent about menopausal discomfort, and these attitudes block positive treatment-seeking behaviour. When considering treatment options for menopausal symptoms an understanding of how the structural systems of society and culture intercept and impact health is imperative (Peate et al., 2024). Peate et al. (2024) outline in Figure 1.4 a social health model that can be used to view the experience of menopause in its full context and highlights areas of life that are not modifiable vs those that are. Physical activity is among the modifiable lifestyle factors and is widely recognised for its positive impact on both physical and mental health.

Figure 1.4

How Menopause Can Be Viewed in the Context of a Social Health Model



Note. From “Addressing sociodemographic, socioeconomic, and gendered disparities for equity in menopause care” (Peate et al., 2024, p.2)

<https://www.sciencedirect.com/science/article/pii/S2666379124003203>).

Physical Activity and Perimenopause

Physical activity can be defined as any movement that increases heart rate, skeletal muscle activation, internal respiration, and external respiration (World Health Organisation, 2024). It includes both recreational and work-related effort and can be high intensity, such as sprinting, wrestling, and gymnastics, or low intensity, such as housework, gardening, and Tai Chi. Physical activity has been shown to positively affect cognition and mood. Several theories exist outlining potential mechanisms that contribute to improved mental health.

Neurotransmitters such as serotonin, dopamine, and noradrenaline play roles in cognition and mood regulation, and increases in circulating neurotransmitters occur during physical activity (Kuwamizu & Yamada, 2024). Physical activity promotes brain cell growth and circuit remodelling in the hippocampal area which is associated with cognitive processes such as learning and memory (Eugenin & Dimou, 2022). Physical activity contributes to brain cell health (Furlong et al., 2020). Also seen among those who exercise regularly are reductions in inflammation, improved overall brain functioning, and reductions in stress resulting in improved mood and sleep (Kierstyn et al., 2023; Lilia et al., 2023; Pikmezi et al., 2024).

Physical activity has been shown to support positive mental health as a non-pharmacological intervention with little to no cost (Garvey et al., 2023; Lange et al., 2023; Zhao et al., 2022). The psychological benefits of exercise are evidenced and undisputed (Broman et al., 2018). The World Health Organisation promotes physical activity for good psychological and physical health (Lange et al., 2023; Nguyen et al., 2022). Inactive lifestyles contribute to degenerative disorders (Figueira et al., 2023). Nguyen et al. (2022) explain the implementation of scheduled daily physical activity is a safe, simple, and effective form of health insurance.

During the perimenopausal transition, engaging in physical activity is believed to enhance mood, reduce vasomotor symptoms, preserve muscle mass, and improve self-image (Zhao et al., 2022). Muscle mass decreases that occur with declining oestrogen are associated with reductions in speed, balance, posture, and overall functional confidence (Ji

et al., 2022; Figueira et al., 2023). Sarcopenia and weight gain seen during the menopausal transition have been found to not only impact body function but also affect body image negatively (Young & Kotera., 2022). Collectively these changes in body composition all contribute to informing body image (Young & Kotera., 2022). Mental health is closely tied to self-concept and self-image, but little research has been undertaken to examine these aspects during the perimenopausal transition (Nguyen et al., 2022).

Physical inactivity combined with hormonal shifts that affect muscle mass and increase body fat could contribute to the psychological and somatic complaints reported by women transitioning (Nguyen et al., 2022). This presents an important window of time where increasing exercise and strength training may mitigate decreases in body confidence (Young & Kotera., 2022). However, perimenopausal symptoms such as sleep disruption, anxiety, depression, hot flashes, and fatigue have been found to lower motivation to engage in exercise (Nyeonju et al., 2023). It has been reported that men tend to be more active than women, suggesting up to 60% of women do not meet minimum physical activity guidelines for good health (Nyeonju et al., 2023).

Studies have been conducted looking at the relationship between physical activity and the menopausal transition. For example, Wu et al. (2023) looked to examine if a relationship existed between physical activity and menopausal symptoms in a cross-sectional online survey of 468 women aged between 46 and 60 years. Findings indicated a strong negative correlation between the two, suggesting physical activity may improve menopausal symptoms (Wu et al., 2023). Polat and Aylaz (2022) looked at the same relationship using an intervention study with 156 participants, menopausal women were assigned to either an exercise group or a non-exercise group for 12 weeks. The results obtained were statistically significant, the women in the experimental group had reductions in menopausal symptom severity (Polat and Aylaz, 2022).

Lee and Choi (2022) found reduced menopausal symptoms among women who were physically active in a cross-sectional study using a structured questionnaire involving 150 menopausal women. Another cross-sectional study was undertaken by El Hajj et al. (2020) involving 1113 Lebanese women utilising The Menopause Specific Quality of Life Questionnaire and The International Physical Activity Questionnaire. Findings indicated physical activity may protect from menopausal discomfort (El Hajj et al., 2020). Kim et al. (2014) also examined associations between menopausal symptoms and exercise in a cross-

sectional observational study involving 2204 Korean women between the ages of 44 and 56. Results indicated exercise may reduce psychosocial and physical symptoms of menopausal transition (Kim et al., 2014).

Mohamed et al. (2023) in a randomised controlled trial looking to examine Pilates and fatigue in menopause with a group of 52 fatigued women aged 50 and 55 years found decreases in fatigue were highly significant in the exercise group. Suggesting Pilates could be a potential treatment for menopausal fatigue (Mohamed et al., 2023). Avadivala et al. (2020) wanted to examine the utilisation of a behavioural strategy to initiate physical activity to reduce menopause symptom severity. Here 190 participants were randomly assigned to an intervention or control group (Avadivala et al., 2020). They found educational programs could improve physical activity levels, reducing perimenopausal symptom severity.

Those who live more physically active lives appear to experience less stress compared to those who are less physically active. Suggesting exercise may function as a buffer to excessive worry (Figueira et al., 2023). It is hypothesised that hormonal fluctuations during the menopausal transition increase stress sensitivity and empirical evidence suggests that a relationship between stress and menopausal symptoms exists (Bromberger et al., 2022). Stress can lead to a range of psychological and physiological disorders a prescription for a healthy lifestyle that includes physical activity could increase stress tolerance (Cerezci-Duygu et al., 2023; Garvey, 2023). It is proposed physical activity reduces the impact of stressful life events via modulation of the hypothalamic-pituitary-adrenal axis (Lange et al., 2023). An active lifestyle therefore has the potential to increase our ability to cope with or manage stress and improve overall mood which in turn down-regulates cortisol release and promotes decreases in muscle tension (Powell et al., 2023).

Physical activity not only contributes to physical and mental health improvements. Group sports may decrease feelings of isolation and loneliness (Figueira et al., 2023; Powell et al., 2023). Exercise communities boost confidence and promote feelings of social cohesion and belonging (Lange et al., 2023). This highlights how important social support can be to women transitioning as feelings of isolation, loneliness, low confidence, and displacement from belonging have been reported by women during this stage (Kang et al., 2022; Clarke, 2017).

Social Support and Perimenopause

Social support can be defined as the existence of reliable close connections to others (Jalambadani et al., 2020; Xiangrong et al., 2022). Social support is a powerful resource that allows a person to seek refuge from friends, family, and society in times of struggle (Wong et al., 2023). Social connections can function as a buffer in times of stress (Jalambadani et al., 2020). Increases in social support have positive ramifications for psychological well-being, although the exact mechanisms of this are unclear, the stress-buffering theory suggests a model to explain this (Lam, 2024).

The stress-buffering model of social support suggests that decreased positive social support can lead to psychological disorder that impacts physical health and can result in increased susceptibility to disease or promote behaviours that induce it (Cohen & Wills, 1985). The model highlights how social support offers a protective layer that increases resilience to life stressors (Praharso et al., 2017). Overall, the theory suggests social networks provide stability, and predictability about one's life and role in the community that contribute to positive feelings of self-worth (Cohen & Wills, 1985).

The benefits of layered social connections include reduced stress, anxiety, and increases in positive affect, self-esteem, and life outlook (Wong et al., 2023). Studies have shown lower incidences of mental health disorders among perimenopausal women who feel supported in comparison to those who do not (Caliskan et al., 2023). Jalambadani et al. (2020) undertook a cross-sectional study of 410 menopausal women from Iraq, utilising self-report questionnaires they found a significant relationship between perceived social support and life quality existed. Polat et al. (2022) examined the perception of social support and menopausal symptoms among 505 menopausal women in a descriptive correlation study using the Menopause Rating Scales and the Multidimensional Scale of Social Support. It was found as social support increased menopausal symptoms decreased (Polat et al., 2022).

Some studies have produced findings to suggest that the stress-buffering theory of social support may fall short when applied to stressful life transitions such as menopause as no consideration is given to social changes. The Social Identity Model of Identity Change (SIMIC) is a theoretical framework that proposes changes to social identity that occur during life transitions can involve less stress if an individual has many sources of identity support (Emamzadeh, 2021; Praharso et al., 2017). Social support does not simply buffer stress it

informs our shared identity (Praharso et al., 2017). For instance, mothers whose children have left home and are now transitioning toward menopause may find involvement in various community groups and hobbies to ease identity change stress. Emamzadeh (2021) refers to this as shared identity and purpose, a facilitation of adjustment occurs when we share experiences with others,

Praharso et al. (2017, p.275) compared the stress-buffering theory and the identity model of change and summarised their findings as follows “We can predict that life transitions will only be perceived as stressful when they entail a significant identity transition and the loss of social support that this often entails”. They postulated that life transitions such as menopause alter social supports and networks. Therefore, only available social resources at transition can be considered beneficial (Praharso et al., 2017).

Social support is related to subjective quality of life during the perimenopausal transition (Kang et al., 2022; Xiangrong et al., 2022). The key to positive life quality is to maintain stability in times of change by utilising surrounding resources and adapting when needed (Xiangrong et al., 2022). Connection to others has been found to increase a perimenopausal woman’s sense of well-being via shared experiences, As well as emotional and spiritual support (Wong et al., 2023). Feelings of belonging and inclusion promote the development of coping mechanisms that increase resistance to stressful life events (Xiangrong et al., 2023). Positive relationships confer numerous benefits. However negative relationships and family strain can produce harm in the form of stress and mental health distress (Wong et al., 2023). Studies have shown strong social support can alter the perception of perimenopausal symptoms both psychological and physiological (Nguyen et al., 2022).

Caliskan et al. (2020) remind us that the transition into menopause is also a shared experience that also involves family and friends. Rapid change during perimenopause is a time of increased need for support (Li et al., 2022). Studies have shown spousal relationships have a significant influence during this time in both directions (Nair & George, 2021). Jalambadani et al. (2020) state women who receive understanding and support from husbands during their menopause transition report fewer negative experiences compared to those who do not. Caliskan et al. (2020) agree suggesting long happy marriages confer protection from mental health distress because of both direct and indirect support. Whilst

marital support can help minimise menopausal-related symptoms it is not a luxury afforded to all (Nair & George, 2021).

The Reasoning Behind This Thesis

Research and literature on the factors contributing to and potential treatment methods for psychological symptoms during perimenopause is limited, particularly within the Aotearoa/ New Zealand context. Whilst research from elsewhere has considered isolated indicators of resilience, exercise, and social belonging in relation to perimenopause, this study's objective was to examine if increases in physical activity and social support decrease perceived stress which in turn affects how psychological perimenopausal symptoms are interpreted.

Statement of Positionality

I acknowledge and consider how my positioning within this topic may bring a specific lens that has guided my research throughout this thesis. I am a 47-year-old woman in perimenopause myself. I also have an extensive history working in the exercise and sports industries.

Aims and Objectives

This study aims to explore the relationships that indicators of physical activity and social support have with the frequency and severity of key negative mood and cognitive symptoms of perimenopausal syndrome. This was achieved by an online survey collecting key self-reported indicators of perimenopausal symptoms, perceived stress, and indicators of physical activity and social connection among women aged 45-55 years living in Aotearoa/ New Zealand. Based on the present literature review, this study had four hypotheses:

- 1) Women who engage in regular physical activity will have lower stress scores.
- 2) Women who engage in regular physical activity will experience or perceive with less severity perimenopausal symptoms.
- 3) Women who feel socially supported by friends or family will have lower stress scores.
- 4) Women who feel socially supported by friends or family will experience or perceive with less severity perimenopausal symptoms.

In summary, the perception of feeling socially supported and participation in regular physical activity may confer resilience to stress that affects how psychological and cognitive symptoms of perimenopause are interpreted. Table 1.2 presents a table of key studies

considered and discussed in this thesis looking at physical activity, stress, and social support in peri/menopause. Although not an exhaustive review of studies it highlights that there are gaps and that more work is required looking at the three factors in combination regarding psychological and cognitive symptoms during perimenopausal transition.

Table 1.2

Summary of Key Literature Used in This Thesis, Examining Relationships Between Stress, Physical Activity, and Social Support with Mood and Cognitive Peri/Menopausal Symptoms.

Peri/Menopause, Stress, and Resilience Studies

Author	Objective	Method	Findings
Kuck and Hogervorst (2024)	Examine relationships between psychological complaints of perimenopause and stress resilience	287 participants completed self-report scales on quality of life, perceived stress, and resilience alongside how bothered they were by poor memory, depression, and anxiety.	Women in early perimenopause transition reported more stress and felt more bothered by psychological symptoms.
Augoulea et al. (2021)	Evaluate a stress management and education program with menopausal women.	61 women participated aged between 40-65 years with varying stress and symptoms presentations.	Stress management may offer an alternative approach, for menopausal symptoms.
Garcia et al. (2023)	Examine the impacts on mental and reproductive health of the first year of the COVID-19 pandemic.	Population-based online retrospective survey. Participants 4171 in British Columbia.	Those with high scores of perceived stress reported more menstrual cycle disruption and more menopause symptoms.
Sozer et al. (2022)	Investigate the relationship between perceived stress and menopause symptoms during the COVID-19 pandemic.	239 women took part in this cross-sectional online study. Inventories used included the menopause rating scale and the perceived stress scale.	A positive correlation was found to exist between scores on the menopause rating scale and the perceived stress scale.

Peri/Menopause, and Physical Activity Studies

Author	Objective	Method	Findings
Liu et al. (2023)	Evaluate the mediating effect of physical activity regarding depression and quality of life.	A stratified cross-sectional study.	Physical activity may improve the quality of life in perimenopausal women.
Wu et al. (2023)	Examine the relationship between physical activity and the severity of menopausal symptoms.	Cross-sectional online survey. Using snowball sampling to gain 468 participants, aged between 46-60 years of age, using the menopause index scale and international physical activity questionnaire.	Found a strong negative correlation between physical activity and menopausal symptoms. Suggesting physical activity may well improve menopausal symptoms.
Avadivala et al. (2020)	Utilise behavioural strategy for initiating and maintaining physical activity to reduce menopause symptoms intensity.	190 peri/menopausal women were randomly assigned to an intervention and control group. The intervention group took part in a 12-week exercise program. The menopause rating scale was used to determine menopause symptom severity.	Educational programs could increase physical activity levels and decrease menopause symptoms. A low-cost opportunity to improve quality of life in both perimenopausal and menopausal women.
Kim et al. (2014)	Associations between menopausal symptoms and exercise evaluated.	A cross-sectional observational study of 2204 Korean women aged between 44-56 years.	Physical activity may improve quality of life by improving menopausal symptoms. Physical activity reduces psychosocial and physical symptoms.
Polat and Aylaz (2022)	To examine exercise effects on menopausal symptoms.	156 menopausal women were prescribed 30 minutes of daily activity for 12 weeks in duration in the intervention group. While the control group did not exercise.	A statistically significant mean score of $p=0.000$ was obtained. Women in the experimental group had reductions in menopausal symptoms.
Mohamed et al. (2023)	To examine the relationship between fatigue in menopause and taking part in exercise (Pilates).	This was a randomised controlled trial using the fatigue assessment scale. 52 women with fatigue aged between 50-55 years were assigned into two	Decreases in fatigue were significant in the exercise group $p<0.00001$. In conclusion, Pilates can be considered a

		groups. One group undertook the Pilates exercise intervention.	treatment for menopausal fatigue.
Lee and Choi (2022)	Evaluate exercise psychological well-being, depression, and symptoms with menopausal women.	150 participants undertook this cross-sectional study using a structured questionnaire.	Regular exercise can contribute to reducing menopausal symptoms.
El Hajj et al. (2020)	To examine quality of life and menopause symptom discomfort in relation to physical activity.	1113 Lebanese women were recruited for this cross-sectional study. The Menopause Specific Quality of Life Questionnaire and International Physical Activity Questionnaire were used.	Physical activity may reduce menopausal discomfort in a protective role.

Peri/Menopause and Social Support Studies

Author	Objective	Method	Findings
Caliskan et al. (2022)	Investigate depression prevalence in peri/menopause. And to evaluate social support and quality of life.	827 women were administered the Becks depression and perceived social support inventories.	Perimenopausal and post-menopausal women had an increased vulnerability to depression. And low social support was a risk factor.
Jalambadani et al. (2020)	To examine the quality of life and perceived social support during menopause.	A cross-sectional study of 410 menopausal women from Iran using self-report questionnaires.	A significant relationship between perceived social support and life quality existed.
Polat et al. (2022)	Examine the perception of social support and its impact on menopausal symptoms.	505 menopausal women participated in this descriptive correlation study. Menopause rating scales and multidimensional scales of social support were used for measurement.	It was found as social support increased distressing menopausal symptoms decreased.

Peri/Menopause Physical Activity, Stress and Social Support Combined Studies

Author	Objective	Method	Findings
Nguyen et al. (2022)	To study the quality-of-life measures of Vietnamese women in perimenopause. Focusing on psychosocial, vasomotor, and sexual aspects.	A cross-sectional study on 400 middle-aged women from.	Exercise and social support alleviated negative symptoms of perimenopause.
Arnot & Mace (2021)	Examine if vasomotor symptoms decrease with increased social support. If symptoms worsen with increased stress. And answer does support function as a buffer against stress in menopausal women.	Utilised nine years of data obtained from the Study of Women's Health Across the Nation. Participants 2718.	Did not find convincing evidence that emotional support reduces vasomotor symptoms, nor did it function as a buffer to stress.

Methodology

Participants

This survey study aimed to examine if increased levels of physical activity and social support lowered perceived stress and the perception of the severity and number of commonly reported perimenopausal symptoms associated with mood and cognition. A power analysis was performed using G* Power analysis 3.1.9.2 (Faul et al., 2009) to determine sample size. This indicated that for making reliable comparisons between groups (i.e. with a statistical power of 0.95 and alpha 0.05) a minimum sample size of 74 was needed to be sought.

A Facebook advertisement (see Appendix A) with a direct link to the survey was used to gather survey responses. The primary recruitment strategy was to target groups catering to women in their 40's and 50's such as women's support groups and community grapevines. In addition, the study was advertised to distance online learner groups within Massey University. Inclusion criteria for participation included the following:

- 1) Women aged between 45-55 years.
- 2) Living in Aotearoa/ New Zealand.
- 3) Had at least one menstrual cycle in the last 12 months.

- 4) Had not undergone surgical menopause.
- 5) Had not undertaken hormone replacement therapy or hormonal therapy.

The rationale behind selecting 45- to 55-year-olds is that earlier studies investigating perimenopausal experience have primarily examined this age bracket. Also, this cohort of women has been identified as the common age for perimenopausal onset (Zhang et al., 2021). This survey was limited to residents of Aotearoa/ New Zealand because, as highlighted in the literature review, there is a lack of research on perimenopause within our cultural context, particularly regarding the alleviation of mood and cognitive distress through lifestyle modification. The inclusion criteria of having at least one menstrual cycle in the last 12 months allowed the exclusion of those who have completed the transition and are now defined post-menopause (Dar et al., 2020).

For this study, women were defined as menstruating biological adult human females. In acknowledgment this may be exclusionary to some women such as intersex and transgender, it was considered the inclusion of all women to be beyond the scope of this master's thesis.

Materials

The materials used within this survey study included the Facebook advert (see Appendix A), the information sheet (see Appendix B), and the questionnaire itself (see Appendix C). Participants required access to the internet.

Section One: Demographic Questions

The first section was comprised of demographic questions on ethnicity, education, and employment, and included the following questions 1) What ethnic group/groups do you identify with? 2) What is the highest qualification you hold? 3) Are you currently in paid employment? These questions were optional.

Section Two: Social Support Questions

Section two consisted of the Multidimensional Scale of Perceived Social Support (MSPSS) developed by Zimet et al. (1988). Studies have found good internal reliability, test-retest reliability, and good validity with this instrument, but it is noted there are no established population norms for the MSPSS (Zimmet et al, 1990). The MSPSS is a brief instrument making it relatively easy to complete and score. It has been used extensively in research projects. The MSPSS was confirmed to be a reliable instrument in a study by Kogar

and Yilmaz Kogar (2024) utilising 54 studies to perform confirmatory factor analysis that examined the MSPSS structure. Using a Likert scale ranging from “very strongly disagree” to “very strongly agree” participants select one response that best describes how they perceive each situation relates to them (Zimmet et al., 1988). The MSPSS consists of 12 items that cover issues such as special relationships e.g. “There is a special person with whom I can share joys and sorrows”, and friendships e.g. “My friends really try to help me”, and family relations e.g. “My family is willing to help me make decisions”.

The MSPSS can be scored and broken down into three subgroups 1) significant other subscale, 2) family subscale, 3) friend subscale, and means can be derived for interpretation of scores (Zimit, 2016). For the purposes, of this study, the total score over all 12 items is summed to derive a categorical score of low (12-35), medium (36-60), and high (61-84) perceived support.

Section Three: Stress Questions

Section three was made up of the Perceived Stress Scale (PSS-10) having a long history of use in research and a wide range of population norms (Cohen & Williamson, 1988). Lee (2012) reviewed 19 articles examining the psychometric properties of the Perceived Stress Scale, finding the psychometrics of the PSS-10 to be valid. Lee (2012) also found it was superior to the PSS-14. The PSS-10 has good internal consistency (Cronbach alpha 0.78) and construct validity determined by factor analysis (Cohen & Williamson, 1988). This ordinal scale asks participants to consider the following month in relation to each question and select one frequency option from: “never”, “almost never”, “sometimes”, “fairly often”, “very often” (Cohen & Williamson, 1988).

The 10 Items are presented in a non-sequential manner with items 1,2,3,6,9,10 representing perceived helplessness e.g. “How often have you felt you were unable to control the important things in your life?”, and items 4,5,7,8 representing lack of self-efficacy e.g. “How often have you felt confident about your ability to handle your personal problems?”. Before summing scores items 4,5,7,8, were reversed in the following way 0=4, 1=3, 2=2, 3=1, 4=0 and then added to derive an overall score to determine three stress groups, low stress (0-13), Moderate stress (14-26), High stress (27-40).

Section Four: Physical Activity Questions

For reference, the definition used within this survey for physical activity refers to the total energy expenditure of each participant in metabolic equivalents (METs) (Craig et al., 2003). Section four was composed of the International Physical Activity Questionnaire (IPAQ). The IPAQ was initially conceived in Geneva in 1998 and was developed by a group of researchers, there are both long and short versions available (Craig et al., 2003). The IPAQ has undergone extensive reliability and validity tests (Lee et al., 2011). The seven-item short form was selected for use in this survey to reduce participant fatigue from too lengthy a questionnaire.

This instrument requires respondents to self-report their physical activity, domestic activity, employment activity, and sitting activity frequency and duration considering the previous seven days (Craig et al., 2003). Examples of two of the questions are below:

1. During the last 7 days, on how many days did you do vigorous physical activities like heavy lifting, digging, aerobics or fast bicycling?

___ days per week

No vigorous physical activities → Skip to question 3.

2. How much time did you usually spend doing vigorous physical activities on one of those days?

___ hours per day

___ minutes per day

The items in the IPAQ-short form are normed for ages 15- 69 years and are a frequently used research instrument for various age groups (International Physical Activity Questionnaire, 2016). The IPAQ- short form has established good predictive, discriminant, criterion, concurrent, and convergent validity with high reliability and test-retest reliability (International Physical Activity Questionnaire, 2016). Processing of the data can be done continuously or categorically. To align with the other instruments used within this survey categorical was selected. For ease of analysis, a spreadsheet has been developed by Cheng (2016) that automatically scores the IPAQ-short form. Participants were assigned to one of three physical activity level categories low, moderate, or high using the following criteria:

- 1) Low – if the criteria for moderate or high activity were not met.

- 2) Moderate – if any one of the following criteria are met:
 - 20 minutes per day of vigorous activity on three or more days
 - 30 minutes per day of moderate-intensity activity or walking on five or more days.
 - Recording 600 MET-minutes per week from any combination of walking, moderate intensity, or vigorous intensity activities on five or more days
- 3) High – if any one of the following criteria are met:
 - Record at least 1500 MET-minutes per week from vigorous-intensity activities on three or more days
 - Record at least 3000 MET-minutes per week in any combination of walking, moderate-intensity, or vigorous-intensity activities over seven days.

Note. MET minutes are a way to quantify the amount of physical activity and are calculated by multiplying the MET value (a measure of the energy cost of physical activities) by the minutes spent on the activity (International Physical Activity Questionnaire, 2016).

Section Five: General Health Questions

Section five of this survey is composed of three health-related questions as follows:

1. Do you consider yourself perimenopausal? (experiencing some menstruation changes or physical symptoms but have not gone longer than 12 months without a period). Yes/No
2. Have you ever discussed health related issues or personal concerns about perimenopause or menopause with your doctor? *Yes, I have/ No I have not.*
3. Have you received a diagnosis for any of the following long term health conditions/disabilities? (select all options that apply)
 - a) *disease*
 - b) *Stroke*
 - c) *Diabetes*
 - d) *Asthma Heart*
 - e) *Mental health conditions*
 - f) *Chronic pain*

These questions are included as factors worth discussion and consideration in relation to the perception of perimenopausal status. Question three looks to identify the

presence of other physical and mental health conditions that could impact the perimenopausal transition experience. These were selected as the most frequently reported and included in the New Zealand health survey (Ministry of Health, 2021).

Section Six: Perimenopausal Symptoms

Section six of the survey is a brief screen of mood and cognitive symptoms commonly reported as experienced during perimenopause. Whilst there is a wide range of symptoms both physical and psychological reported by women (Stute & Loza-Fiacco, 2022; Zhao et al., 2022) for this survey a concise set of the 14 most common mood and cognitive complaints was selected (see Appendix C). Participants were asked to select one option from “never”, “rarely”, “frequently”, and “always”. Examples of some of the questions asked included “I feel more anxious than I used to”, “I experience a low mood”, and “I wake up throughout the night”.

This section was designed specifically for use within this study and in response to the literature review. Therefore, no validity or reliability information is available. To produce a scoring protocol each of the Likert options was assigned a score, 1= never 2= rarely 3=frequently 4= always. The scores were summed to derive a total score for the 14 items. The total score possible (56) was divided into three levels of symptom frequency and severity 1) no or low symptoms (0-18), Moderate (19-37), and High (38-56).

Procedure

The Code of Ethical Conduct for Research was consulted prior to study commencement and an application was made to the Massey University Ethics Committee and approval was gained: This project was reviewed and approved by the Massey University Ethics Ohu Matatika 1, Application OM1 23/59.

On ethics approval, the survey was launched, and online promotion began via multiple Facebook and Massey University groups/forums at the end of April for three months. The survey was closed once the G*power analysis target sample size was reached. Participants were informed of their right to refuse to answer questions. Participants were made aware that undertaking the survey implies full consent has been given this was outlined within the provided information letter (see Appendix B) that was the opening page of the survey once the link was accessed. Participants were also made aware of the following:

1. Once the survey is submitted, it will not be possible to remove data upon request as there are no identifiers to find any particular responses.
2. Participants have the right to ask any questions about the study.
3. Access to a summary of the study findings when it is concluded will be made available by request.

Participants were made aware all information collected was anonymised and the results will be documented in Massey University's Master's thesis publications. All digital information was stored under password protection and was only accessed by the researchers managing and analysing the data. All research data will be destroyed five years post-project completion.

Data Analysis

Once data had been collected it was entered in SPSS version 29.0 and labelled. Participant information for the four instruments was collated and appropriate summed numerical scores were grouped and coded into the three levels of categorical data for the variables stress, social support, physical activity, and perimenopausal symptoms. Upon inspection of each variable and group distribution, it became apparent that due to insufficient sample size and the skewed nature of some responses within categories the three-level model would not be appropriate, so each variable was categorised into two levels for analysis. Continuous data from the scales was also utilised for some statistical analysis. Initially, Chi-square tests were performed to evaluate the relationships between variable pairs but due to the small sample size and issues of normality impacting the choice of non-parametric tests it was deemed Fisher exact tests would be more appropriate (Lim, 2015). Table 2.1 outlines analyses used to evaluate the relationships between variable pairs:

- 1) Perceived stress and physical activity
- 2) Perimenopausal symptoms and physical activity
- 3) Perceived stress and social support
- 4) Perimenopausal symptoms and social support.

Finally, results from these univariate analyses were used to inform a linear regression model to explore factors independently associated with women's perceived stress.

Table 2.1*Analyses Used to Evaluate Relationships Between Variable Pairs*

Statistic	Reasoning for test selection
Fisher's exact test	This statistic offers more accuracy for smaller sample sizes when any of the cells in a contingency table are low. Using probability, it does not work on the assumptions of large samples.
Mann-Whitney U test	This test does not require a normal distribution and is an alternative to the t-test. This test is robust to outliers and large sample sizes are not required.
Kendall's Tau Correlation	This correlation test is suitable for non-parametric data, does not assume a normal distribution, and is suitable for small sample sizes.
Rank Spearman's Correlation	Spearman's is also non-parametric and can capture monotonic relationships without requiring linearity of the data.
Simple Linear Regression	This statistic is easy to use and reliably quantifies the relationship between two variables. And is also suitable for smaller data sets.

Results

Demographics

In total 115 participants undertook the survey. However, only 75 fully completed the required questions and this data was utilised for analysis. All were females aged between 45 and 55 years. Of the participants, 86.7% considered themselves perimenopausal and 49.3% had discussed health-related issues or personal concerns about perimenopause with their doctor. Key demographic characteristics are summarised in Table 3.1. The majority of participants (68 %) identified as NZ European, followed by Māori (9%), with the remainder composed of all other ethnicities. More than half (60%) of the participants had a bachelor's

degree or higher level of education, with most (80%) employed in full-time or part-time work. On average the participants had one health condition ($M=1.23$, $SD=0.65$) with mental health conditions and asthma being the most common.

Table 3.1

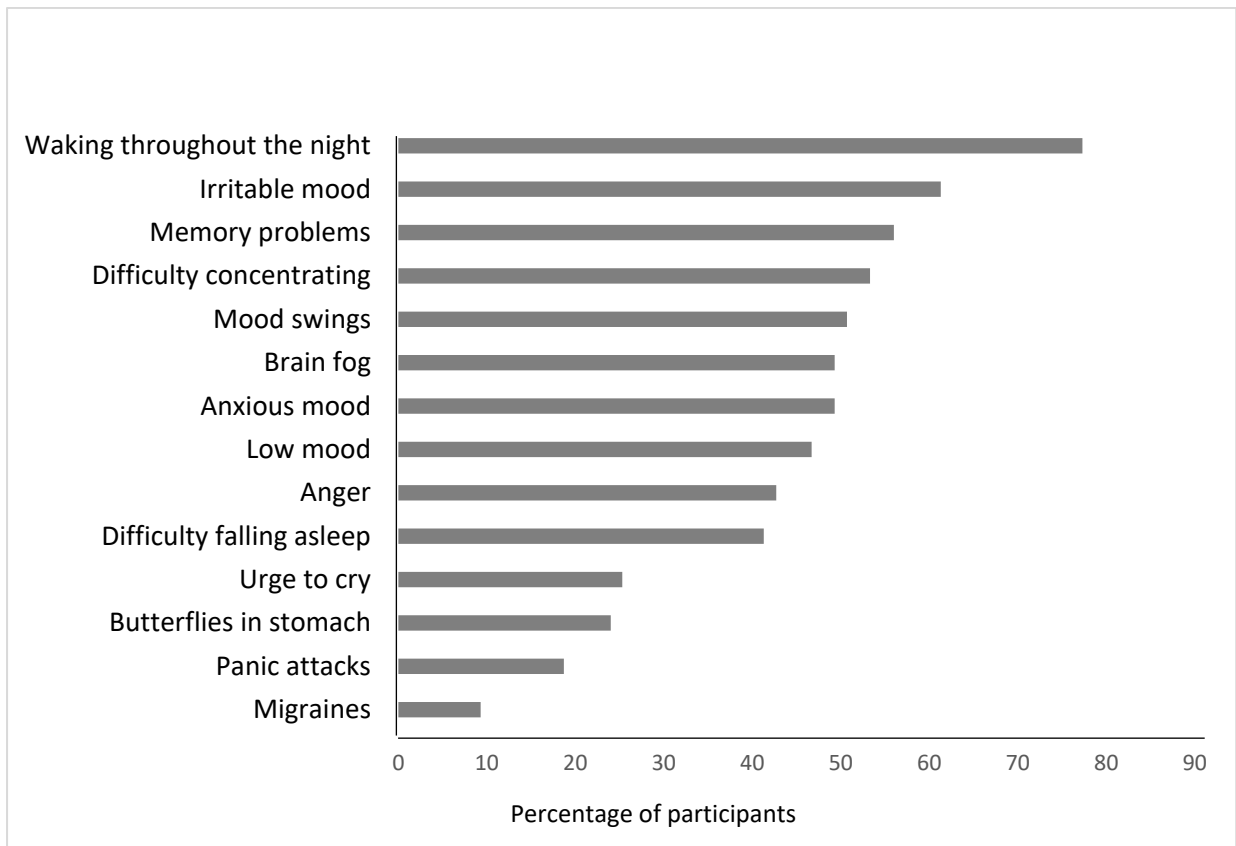
Demographics of Participants

Variables		n	%
Ethnicity	NZ European	51	68.0
	Māori	9	12.0
	Other	15	20.0
Education level	Higher education	45	60.0
	Non higher education	30	40.0
Employment status	Full time	38	50.7
	Part time	22	29.3
	No employment	15	20.0
Health conditions (top four)	Mental health conditions	11	14.7
	Asthma	10	13.3
	Arthritis	5	6.7
	Chronic pain	4	5.3

Scores for symptoms were provided by all 75 of the participants with all of the women reporting having experienced at least one. As depicted in Figure 3.1 the top three mood and cognitive perimenopausal symptoms reported by frequency and severity were waking throughout the night (77.3%), irritable mood (61.3%), and memory problems (56%).

Figure 3.1

Perimenopausal Symptom Percentages of Those who Selected Frequently or Always



Within Group Descriptive Statistics

Figures 3.2 to 3.5 illustrate the skewed nature of responses within the original categories for the four key variables physical activity, social support, perceived stress, and perimenopause symptoms so were recoded into a binary form instead of three as depicted in Table 3.2.

Figure 3.2

Physical Activity Categorical Score Distributions

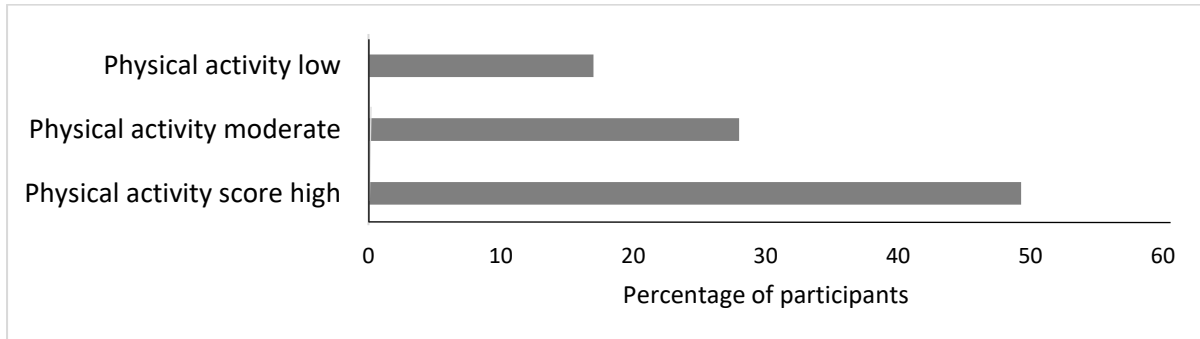


Figure 3.3

Social Support Categorical Score Distributions

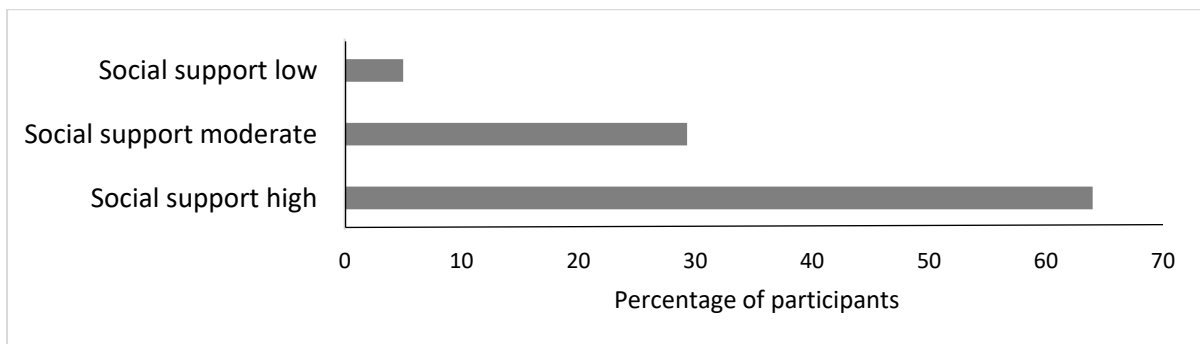


Figure 3.4

Perceived Stress Categorical Score Distributions

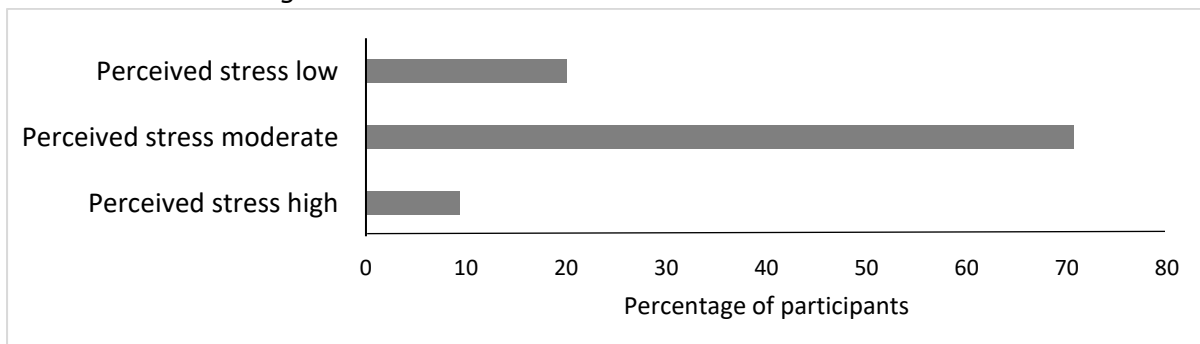


Figure 3.5

Perimenopause Symptom Frequency Categorical Score Distributions

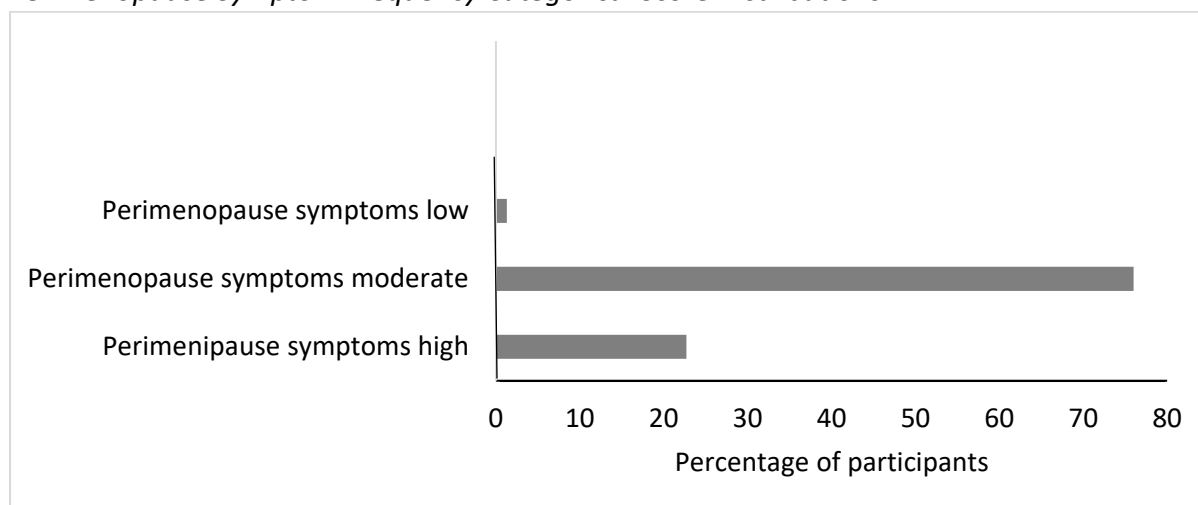


Table 3.2

Proportions of Participants Scoring in Binary Forms of Key Variables

Variables	Binary Categories	n	%
Perceived social support	High	48	64.0
	Low to moderate	27	36.0
Perceived stress	Moderate to high	60	80.0
	Low	15	20.0
Physical activity level	High	37	49.3
	Low to moderate	38	50.7
Perimenopausal symptoms	High	11	22.7
	Low to moderate	58	77.3

Note. In contrast to all other variables, which were divided into ‘high’ and ‘low to moderate’ groups; perceived stress was divided into ‘moderate to high stress’ and ‘low stress’ due to insufficient variability.

The distribution of variables in continuous form is summarised in Figures 3.6 to 3.9 and Table 3.3.

Figure 3.6

Histogram of MET Minutes per Week for Physical Activity

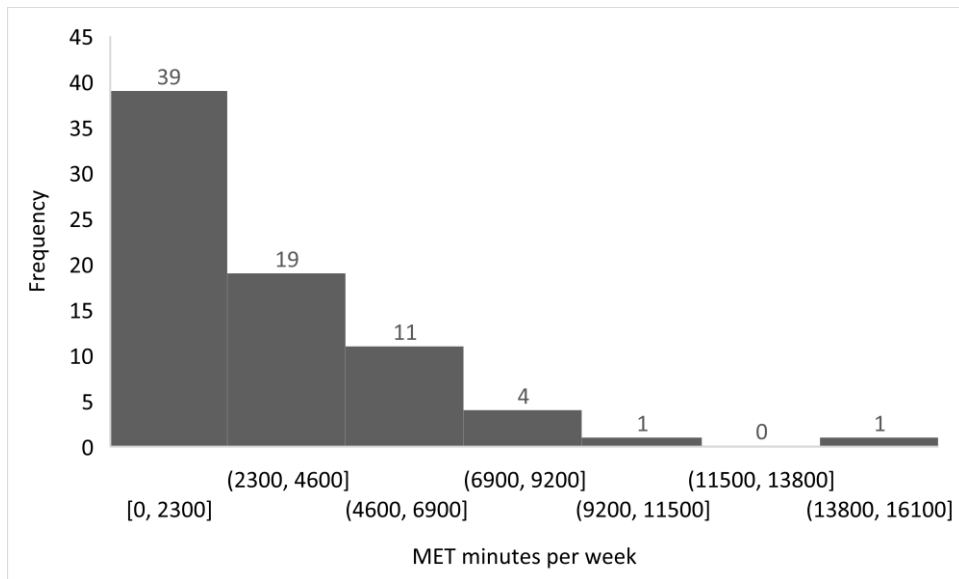


Figure 3.7

Histogram of Social Support Mean Scores

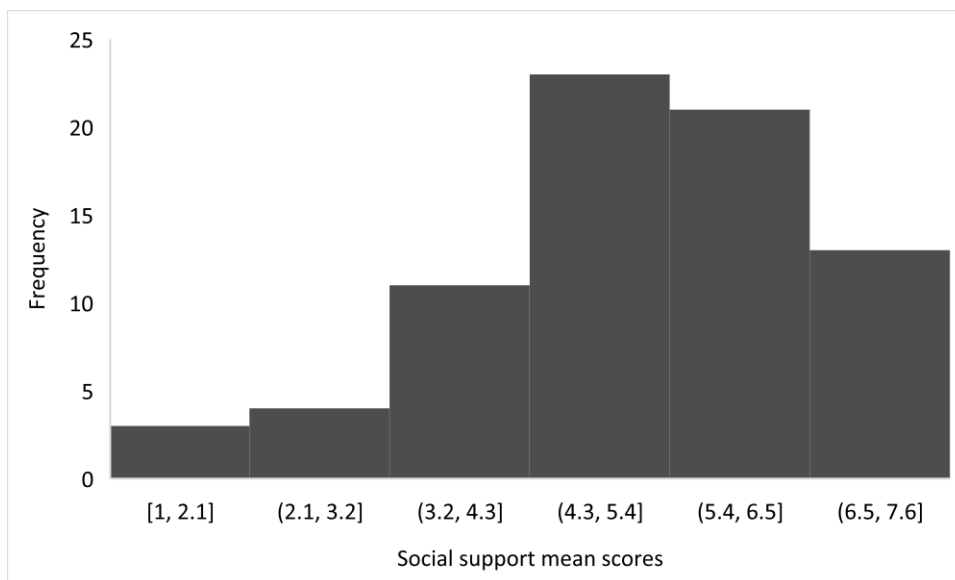


Figure 3.8

Histogram of Perceived Stress Raw Scores

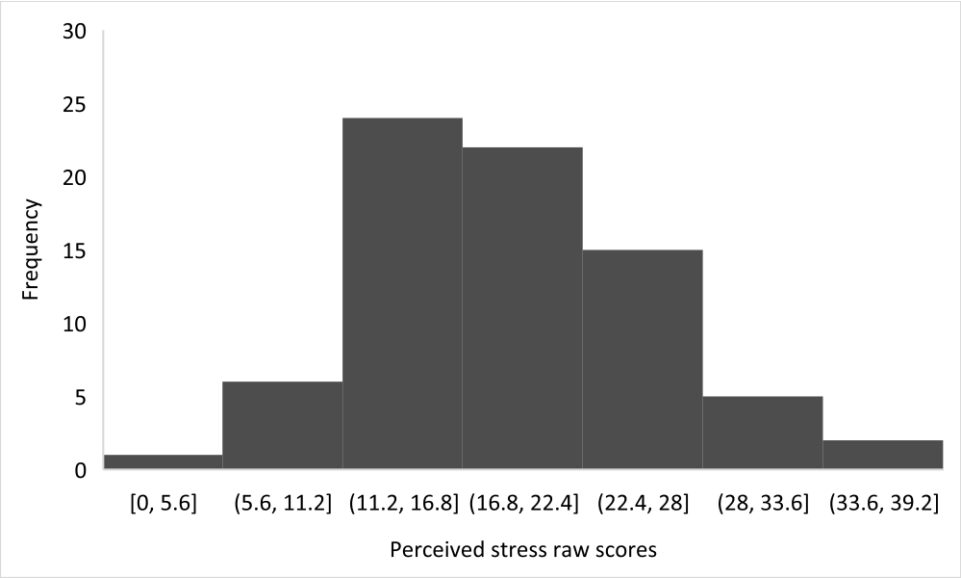


Figure 3.9

Histogram of Perimenopausal Symptoms Score

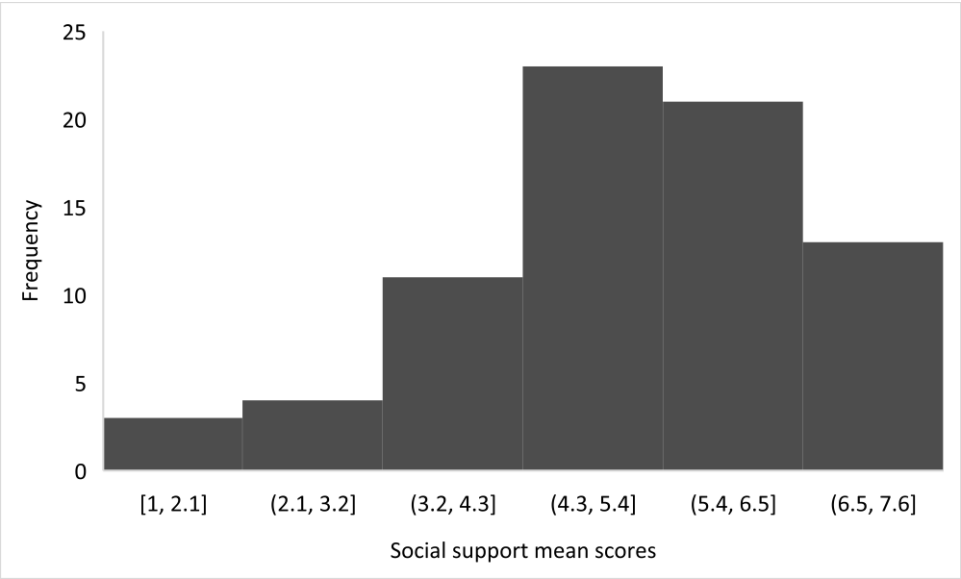


Table 3.3*Summary of Continuous Distribution of Variables*

Variables	Mean (SD)	Median (Range)	Skewness	Kurtosis
Physical Activity	2921 (2753)	2106 (14319)	1.603	3.229
Social Support	5.16 (1.33)	5.3 (6.0)	-.824	.609
Perceived Stress	18.81 (6.73)	18 (35)	.277	.256
Perimenopausal Symptoms	33.12 (5.35)	33 (26)	.277	.417

Inferential Statistics

Fisher's exact tests and Mann-Whitney U tests were undertaken to determine if relationships existed between perceived stress score, perimenopausal symptoms, physical activity, and social support.

Mann Whitney U tests indicated that those with higher levels of stress had significantly lower physical activity scores ($Mdn = 1654$, $IQR = 3828$) compared to those with lower perceived stress scores ($Mdn = 2978$, $IQR = 2642$) $U = 482$, $p = 0.019$. Similarly, Fisher's exact tests indicated that those categorised as having a lower activity level were significantly more likely to have higher stress levels (45.3 %) compared to those with higher activity levels (34.7 %, $p = < 0.001$)

Mann Whitney U tests indicated that participants with more perimenopausal symptoms had significantly lower physical activity scores ($Mdn = 1230$, $IQR = 1259$) compared to those with fewer symptoms ($Mdn = 2550$, $IQR = 2342$) $U = 499$, $p = 0.030$. Similarly, Fisher's exact tests indicated that those categorised as having a lower activity level were significantly more likely to report perimenopausal symptoms (17.3 %) compared to those with higher activity levels (5.3 %, $p = < 0.001$).

Mann Whitney U tests indicated no statistically significant difference between both the high ($Mdn = 5.2$, $IQR = 1.7$) and low ($Mdn = 5.9$, $IQR = 1.5$) social support groups in stress scores ($U = 615.5$, $p = 0.719$). In contrast, Fisher's exact tests found a statistically significant relationship between social support level and stress scores ($p = < 0.001$). A larger proportion of those in the low social support group were seen in the high-stress group (92.3 %) compared to those with high social support (70.8%).

Mann Whitney U tests indicated no statistically significant difference between both the high ($Mdn = 3.8$, $IQR = 2.4$) and low ($Mdn = 5.5$, $IQR = 5.1$) social support groups in perimenopause symptom scores ($U = 630.5$, $p = .0846$). In contrast, Fisher's exact tests found a statistically significant relationship between social support level and perimenopause symptom scores ($p < 0.001$). A larger proportion in the high social support group were in the low to moderate perimenopause symptom group (87.5 %). A larger proportion of the low social support group were in the low to moderate perimenopause symptom group (59.3 %).

Kendall's tau_b and Spearman's rho coefficient correlation analysis was conducted to evaluate the pairs of variables, Kendall's tau analysis revealed weak negative relationships between physical activity ($M = 2921$, $SD = 2753$) and perceived stress ($M = 18.81$, $SD = 6.73$) ($\tau = -0.160$, $p = 0.023$). Spearman's rho coefficient correlation analysis also revealed a weak negative relationship ($r_s = 0.248$, $p = 0.016$) indicating a slight tendency for higher physical activity frequency to be associated with lower stress.

Kendall's tau_b analysis revealed weak negative relationships between physical activity ($M = 2921$, $SD = 2753$) and perimenopause symptoms ($M = 33.12$, $SD = 5.347$) ($\tau = -0.176$, $p = 0.015$). Spearman's rho coefficient correlation analysis also revealed a weak negative relationship ($r_s = -0.255$, $p = 0.014$) indicating a slight tendency for higher physical activity frequency to be associated with fewer reported menopausal symptoms and severity.

Kendall's tau_b analysis revealed a moderately negative relationship between social support ($M = 5.17$, $SD = 1.33$) and stress ($M = 18.81$, $SD = 6.73$) ($\tau = -0.340$, $p < 0.001$). Spearman's rho coefficient correlation analysis also revealed a moderately negative relationship ($r_s = -0.463$, $p < 0.001$) indicating a moderate tendency for increases in social support to be associated with lower stress.

Kendall's tau_b analysis revealed weak negative relationships between perimenopause symptoms ($M = 33.12$, $SD = 5.347$) and social support ($M = 5.17$, $SD = 1.33$) ($\tau = -0.180$, $p = 0.014$). Spearman's rho coefficient correlation analysis also revealed a moderately negative relationship ($r_s = -0.262$, $p = 0.012$)

Regression Analysis

A simple linear regression analysis was conducted to evaluate the extent to which perceived social support, physical activity, employment information, and the number of health conditions independently predicted perceived stress scores. A significant regression was not found ($F(4,25) = 0.076, p = 0.0989$). The R^2 value was 0.012, indicating that social support, physical activity, employment, and health explained approximately 1.2% of the variance in perceived stress, results are depicted in Table 3.4.

A simple linear regression analysis was conducted to examine if the same independent variables could predict perimenopausal symptom frequency and intensity. But no significance was found. ($F(4,25) = 0.352, p = 0.840$). The R^2 value was 0.053, indicating that social support, physical activity, employment, and health explained approximately 5.3% of the variance in perimenopausal symptoms, results are depicted in table 3.4.

Table 3.4

Simple Linear Regression Predicting Stress

Predictor	B	SE B	β	t	p
Constant	18.574	7.655		2.426	0.023
Social Support	2.044	6.097	0.091	0.335	0.074
Physical Activity	0.392	3.136	0.028	0.125	0.901
Employment Status	- 1.022	2.078	- 0.114	- 0.492	0.627
Health Status	-0.279	1.662	- 0.043	- 0.168	0.868

Note. B = unstandardised coefficient; SE B = standard error of the coefficient; β = standardised coefficient; t = t-value; p = significance level.

Table 3.5*Simple Linear Regression Predicting Perimenopausal Symptoms*

Predictor	B	SE B	β	t	p
Constant	34.254	4.883		7.015	< 0.001
Social Support	-0.954	3.890	- 0.065	- 0.245	0.808
Physical Activity	0.871	2.001	0.096	0.436	0.667
Employment Status	-1.232	1.326	- 0.210	- 0.930	0.361
Health Status	0.797	1.060	0.188	0.752	0.459

Note. B = unstandardised coefficient; SE B = standard error of the coefficient; β = standardised coefficient; t = t-value; p = significance level.

Discussion

The research objective for this thesis was to explore the relationships that indicators of physical activity and social support have with the frequency and severity of key negative mood and cognitive symptoms in menopausal transition. It also examined whether increases in physical activity and social support decrease perceived stress, affecting how psychological perimenopausal symptoms are interpreted. This study was among the first of its kind within the Aotearoa/ New Zealand context. Despite its small size, it achieved its goal of exploring key factors in relation to perimenopausal symptoms and stress.

The aims of this study were achieved via a sample size of 75 women aged between 45 and 55 years. Of the 75 participants who fully completed the study 86.7% considered themselves perimenopausal with the remaining women not identifying as perimenopausal despite meeting the criteria for survey inclusion. 49.3% had discussed health-related issues or personal concerns surrounding perimenopause with their doctor. All respondents reported experiencing at least one symptom.

The top three mood and cognitive perimenopausal symptoms reported by frequency and severity were waking throughout the night (77.3%), irritable mood (61.3%), and memory problems (56%). This is in agreement with a survey conducted with 2000

respondents in the United States that found the top three psychological or cognitive symptoms of menopausal women to be difficulty sleeping, mood changes, and memory problems (Statista Research Department, 2024). A factor to consider is that hot flushes are the most commonly reported physiological menopausal symptom (Statista Research Department, 2024). Hot flushes can negatively affect sleep quality, and sleep quality can negatively affect mood and memory (Luo, 2020). As shared earlier in this thesis Daly et al. (2024) suggest that not all symptom presentations may result from hormonal fluctuations, but instead a ripple effect of one symptom promoting another.

Summary of Key Findings

An area of interest for this thesis was to explore the relationship between physical activity and symptoms of perimenopause. Univariate analysis revealed that reduced physical activity was significantly associated with increased stress and perimenopause symptoms. When looking at the relationship of perimenopausal symptoms and physical activity the results from the univariate analysis agree with research findings. Kim et al. (2014), Lee and Choi (2022), Polat and Aylaz (2022), Wu et al. (2023) all found empirical evidence of a reduction in perimenopausal symptoms with increases in physical activity and exercise. This supports the proposition that physical activity plays a role in moderating mood and cognition (Eugenin & Dimou, 2022; Furlong et al., 2020; Kierstyn et al., 2023; Kuwamizu & Yamada, 2024; Lilia et al., 2023; Pikmezi et al., 2024).

Reduced physical activity was also associated with increases in stress this is in alignment with research literature on the topic that suggests exercise can increase stress tolerance and promote positive mental health (Cerzi-Duygu et al., 2023; Garvey, 2023; Figueira et al., 2023). Physical activity may independently reduce the perception of perimenopausal symptoms, but it is important to consider that physical activity may be increasing stress tolerance, and that stress could be informing the experience of the menopausal transition.

Bromberger et al. (2022) state evidence suggests that there is a relationship between stress and perimenopausal symptoms. Nguyen et al. (2022) undertook a cross-sectional study on middle-aged women and found exercise alleviated symptoms of menopausal transition. Sozer et al. (2022) also found a positive correlation existed between scores on a Menopause Rating Scale and the Perceived Stress Scale. Studies undertaken by Angoulea et

al. (2021), Garcia et al. (2023), Kuck and Hogervorst (2024) all found increases in reported stress coincided with increases in menopausal symptoms.

Another area of interest for this thesis was to explore the relationship between social support and symptoms of perimenopause. Univariate analysis revealed that reduced social support was significantly associated with increased stress and perimenopause symptoms. When looking at the relationship between perimenopausal symptoms and social support the findings from univariate analysis are in line with studies undertaken by Nguyen et al. (2022) and Polet et al. (2022) who found that as social support increased distressing menopausal symptoms decreased.

Reduced social support may be associated with increased stress. Jalambadani et al. (2020), Praherso et al. (2017), and Wong et al. (2023) report that layered social connections can buffer stress by increasing resilience. In contrast, a study undertaken by Arnot and Mace (2021) concluded social support did not function as a buffer to stress. Social support may work to buffer the experience of both menopausal symptoms and stress thus suggesting both the Stress Buffering Model and The Social Identity Model of Identity Change as potential mechanisms behind this.

Despite univariate analysis finding a significant association between the independent variable's physical activity and social support and the dependent variables stress and perimenopause symptoms in a multivariate model significance was not found. Simple linear regression models found no statistical significance that physical activity, social support, employment status, and health conditions have a strong reliable influence on perceived stress and perimenopausal symptoms. A possibility is an independent relationship in the models was not seen that provided the mechanisms with which physical activity and social support take. Future research could look at other key factors such as age, alcohol use, body mass index, smoking status, relationships, and income. Other factors that may have affected the linear regression findings include a small sample size with limited diversity and the complexity of the interactions between stress and perimenopausal symptoms.

The difficulty of research examining the potential protective factors of exercise and social support in reducing stress and perimenopausal symptoms is the cyclical relationship between sleep, stress, perimenopausal symptoms, and mood. Disruptions to sleep can lead to mood disorders, and difficulties regulating emotions (Dar et al., 2020). Mood disorders such as anxiety and depression can disrupt sleep quality. Poor sleep quality can reduce

resilience to perimenopausal symptoms (Luo et al., 2022; Swaminathan et al., 2021). Physiological symptoms such as hot flushes and night sweats can disrupt sleep (Zhang et al., 2020) Mood disturbances can negatively inform the perimenopausal experience (Lozza-Fiacco et al., 2022). Perimenopausal symptoms can exacerbate mood swings, physical discomfort, and pain perception, collectively contributing to increases in stress, anxiety, and depression (Musial et al., 2021). Prolonged elevated levels of stress keep the body in a high state of alert this can disrupt sleep, exacerbate existing mood disorders, and contribute to the development of new ones (Luo et al., 2020). The combination of sleep disruption, perimenopausal symptoms, and mood dysregulation can contribute to increasing stress (Dar et al., 2020).

Comparison With Previous Research

While the simple linear regression results do not indicate independent relationships the associations between physical activity and social support with symptoms of menopause and distress are clear through previous research. Regular physical activity may protect and potentially reduce the frequency and severity of perimenopausal symptoms. Reductions in menopausal symptoms have been seen with exercise interventions and physical activity interventions in both observational and experimental studies (El Hajj et al., 2020; Kim et al., 2014; Lee & Choi, 2022; Lie et al., 2023; Polat & Aulaz, 2022). In general increases in physical activity have been shown to affect cognition and mood positively (Kuwamizu & Yamada, 2024).

Although the exact mechanisms are not well understood several theories have been put forward to explain this including but not limited to increases in neurotransmitters, such as serotonin and dopamine, and the promotion of brain cell growth and circuit remodelling (Eugenin & Dimou, 2022). The World Health Organisation advocates physical activity for good psychological and physical health (Lange et al., 2023; Nguyet et al., 2022). Given the acceptance and acknowledgment that daily physical activity is a primary component of good mental health it would be reasonable to ensure physical activity guidelines are met to mitigate symptoms. (Nguyen et al., 2022).

Inactive lifestyles contribute to degenerative mood disorders (Figueira et al., 2023). However, Nguyen et al. (2022) noted psychological and physiological perimenopausal symptoms such as anxiety, depression, hot flushes, sleep disturbances, and fatigue all

contribute to lower motivation to engage in exercise. Broman et al. (2018) state that the psychological benefits of exercise are evidenced and undisputed. Physically active individuals also appear to experience less stress compared to those who are less active, this suggests exercise may function as a buffer to stress (Figueira et al., 2023). Could it be possible that the buffering of negative psychological perimenopausal symptoms such as anxiety, depression, and mood swings seen in menopausal studies focusing on physical activity may be a result of reduced stress levels that have occurred due to a more physically active lifestyle.

While the simple linear regression results do not indicate independent relationships the associations between physical activity and distress are clear through previous research. Kuck and Hogervorst (2024) explain women particularly those in the early stage of perimenopausal transition reported more stress and felt more bothered by psychological symptoms. A positive correlation was also found to exist between ratings on the perceived stress scale and menopause symptoms rating scale (Sozer et al., 2022). Garcia et al. (2023) found those with high scores of perceived stress reported more menstrual cycle disruption along with more menopausal symptoms. Stress management may offer an alternative approach to the treatment of menopausal symptoms (Augoulea et al., 2021).

Stress has been shown to contribute to a range of psychological and physiological disorders with suggestions exercise may function as a buffer to the excessive worry that contributes to stress (Figueira et al., 2023; Garvey, 2023). Physical activity could increase stress tolerance (Cerezci-Duygu et al., 2023; Garvey, 2023). The mechanism proposed for how physical activity decreases stress is via modulation of the Hypothalamic-pituitary-adrenal axis (Lange et al, 2023). Another accepted hypothesis for how physical activity produces reductions in stress during midlife is decreased stress sensitivity which has been found to be heightened during menopause (Bromberger et al., 2022).

No matter the mechanism for increases in hypervigilance to threat, a woman's interpretation of the perimenopausal experience must in part be informed by the stress she is under (Bromberger et al., 2022). Hormonal fluctuations experienced during perimenopause can disrupt subtle mechanisms that maintain the homeostasis of stress levels, erosion to these homeostatic mechanisms can result in increases in negative emotions such as fear, anger, and low mood (Strute & Lozza-Fiacco, 2022). Promoting and participating in a physically active lifestyle may reduce the negative perception of

perimenopausal symptoms, it could also be that physical activity increases stress tolerance and resilience which in turn negates the negative perception of perimenopausal symptoms and informs the perimenopausal experience.

Simple linear regression results from this survey study do not indicate independent relationships but research on potential associations between social support and perimenopausal symptoms have been supported yet mixed. Social support may buffer perimenopausal symptoms. Nguyet et al. (2022) found exercise in combination with social support alleviated negative perimenopausal symptoms. Polat et al. (2022) found as social support increased menopausal symptoms decreased, and a significant relationship was found. In contrast, Arnot and Mace (2021) failed to replicate the findings that social support was associated with fewer menopause symptoms. They found contrary to literature linking support and menopause, no evidence to suggest social support was an effective protector against symptoms. Arnot and Mace (2021) also found no convincing evidence that social support buffered stress. This highlights the complexity surrounding social support.

Studies have shown decreases in the incidence of mental health disorders among perimenopausal women who perceive a high level of support (Caliskan et al., 2023). Literature has highlighted that observation in reduced stress may be explained by the stress-buffering theory, which proposes that increases in layered social connections positively impact psychological well-being. However, other studies suggest this theory falls short when considering stressful life transitions and the change in relationships that can occur during this time (Praherso et al. 2017).

Overall literature on menopause and stress suggests that the utilisation of surrounding resources, such as connections with others can facilitate adaptation to change, resulting in reductions of stress (Xiangrong et al., 2022; Wong et al., 2023). Nguyen et al. (2022) defend that studies have demonstrated high levels of social support can alter the perception of perimenopausal symptoms, both physiological and psychological. Wong et al. (2023) caution positive relationships can confer benefits but acknowledge negative relationships and strained family relations can produce more harm in the form of stress. There is a lack of research in the area of social support and its potential relationship with perimenopause symptom frequency severity and stress.

In summary, the complexity and interrelatedness of numerous factors that influence stress and perimenopausal symptoms make it difficult to capture and establish associations.

Different measures to capture and record stress levels may have been more useful to extract more meaningful statistics but were beyond the resources available to undertake this thesis.

Theoretical Implications

The Biopsychosocial Model posits that the interplay between psychological, social, and biological factors influences health and wellness. Whilst the findings from this survey research were conflicted in that univariate analysis supported significant associations, simple linear regression analysis did not. Literature research in this area, however, supports the Biopsychosocial Model approach to understanding the aetiology of psychological illness. Those with higher activity levels and increased social support exhibited less psychological and cognitive perimenopausal symptomology and a decrease in stress perception. This suggests that physical activity and social support positively affect biological, psychological, and social aspects of health during the perimenopausal transition.

Other theoretical frameworks discussed within this thesis could not be tested but aided in explaining potential mechanisms for the causation and/or buffering of perimenopausal symptoms and stress, such as Differential Susceptibility Theory (Belsky & Pluess, 2009), HPA Dysregulation Theory (Gordon et al., 2015), and Oestrogen Deficiency Theory (Stute & Loza-Fiacco, 2022). Future research may want to apply and examine the Social Support Theory that proposes diverse types of social support may have varying effects on how individuals understand and interpret perimenopausal experiences and symptoms. This could be accomplished by a mixed methods research approach surveying perimenopausal women on various social support aspects such as perceived social support from friends and family, relationship status, participation in work, volunteer environments, and group, club, or church memberships. Those with more diverse social networks could be compared to those with more limited social diversity by undertaking interviews looking at individual perceptions of the perimenopausal experience.

Practical Implications

Whilst the results from this thesis research do not indicate independent relationships, associations between physical activity and social support with symptoms of menopause and distress are clear through previous research. Improving the experience of perimenopausal transition using the promotion of physical activity and encouraging positive

social interaction could be a relatively easy and low-cost intervention to implement, but more importantly a valuable tool in the form of prevention (Garvey et al., 2023; Lange et al., 2023; Zhao et al., 2022).

At a community level wellness programs could be set up to promote regular physical activity. There are a wide range of community groups and classes, such as group fitness, outdoor exercise groups, walking and running teams, bowling groups, and fit-over-40 clubs. An existing program could be adjusted to cater specifically to perimenopausal and menopausal women. Group physical activity not only contributes to stress reduction but also positive social interaction (Lange et al., 2023). Community groups could create peer support meetings for women experiencing perimenopause, where women are free to speak openly about their experiences and overcome the stigma that often stifles the subject (Nair & George, 2021; O'Reilly et al., 2023).

The findings of this study show almost half of the participants (49.3%) consulted a healthcare professional regarding health-related issues or personal concerns. Healthcare professionals could be educated on how to prescribe a more holistic and healthy lifestyle approach to women who present with concerns around symptoms that do not feel psychotherapy, antidepressants, or hormone replacement therapy options suit them. This is particularly relevant when considering Indigenous Māori perspectives of holistic health and well-being (Bullivant Ngāti Pikao et al., 2022; Musial et al., 2021; Swaminathan et al., 2023).

Rather than stating to women to improve their social interactions and engage in more physical activity, supports could be put in place to link women to community groups targeted at perimenopausal transition. Health professionals could also incorporate as part of a standard care routine screening for perimenopausal symptoms and stress to track changes over time that could aid in motivation for healthy lifestyle modifications that require constant effort.

Looking at wider strategies public health campaigns could highlight the importance of physical activity, social activity, and stress reduction for women's health, particularly during the perimenopause phase. Health campaigns can highlight not only the importance of these factors but also encourage the topic to be normalised potentially reducing stigma and shame that prevent women from relaying negative experiences and seeking help (Tariq et al., 2023). Increasing funding or fundraising to foster opportunities for more research into

the perimenopausal experience and how modifiable lifestyle factors may or may not contribute to improvements in the negative symptoms some women experience.

The literature review for this thesis touched on the impacts of perimenopausal symptoms on women in the workplace. A large number of women remain active in their jobs into later life (Swanson et al., 2023). The workplace could play a crucial role in supporting symptomatic women during this period. With the COVID-19 outbreak, we saw the fast mobilisation of on-site work switched to at-home online work, and a direct result of that was new flexibility in work hours. Remote work and flexible hours could be options opened up for women struggling with cognitive and psychological perimenopausal issues. Stress management workshops and support services could also be offered within larger workplaces.

Considerations and Future Directions

When looking at the design of this study key limitations present themselves. Although 115 participants initiated the survey only 75 completed the required questions fully, there were four screening inventories used within this survey, and the result of this may have meant the questionnaire was fatiguing. Although 75 participants met the statistical power for making reliable comparisons, more participants may have allowed for better representation in the cross-tabulations delivering more meaningful results. But was out of the scope and time period for this thesis.

Future studies could increase volunteer participation by utilising wider networks and expanding the survey distribution. This would increase participant numbers and potentially increase Māori and Pacifica representation in the sample to better represent the broader population. A wider network and increased survey distribution would also result in capturing a more representative sample of education history. The majority of respondents for this survey were of European descent (68%) with 60% of the respondents reporting a level of education with a bachelor's degree or higher. Despite efforts made to promote inclusivity the lack of diversity in respondents could be attributed to the distribution methods selected for this thesis which included university forums and social media menopause groups. Syed Alwi et al. (2021) note observations of a relationship between tertiary qualifications and positive attitudes around the menopausal transition have been found and attributed to increased education on the topic.

The volunteers for this survey study were at varying stages of perimenopause for which could not be controlled. Gordon et al. (2021) point out that hormone fluctuation is most pronounced in the early stages of perimenopause. Whilst this study could not control for varying stages of perimenopausal transition this could be overcome in future studies by defining perimenopause into two stages. Early perimenopause could be defined by the following criteria slight menstrual irregularities but regular menstruation presenting with few symptoms and late menopause defined as irregular menstruation resulting in skipped cycles with higher symptomology.

The IPAQ, PSS-10, and MSPSS were all self-reported scales, which could introduce bias, for example, an overestimation of physical activity or an underestimation of perceived stress. The screening for perimenopausal symptom severity and frequency was designed for this thesis due to current screening tools for menopausal symptoms including predominately physiological symptoms. This study was interested in cognitive and psychological perimenopausal symptoms; therefore, this instrument has not been tested or normed for this specific population.

Future research may look at examining physiological symptoms along with cognitive and mood symptoms. Research undertaken during this thesis found cognitive and mood symptoms can manifest from physiological symptoms i.e. hot flushes affecting sleep that can impact mood and cognition. A more intensive examination of the variable physical activity could be undertaken utilising wearable physical activity trackers. The use of the IPAQ for this study presented problems with ease of use and understanding. An activity tracker worn over time could relay more exact physical activity data as it can measure steps, distance, and activity types. An activity tracker could also monitor other health indicators such as sleep, which would enable researchers to examine potential associations with stress and perimenopausal symptoms. To increase the validity of the measurement of stress a screening tool such as the Social Adjustment Scale could be included in future studies to add depth to the Perceived Stress Scale. By measuring stressful life events in life change units more universal scores for participants stress can be obtained.

The PSS-10 used for determining perceived stress asked questions on an individual's belief of their ability to cope and manage general life stressors. This thesis did not investigate significant stress factors often present in this age group, such as caring for ageing parents, parental death, and the empty nest experience. Strute and Lozza-Fiacco (2022)

caution against attributing perimenopausal symptoms to hormonal changes when stress and psychosocial factors present in midlife may be the key mechanism behind them. Another limitation of this study was the lack of information and research available on the attitudes and lived experiences of those in perimenopause within the Aotearoa/ New Zealand context. The ability to explore a variety of cultural beliefs on the experience of transition was beyond the scope of this thesis. Acceptance of perimenopause and understanding from others could affect how positive or negative the perimenopausal experience is perceived. A person's position within a community shapes self-concept, self-esteem, and social value (Kang et al., 2022). Opportunities to explore the contribution of this component to the perimenopausal experience were beyond the scope of this thesis.

This study did not explore the phenomenon that some women experience distressing perimenopausal symptoms, whilst others experience little or none. Due to the voluntary nature of this study participants who experience symptoms may have felt more motivated to take part. Future studies may look to include investigations into identifying missing protective factors that may have been overlooked and investigate other modifiable lifestyle factors such as body mass index, smoking status, diet, alcohol consumption, and attitudes. Whilst this thesis controlled for education and health conditions, other areas that could be controlled for include age and socioeconomic status.

Future studies could examine in detail and determine statistics that describe the percentage of women in Aotearoa/ New Zealand who consider themselves perimenopausal and are symptomatic or non-symptomatic. The community within which a woman lives contributes to informing her self-concept. Self-esteem, social position, and social worth (Kang et al., 2022). Future studies could incorporate qualitative research into their study designs to capture discourses surrounding attitudes and feelings on ageing and disease.

Conclusion And Summary

This research is the first of its kind exploring indicators of physical activity, social support, and stress with perimenopausal symptom severity and frequency in the Aotearoa/ New Zealand context. The findings from this survey study found individual variables may be associated with each other, but when interactions among multiple variables are combined the same association is not found. This suggests that more complex relationships may exist. Previous research has demonstrated that increases in physical activity and social support

may in isolation, or potentially, in combination contribute to easing the perimenopausal transition and reducing stress. Raising the awareness of the importance of physical activity for good mental health during this change could improve health outcomes for symptomatic women. Implementing strategies to improve physical activity participation and social engagement is cost-effective with minimal barriers. Lifestyle modification offers an alternative treatment to expensive therapy and pharmaceutical options. Both physical activity and social support confer potential protective mechanisms against stress. There is a contradiction between the protective benefits of physical activity and perimenopausal symptoms such as low mood, disrupted sleep, and fatigue that reduce motivation which may require strategies such as health professional monitoring to overcome. Future studies could look at including qualitative approaches to investigate other protective factors that may have been overlooked. Qualitative approaches may also capture cultural and societal factors that shape the understanding of perimenopausal transition for women. An examination of the diverse types of social support could also be considered using the social support theory lens which infers varying protective qualities of support exist. Increased research into perimenopausal symptom distress could improve the lived experiences for middle-aged women within Aotearoa/ New Zealand.

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Appendix A: Social Media Advert



.....Volunteer participants are needed.....

My name is Serina Cole, I am a Master of Science Student in the School of Psychology at Massey University. This study looks to examine the experiences of women aged between 45 and 55 who are transitioning toward menopause. Some women throughout this stage experience a common set of cognitive and mood complaints, but the individual experience is unique. Your voluntary participation in this brief survey would be appreciated. No identifying information will be required.

We want you!

If you are a menstruating biological adult female aged between 45 and 55 living in Aotearoa/New Zealand. If you have had at least one menstrual cycle in the last 12 months. If you have not undergone surgical menopause. If you have never undertaken hormone therapy or hormone replacement therapy.

Please follow the link to complete this survey if you fit the above criteria.

Any questions please contact mood.menopause@gmail.com

This project has been reviewed and approved by the Massey University Human Ethics Ohu Matatika 1, Application OMI 23/59. If you have any concerns about the conduct of this research, please contact the Chairperson, Massey University Human Ethics Ohu Matatika 1, email humanethics1@massey.ac.nz.

Appendix B: Information Sheet

Factors associated with the symptoms of menopause transition.

Nau Mai, Haere mai!

My name is Serina Cole, and I am a Master of Science Student in the School of Psychology at Massey University in Aotearoa/New Zealand. This study aims to examine the experiences of women aged between 45 and 55 who are transitioning toward menopause. And look at factors that may improve mental health outcomes for women transitioning. This cohort of women has been identified as the common age group for perimenopausal onset (Zhang et al., 2021). Some women transitioning into menopause experience a common set of cognitive and mood complaints, but the individual experience is unique. This study looks to examine the role of lifestyle factors that may affect how symptoms are interpreted which could improve the experience for perimenopausal women. This study will contribute toward the obligations required to complete my thesis.

What will happen when I take part? / Ka aha ahau ina whai waahi ahau?

I would like to invite menstruating biological adult human females who fulfil the criteria below to complete a brief online survey. The survey is composed of short answer questions and should take no longer than 10 to 15 minutes to complete at your convenience. No identifying information such as name and date of birth will be required, no contact information will be collected. If you would like to request a summary of findings your email address will be stored separately from your survey answers.

Who can take part? / Ko wai ka whai waahi?

If you fit the following criteria, I would like to invite you to take part in this survey study.

- You are a woman aged between 45 to 55 years and living in Aotearoa/New Zealand.
- You have had at least one menstrual cycle in the last 12 months?
- You have not undergone surgical menopause?
- You have never undertaken hormone therapy or hormone replacement therapy?

What will happen to my data? / Ka ahatia aku raraunga? All information collected will be anonymised. Results will be documented in Massey University's Master's thesis publications. All digital information will be stored under password protection and only accessible by the researchers managing and analysing the data. All research data will be destroyed five years post-project completion.

Do I have to take part? / Me whai waahi ahau?

You are under no obligation to accept this invitation to take part. If you agree to volunteer and undertake the survey this implies your full consent has been given and that you understand the following.

- Once my survey has been submitted, the researcher will be unable to remove my data upon request as there will be no identifiers to find which survey responses were mine.
- I will have the right to ask any questions about the study.
- I will be given access to a summary of the study findings when it is concluded by request.

What are the benefits to me? He aha ngā painga ki ahau?

By contributing to this study, you help to increase awareness of midlife experiences for women such as yourself. All research surrounding women's experiences as they age contributes to the growth of innovative approaches to improving and understanding not just women's physical needs but mental health needs also.

What if I have questions? / He aha mehemea he patai aku?

Researcher: Serina Cole email: mood.menopause@gmail.com

Supervisors:

Rosie Gibson, PhD

School of Psychology

Private bag 11 222

Massey University, Palmerston North, 4442

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Ute Kreplin, PhD

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Email: U.Kreplin@massey.ac.nz

Committee Approval Statement

This project has been reviewed and approved by the Massey University Human Ethics Ohu Matatika 1, Application OMI 23/59. If you have any concerns about the conduct of this research, please contact the Chairperson, Massey University Human Ethics Ohu Matatika 1, email humanethics1@massey.ac.nz.

“If you would like to receive a summary of findings for general interest at the completion of this thesis study, please email mood.menopause@gmail.com

Appendix C: Questionnaire

Factors associated with the symptoms of menopause transition.

Section one:

Demographic questions (this section is optional to answer)

1. What ethnic group/groups do you identify with? (***select one or multiple options***)
 - a) NZ European
 - b) Māori
 - c) Pacific Peoples
 - d) Asian
 - e) Other Ethnicity – please specify (***insert space to answer***)

2. What is the highest qualification you hold? (***select one option***)
 - a) Level 2 NCEA
 - b) Level 3 NCEA
 - c) Level 4 Certificate
 - d) Level 5 Diploma
 - e) Level 6 Diploma
 - f) Bachelor's degree or level 7 qualification
 - g) Master's degree
 - h) PhD or other doctoral degree
 - i) Other qualification (***insert space to fill out***)

3. Are you currently in paid employment? (***select one option***)

Yes /no

If yes which describes your situation best?

 - a) Part time less than 15 hours a week

- b) Part time less than 30 hours a week
- c) Full time more than 30 hours a week

Section two:

Social support (this section needs to be completed fully)

We are interested in how you feel about the following statements. Read each statement carefully. Indicate how you feel about each statement.

Very Strongly Disagree Strongly Disagree Mildly Disagree Neutral
 Mildly Agree Strongly Agree Very Strongly Agree

1. There is a special person who is around when I am in need.
2. There is a special person with whom I can share joys and sorrows.
3. My family really tries to help me.
4. I get the emotional help and support I need from my family.
5. I have a special person who is a real source of comfort to me.
6. My friends really try to help me.
7. I can count on my friends when things go wrong.
8. I can talk about my problems with my family.
9. I have friends with whom I can share my joys and sorrows.
10. There is a special person in my life who cares about my feelings.
11. My family is willing to help me make decisions.
12. I can talk about my problems with my friends.

Section three:

Perceived stress (this section needs to be fully completed)

The following questions in this scale ask you about your feelings and thoughts during the last month. In each case, you will be asked to indicate how often you felt or thought a certain way.

In the last month, how often have you...

Never Almost Never Sometimes Fairly Often Very Often

1. Been upset because of something that happened unexpectedly?
2. Felt that you were unable to control the important things in your life?
3. Felt nervous and “stressed”?
4. Felt confident about your ability to handle your personal problems?
5. Felt that things were going your way?
6. Found that you could not cope with all the things you had to do?
7. Been able to control irritations in your life?
8. Felt that you were on top of things?
9. Been angered because of things that were outside of your control?
10. Felt difficulties were piling up so high that you could not overcome them?

Section four:

Physical activity (this section needs to be completed fully)

We are interested in finding out about the kinds of physical activities that people do as part of their everyday lives. The questions will ask you about the time you spent being physically active in the **last 7 days**. Please answer each question even if you do not consider yourself to be an active person. Please think about the activities you do at work, as part of your house and yard work, to get from place to place, and in your spare time for recreation, exercise, or sport.

Think about all the **vigorous** activities that you did in the **last 7 days**. **Vigorous** physical activities refer to activities that take hard physical effort and make you breathe much harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

1. During the **last 7 days**, on how many days did you do **vigorous** physical activities like heavy lifting, digging, aerobics, or fast bicycling?

___ **days per week**

No vigorous physical activities → **Skip to question 3**

2. How much time did you usually spend doing **vigorous** physical activities on one of those days?

___ **hours per day**

___ **minutes per day**

Don't know/ Not sure

Think about all the **moderate** activities that you did in the **last 7 days**. **Moderate** activities refer to activities that take moderate physical effort and make you breathe somewhat harder than normal. Think only about those physical activities that you did for at least 10 minutes at a time.

3. During the **last 7 days**, on how many days did you do **moderate** physical activities like carrying light loads, bicycling at a regular pace, or doubles tennis? Do not include walking.

___ **days per week**

No moderate physical activities → **Skip to question 5**

4. How much time did you usually spend doing **moderate** physical activities on one of those days?

___ **hours per day**

___ **minutes per day**

Don't know/ Not sure

Think about the time you spent **walking** in the past **last 7 days**. This includes at work and at home, walking to travel from place to place, and any other walking that you have done solely for recreation, sport, exercise, or leisure.

5. During the **last 7 days**, on how many days did you walk for at least 10 minutes at a time?

___ **days per week**

No walking → **skip to question 7**

6. How much time did you usually spend **walking** on one of those days?

___ **hours per day**

___ **minutes per day**

Don't know/ Not sure

The last question is about the time you spent **sitting** on weekdays during the **last 7 days**. Include time spent at work, at home, while doing coursework, and during leisure time. This may include time spent sitting at a desk, visiting friends, reading, or sitting or lying down to watch television.

7. During the **last 7 days**, how much time did you spend **sitting** on a **weekday**?
___ **hours per day**
___ **minutes per day**
Don't know/ Not sure

Section Five:

Health-related questions (this section is optional to answer)

1. Do you consider yourself peri-menopausal? (Experiencing some menstruation changes or physical symptoms but have not gone longer than 12 months without a period).
Yes/ No
2. Have you ever discussed health-related issues or personal concerns about perimenopause or menopause with your doctor?
Yes, I have/ No I have not
3. Have you received a diagnosis for any of the following long-term health conditions/ disabilities? (**select all options that apply**)
 - a) Heart disease
 - b) Stroke
 - c) Diabetes
 - d) Asthma
 - e) Arthritis
 - f) Mental health conditions
 - g) Chronic pain

Section six:

Mood and cognitive symptoms (this section needs to be completed fully)

For these questions, please indicate if you have had or never had the following experiences and the corresponding frequency over the last **four-week** period.

Never rarely frequently always

1. I find it difficult to fall asleep.
2. I wake up throughout the night.
3. I experience butterflies in my stomach.
4. I have difficulty concentrating.
5. I experience problems with my memory.
6. I have episodes of brain fog.
7. I feel more irritable than I used to be.
8. I feel more anxious than I used to be.
9. I experience anger.
10. I experience a low mood.
11. I experience mood swings.
12. I feel the urge to cry.
13. I experience panic.
14. I experience migraines.

If completing this survey has you experiencing uncomfortable feelings or distress, please reach out to the following groups for support.

Lifeline – 0800 543 354 (0800 LIFELINE) or text 4357 (HELP).

Depression Helpline – 0800 111 757 or text 4202.

Anxiety NZ – 0800 269 4389 (0800 anxiety).

Appendix D: Cultural Considerations Letter

Friday, November 10, 2023

Tēnā koe Serina,

Many thanks for the opportunity to share some whakaaro (thoughts) and kōrero (discussion) with you in relations to your research, and specifically, in regard to critical Māori considerations. While your research does not specifically seek out Māori engagement and/or data, I think the way you have planned your research to be culturally inclusive in terms of survey design and participant recruitment will help ensure mana-enhancing research for both Māori and non-Māori participants.

Ngā manaakitanga,

Aorangi Durie-Kora

Appendix E: Ethics Approval



26/03/2024

Dear: Serina Cole

Re: Ethics Application - OM1 23/59 - Does physical activity and social support increase stress resistance in perimenopausal women?

Thank you for the above application that was considered by the Massey University Human Ethics Committee:

Ohu Matatika 1 at their meeting held on **Tuesday, 5 December 2023**

On behalf of the Committee I am pleased to advise you that the ethics of your application are approved.

Approval is for three years. If this project has not been completed within three years from the date of this letter, reapproval must be requested.

If the nature, content, location, procedures or personnel of your approved application change, please advise the Secretary of the Committee.

Yours sincerely

