



A Model of the Relationship between PMDD and Suicidal Behaviour, and the Effects of Childhood Abuse among South African University Students

by
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DECLARATION

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ABSTRACT

Premenstrual Dysphoric Disorder is a mood disorder that is characterised by a cluster of debilitating cognitive, behavioural, and somatic symptoms. Studies have shown an inextricable link between exposure to childhood abuse and PMDD. There is a paucity of quantitative research showing relationships between PMDD and all phases on the spectrum of suicidal behaviour. Little research has attempted to predict risk for suicidality in the face of both PMDD symptoms and a history of child abuse in an integrated model. Utilising Joiner's Interpersonal Psychological Theory of suicide, the study aimed to determine a structural model of the relationships between PMDD symptoms, suicidal behaviour, and child abuse (CA). This cross-sectional study utilised an online survey questionnaire to collect self-report data from a sample of 1218 female students from Stellenbosch University between March and June 2023. Data were analysed using Statistical Package for Social Sciences. Structural Equation Modeling was used to examine the 10 hypothesized structural relationships between PMDD symptoms, the constructs of IPT, and child abuse. Findings revealed that a positive screening for PMDD symptoms predicted both Thwarted belongingness (TB) and Perceived Burdensomeness (PB). CA had a direct positive effect on both PMDD symptoms and an Acquired Capability for Suicide (ACS). PB also significantly mediated the relationship between PMDD symptoms and an ACS. Additionally, CA moderated the relationship between TB and an ACS. This study provides support for the IPT, emphasizing the roles of PB and CA in the development of an ACS among women who screen positive for PMDD. Future research needs to include additional factors contributing towards suicide risk in future models to provide support for and strengthen the current model.

Key words: PMDD; IPT, suicidal behaviour, child abuse, female university students.

OPSOMMING

Premenstruele Disforiese versteuring (PMDD) is 'n gemoedsversteuring wat gekenmerk word deur uitputtende simptome. Navorsing ondersteun 'n sterk verhouding tussen kinders met blootstelling aan kindermishandeling en simptome van PMDD. Daar is 'n tekort aan kwantitatiewe navorsing wat die verhouding tussen PMDD en verskeie fases van selfmoordgedra ondersoek. Min navorsing het gepoog om die risiko van selfmoord te voorspel in die lig van beide PMDD simptome en 'n geskiedenis van kindermishandeling, in 'n geïntegreerde model. Deur gebruik te maak van Joiner se IPT van selfmoord, was die studie daarop gemik om 'n strukturele model van die verwantskappe tussen PMDD-simptome, die IPT-konstrukte van selfmoordgedrag en kindermishandeling te bepaal. Hierdie korrelasie-ontwerp navorsingstudie het 'n aanlyn vopnameraelys gebruik gemaak en selfverslagdata van 'n steekproef van 1218 vroulike studente van die Universiteit Stellenbosch oor Maart – Junie 2023 ingesamel. Data was geanaliseer met behulp van SPSS en R. SVM was gebruik om die 10 veronderstelde strukturele verwantskappe tussen PMDD simptome, die konstrukte van IPT en kindermishandeling te ondersoek. PMDD-simptome het beide Verhinderde Behoort (TB) en Waargenome Lasbaarheid (PB) voorspel. Kindermishandeling het 'n direkte positiewe uitwerking op PMDD simptome so wel as die vermoë om selfmoord te pleeg (ACS), vermeerder. Waargenome lastigheid het ook die verhouding tussen PMDD-simptome en 'n vermoë tot selfmoord aansienlik bemiddel. Die studie ondersteun IPT se teorie van selfmoord, beklemtoon die rol van PB en kinderlike mishandeling in selfmoordrisiko onder vroue met PMDD. Intervensies wat fokus op gevoelens van lasbaarheid mag die selfmoordrisiko verminder. Toekomstige navorsing moet bykomende faktore wat bydra tot selfmoordrisiko in toekomstige modelle insluit om ondersteuning te bied en die huidige model te versterk.

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DEDICATION

I dedicate this thesis to Faan and Lesley Coetzee, my loving grandparents. This is merely a tangible part of your legacy, of which it is the greatest privilege of my life to be a part. Thank you for teaching me how to be. I'll see you both at graduation. I love you.

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LIST OF ABBREVIATIONS

PMDD – Premenstrual Dysphoric Disorder

PMS – Premenstrual Syndrome

PMDS – Premenstrual Dysphoric Symptoms

PMD – Premenstrual Disorder

IPT – Interpersonal Psychological Theory

TB – Thwarted belongingness

PB – Perceived burdensomeness

ACS – Acquired capability for suicide

CA – Child abuse

EA – Emotional abuse

PA – Physical Abuse

SA – Sexual Abuse

EN – Emotional Neglect

PN – Physical Neglect

LIST OF DEFINITIONS

PMDD

PMDD is stipulated in the DSM-5 as a mood disorder of hormonal sensitivity characterised by a number of symptoms with ranging severity that are confined to the luteal phase of the menstrual cycle.

IPT – Interpersonal Psychological Theory

The IPT is a theory which attempts to explain the progression from different phases on the spectrum of suicidality. The theory aims to answer the fundamental question of “why people die by suicide” using three distinct and interrelated constructs: thwarted belongingness (TB), perceived burdensomeness (PB), and an acquired capability for suicide (ACS).

TB – Thwarted belongingness

TB is one of three components of Joiner’s model of suicidal behaviour. It is defined as an interpersonal need of a human being to be connected to other human beings on a familial, societal and cultural level. (Klibert et al., 2014).

PB – Perceived burdensomeness

PB is the second component of Joiner’s model of suicide and it occurs when a person develops a belief that they are a liability to the people within their social networks and this is accompanied by the additional belief that people they cared about would fare better in their absence.

ACS – Acquired capability for suicide

ACS is the third key construct within Joiner’s model of suicide as it is proposed to explain the progression from suicidal cognitions to suicidal acts. ACS is defined as an increased

tolerance for pain and fearlessness about death that combine to deactivate self-preservation instincts, enhancing risk for engaging in a near-lethal or lethal suicidal act.

CA – Child abuse

The different forms of maltreatment, negligence, and exploitation inflicted upon by a person whose relationship with the child is characterised by trust, responsibility, or power and causes indirect or direct harm to the child's wellbeing and development

EA – Emotional abuse

A type of child abuse in which the behaviours or actions inflicted by caregivers upon a child which harm their emotional well-being or self-esteem can be categorised as emotional abuse

PA – Physical Abuse

A type of child abuse that refers to the intentional use of force against a child which results in injury, bodily harm, or risk of harm

SA – Sexual Abuse

Sexual abuse is a type of child abuse that refers to any sexual behaviour forcibly enacted on a child by an adult or older child

EN – Emotional Neglect

A type of child abuse which falls under the category of neglect, in which a caregiver fails to meet their child's emotional and psychological needs to such a severe extent that it impedes their development, this is considered to be emotional neglect.

PN – Physical Neglect

Physical neglect is a type of child abuse which falls under the category of neglect and involves the failure of caregivers to provide for a child's primary needs for physical health and safety

Chapter 1: Introduction

1.1 Introduction

This chapter outlines background information supporting the current study and key definitions. It systematically presents an argument that establishes the rationale, justifying the research aim and hypotheses. The crux of this argument states that PMDD and suicidal behaviour are related among young women. This association has been supported by both quantitative and qualitative research. Furthermore, the chapter purports that a history of childhood abuse could affect this relationship and that this can be illustrated in a structural equation model (SEM).

1.2 Background

1.2.1 PMDD

Overview of premenstrual disorders: PMS vs PMDD. Premenstrual disorders (PMD) are a classification of conditions allocated to a cluster of physical, cognitive, and psychological symptoms isolated to the luteal phase of the menstrual cycle (Eisenlohr-Moul, 2019). Table 1.1 details a summary of the symptoms of PMDD.

These symptoms can vary widely in severity and may include mood changes, anxiety, irritability, depressed mood, abdominal bloating, swollen and tender breasts, and vegetative symptoms (American Psychiatric Association [APA], 2013). Premenstrual Syndrome (PMS) and PMDD are overlapping but distinct diagnoses within psychiatry and reproductive health which qualify as PMDs (Eisenlohr-Moul, 2019).

PMS is defined as a condition in which the presence of at least one affective symptom and one somatic symptom which results in significant dysfunction in an area of life is required for diagnosis (Hofmeister & Bodden, 2016). These symptoms are not necessarily regular and severe (Di Giulio & Reissing, 2006). However, the temporal pattern of the

symptoms needs to be cyclical, with onset post-ovulation and resolution post-menstruation (Epperson et al., 2012).

Table 1.1

Symptom clusters of PMDD

Physical symptoms	Dysmenorrhea
	Breast tenderness or swelling
	Abdominal bloating and gastrointestinal symptoms
	Headaches
	Fatigue or lack of energy
	Changes in appetite
	Sleep disturbances
Psychological symptoms	Mood swings
	Irritability or anger
	Anxiety or tension
	Depression or feelings of hopelessness
	Sensitivity to rejection
	Increased interpersonal conflicts
Cognitive symptoms	Concentration difficulties
	Sense of feeling overwhelmed and out of control
	Anhedonia
	Reduced productivity

PMDD is considered to be a severe form of PMS. In contrast, a patient must have at least one emotional symptom and five additional symptoms during the same cyclical pattern for most menstrual periods during the past year to be diagnosed with PMDD (Di Scalea & Pearlstein, 2017). Thus, the diagnostic criteria for PMDD are more rigorous than that of PMS, and the disorder is severe and highly debilitating (Epperson et al., 2012). Therefore, “every woman with PMS does not have PMDD, but every woman with PMDD experiences PMS” (Di Giulio & Reissing, 2006, p205).

The differentiation between PMS and PMDD has been discussed at length across various disciplines since PMDD’s controversial addition to the DSM-5 in 2013, where debates around the legitimacy of PMDD persist (Browne, 2014). In Chapter 2, this is explored using a feminist lens.

Defining PMDD. PMDD, a recent addition to the DSM-5 was previously labelled as “late luteal phase dysphoric disorder” (APA, p 172, 2013). It is classified as a psychiatric illness of hormonal sensitivity that occurs in the luteal phase of menses, characterised by a wide range of severe symptoms (Epperson et al., 2012).

Symptomatology. PMDD shares similar symptomatology with PMS (Epperson et al., 2012). However, PMDD is hallmarked by significant disturbances in mood which often interact with somatic and cognitive symptoms – warranting its classification as a psychological disorder in the DSM-5 (Janda et al., 2016). The core emotional symptoms of PMDD has been referred to as “premenstrual tension or distress,” in which anger, anxiety, or irritation is cycled with symptoms which are frequently seen in a major depressive episode, such as feelings of hopelessness, worthlessness, and anhedonia (Akyol et al., 2013; Eisenlohr-Moul, 2019). To meet the DSM-5 criteria, five of eleven symptoms need to be present during the premenstrual phase for most menstrual periods in the last year, and

cease a few days after the onset of menses (Singh et al., 2017). Diagnosis is confirmed through daily symptom tracking for at least two consecutive cycles (APA, 2013).

Due to the complex nature of the diagnostic process and general lack of awareness in the medical community, women who struggle with symptoms of PMDD can wait up to two decades before receiving an accurate diagnosis (Osborn et al., 2020). Research shows the pattern of PMDD symptoms is consistent throughout their reproductive lives and remains stable across time. Thus, if left undiagnosed, the lives of women with severe PMDD symptoms will continue to be negatively impacted (Holland, 2018).

Prevalence. It is estimated that the majority of reproductive-aged women report premenstrual symptoms ranging in severity (Eisenlohr-Moul, 2019). Furthermore, approximately 20 – 40% experience PMS, and between 2 and 8% are diagnosed with PMDD (Chumpalova et al., 2020). Thus, PMDD is both less prevalent and more severe than PMS, further justifying the condition as a distinct psychiatric disorder (Hofmeister & Bodden, 2016).

Prevalence rates can be influenced by factors such as age, genetics, and hormonal fluctuations (Yonkers & Simoni, 2018). This is reflected in several studies which estimated varying prevalence rates of PMDD (Ducasse et al., 2016; Emran et al., 2020; Pilver et al., 2013; Tsegaye & Getachew, 2021). Furthermore, the prevalence could be particularly higher among younger women, as a recent study found that 10.9% of females within the university sample screened positive for symptoms of PMDD in SA (Roomaney & Lourens, 2020). This aligns with initial findings from Rapkin and Winer (2009), who suggested that the prevalence of clinically significant PMDD symptoms is higher than what global prevalence estimates indicate, with 13-18% of women reporting severe premenstrual distress. Based on criteria

outlined in the DSM-5, these women may lack only one symptom to meet the capricious five PMDD symptoms necessary for a clinical diagnosis (APA, 2013; Rapkin & Winer, 2009).

Therefore, there is evidence showing that there are young women in South Africa who are screening positive for PMDD symptoms but who are undiagnosed, and thus untreated for their symptoms. In addition to the distress and impairment which accompanies these symptoms, PMDD has the potential to increase susceptibility to a host of mental health problems (Kleinstäuber et al., 2016).

Implications of PMDD symptoms for female university students. Research shows an adverse impact of PMDD symptoms on young female university students' ability to function, their mental health status, as well as their productivity on an academic and athletic level (Reed et al., 2014; Takeda et al., 2015). PMDD symptomatology, and the potential secondary mental health concerns that PMDD causes young women, may result in the experience of noteworthy psychological distress (Beddig et al., 2019). This form of distress refers to the emotional suffering that can manifest in the form of psychological symptoms, such as depression or anxiety (Belay et al., 2021).

Research suggests that PMDD symptoms are exacerbated by stressful events, and women with PMDD have an impaired ability to cope in the face of daily life stress than women without PMDD (Beddig et al., 2019). Furthermore, psychological distress has been shown to enhance risk for suicidal behaviour (Yang et al., 2021). In fact, a recent quantitative study indicated that the psychological distress associated with PMDD symptoms could inhibit women's ability to cope to such an extent that there is a risk for a potentially fatal outcome, such as a suicide attempt (Prasad et al., 2021).

Among young women, there is a paucity of data reflecting an existing correlation PMDD symptoms and suicidal behaviour, and psychological stress plays a role in this relationship

(Osborn et al., 2020). Other factors associated with PMDD, which also cause extreme psychological distress, are various forms of trauma, abuse, and exposure to violence (Eisenlohr-Moul et al., 2019). Women experiencing PMDD symptoms report more incidences of abuse during childhood, when compared to healthy women (Soydas et al., 2014). Therefore, chapter 2 will report on the existing research on both suicidal behaviour and child abuse, and their associations with PMDD symptoms.

1.2.2 Female Suicidal Behaviour

Overview of the mental health of university students. Across universities in South Africa, recent studies have shown unprecedented rates of mental illness and suicidal acts among students (Van Zyl et al., 2017). Two studies conducted among South African samples of university students in 2019 by Bantjes and colleagues found a prevalence rate of 38.5% for any lifetime common mental disorder among students (Bantjes et al 2019). The second study found high prevalence rates of lifetime suicidal ideation (46.4%; n = 650), suicidal intent (26.5%; n = 372) and suicide attempts (6.8%; n = 120), respectively (Bantjes et al., 2019). Consequently, the rise in mental illness amongst students can be classified as an epidemic (Makhubela, 2021).

Female university students often face a unique set of stressors related to academic pressures, social relationships, and transitions to adulthood, which can contribute to heightened psychological distress (Thakrar et al., 2021). Additionally, women in South Africa may face barriers to accessing mental health support and resources (Aguwa et al., 2023). Systemic issues which impede access to mental health services, particularly in rural areas or in low- income households, where access to affordable and qualified healthcare is often scarce (Aguwa et al., 2023). Coupled with a lack of awareness in the medical community about PMDDs, the cultural stigma around mental health and the menstrual cycle can also

impede help-seeking behaviours among women and prevent diagnosis and treatment (Osborn et al., 2020). These barriers can compound the impact of psychopathology on their risk for suicide (Devries et al., 2011).

Mood disorders affect women more than men and are associated with the full range of suicidal behaviours (Smith et al., 2017). PMDD's cyclical mood disturbances and severe emotional symptoms further amplify the risk of suicidality among affected individuals (Eisenlohr-Moul et al., 2022; Osborn et al., 2021).

The rising number of university students suffering from mental illness calls for a focus of research and intervention efforts on this population group (Yang et al., 2022). Addressing mental health concerns, including mood disorders, among female university students requires comprehensive support systems. These systems need to integrate accessible mental health services, psychoeducation on mood disorders and suicide risk, and strategies for coping with stress and emotional regulation (Prasad et al., 2021).

It has been shown that effectively treating mental disorders can produce significant reductions in suicidal cognitions and suicidal acts in university students in South Africa (Bantjes et al. 2019). By addressing the intersection of mental health and suicidality in the context of female university students, targeted interventions can help mitigate the risk factors and promote psychological well-being within this vulnerable population.

Defining the spectrum of suicidal behaviour. Within the field of suicidology, suicidal behaviour is a process that evolves over time on a risk spectrum. The progression between different phases on the spectrum correlates to differing severity levels and risk for a near-fatal attempt or suicide (Wasserman et al., 2021; Chan et al., 2021).

In this way, suicidal behaviour is an umbrella term for all phases on the suicidality spectrum (Wasserman et al., 2021). The term excludes completed suicide, or "death caused

by self-inflicted injury with the intent to die” (O’Connor et al., 2013, p 85), as death by suicide among women with PMDD is scarce (Eisenlohr-Moul et al., 2022).

Suicidal ideation, collectively referred to as suicidal cognitions, are the first stage on the spectrum. This describes the thoughts a person may have which either passively involve loss of will to continue living, or a desire to escape or free themselves from pain, or actively involve the will for their life to end without the corresponding plans or actions (Wasserman et al., 2021).

Suicidal intent refers to “acts of preparation toward a plan to die” (O’Connor et al., 2013, p 85). This phase on the spectrum lies on the boundary between suicidal cognitions and suicidal acts as suicidal intent can include any behaviour that goes beyond thoughts or ideas around suicide. This includes self-harm, writing a suicide note or preparing a means to commit suicide (Wasserman et al., 2021). Importantly, suicidal intent is “a behaviour driven by a desire to inflict pain onto oneself and has a non-fatal consequence” (O’Connor et al., 2013, p 85).

Within the suicide spectrum, the evolution from plans to attempt is severe and an important progression to understand and eventually predict (Wasserman et al., 2021). A suicide attempt is “a non-fatal suicidal behaviour that may or may not result in injury, but at the time of the attempt the intent is to die by one’s own hand” (O’Connor et al., 2013, p9).

Prevalence. Suicidal behaviour afflicts over 16 million people globally, with more than three quarters of suicides occurring in developing countries – warranting its classification as a global public health concern (World Health Organisation [WHO], 2019). Among people between ages 15 – 29 years, death by suicide is the fourth most common cause of death (WHO, 2019). Furthermore, research shows that suicide is more prevalent among university students compared to the general population (Makhubela, 2021). In fact, Bantjes and

colleagues (2019) conducted a study among a large sample of South African undergraduates and found a lifetime prevalence of 46.4% for suicidal ideation, 26.5% for suicidal intent, and 8.6% for suicide attempts.

Suicide is the third leading cause of death in young women, with more than 50% occurring between ages 15 – 29 years (WHO, 2019). The majority of the burden of suicidal behaviour rests among women, who show higher rates of suicidal ideation, and attempt suicide two to three times more often than men (Vijayakumar, 2015). For women, the risk for suicide attempts increases with age, peaking between ages 18 – 20 years (WHO, 2019). This calls for a focus on the mental health of this cohort.

Female-specific risk factors for suicidal behaviour. Gender differences in patterns of suicidality have been proposed to be explained by women's enhanced propensity to psychopathology and psychosocial stressors than men (Kootbodien et al., 2020). This enhanced vulnerability has been attributed to various factors, including social support, responses to stressors, and women's increased risk to exposure to violence and abuse during childhood (Prachason et al., 2023). However, because more men die by suicide than women, most suicide theories and studies focus on samples of men (Khan et al., 2021). As a result, there is a significant shortfall in suicide research, where minimal theories exist which include women (Khan et al., 2021).

African studies are showing evidence that exposure to various forms of violence and abuse consistently show a close relationship with female suicidal behaviour (Gibbs et al., 2018; Kavak et al., 2018), highlighting the importance of considering the larger societal context when understanding suicide in women. Despite this evidence, the dominant theories of suicide from high-income countries are focused on the individual, and these theories are often applied to women in LMIC (Cai et al, 2021). Ultimately, this leads to

research outputs that lack contextual relevance for the factors influencing female-specific suicide risk in LMICs such as South Africa. In general, this gap in our understanding of gender differences in suicidal behaviour is due to a misconception surrounding where much of the burden lies, which is with women

The rise in suicidality among university students in South Africa (Bantjes et al., 2020), coupled with the female specific vulnerability to suicidal behaviour indicates that suicidal behaviour is a pressing issue among women (Miranda-Mendizabal et al., 2019). Specifically, the risk for suicide attempts peaks between ages 18 – 20, highlighting the vulnerability for women who are attending university during these ages (Rhodes et al., 2014). There is a need to focus suicidal behaviour research and prevention efforts on this vulnerable age group.

Theoretical Framework. Suicide risk is comprised of a constellation of factors which enhance predisposition to contemplate and engage in suicidal acts (Klibert et al., 2015). For this reason, it is paramount to determine suicide risk using an integrative approach which acknowledges: (1) the dynamic interactions within the individual and between the individual and their environment, and (2) constructs related to suicidal cognitions, and the ability to self-injure (Smith et al., 2016). Therefore, the Interpersonal Psychological Theory (IPT) of suicide by Thomas Joiner (2005) was used as the theoretical framework for this research and is discussed in detail in Chapter 2. Joiner's (2005) theoretical model was adapted and formed the basis from which the hypotheses are outlined in the third Chapter.

1.2.3 Child Abuse

Definition. The WHO (p 1, 2022) defines childhood abuse as “the abuse and neglect of minors under the age of 18.” The exhaustive definition encompasses the different forms of maltreatment, negligence, and exploitation inflicted upon by a person whose relationship

with the child is characterised by trust, responsibility, or power and causes indirect or direct harm to the child's wellbeing and development (Fluke et al., 2021).

Prevalence and forms of child abuse. Annually, more than 50% of the world's children are exposed to violence and in South Africa, large numbers of young people are exposed to several forms of violence and abuse during childhood (Mienck et al., 2016). The Optimus South Africa study concluded that the prevalence of child abuse is around 42% nationwide (Artz et al., 2018). These rates are substantially higher than in non-third world countries (Mienck et al., 2015).

There are four dimensions of child abuse, each of which is assessed in the short form version of the Childhood Trauma Questionnaire ([sf-CTQ]; Bernstein et al., 2003), namely: emotional abuse, sexual abuse, physical abuse, and neglect, which can be further distinguished between emotional neglect and physical neglect.

Emotional Abuse. Behaviours or actions inflicted by caregivers upon a child which harm their emotional well-being or self-esteem can be categorised as emotional abuse ([EA]; Bernstein et al., 2003). This can include verbal assaults, threats, rejection, and other forms of manipulation (Mienck et al., 2015). In South Africa, the estimated prevalence of EA is 16% (Artz et al., 2018). Exposure to EA can enhance risk for long-term negative outcomes for children later in life, including the onset of psychopathology and suicidality (Mienck et al., 2015).

Physical Abuse. Physical abuse involves the intentional use of force against a child which results in injury, bodily harm, or risk of harm ([PA]; Bernstein et al., 2003). This can include being struck with an object with the potential to cause harm at a single time-point or on a regular basis (Mienck et al., 2015). Corporal punishment is a common form of

parental discipline in South Africa, which could explain why more than a third of the sample in Optimus South Africa study reported lifetime PA (Artz et al., 2018).

Sexual Abuse. Sexual abuse refers to any sexual behaviour forcibly enacted on a child by an adult or older child ([SA]; Bernstein et al., 2003). There are more than 120 million young female victims of forced sexual contact (WHO, 2022). SA can encompass a wide range of abusive acts such as touching, fondling, penetration or forced exposure to sexual material (Murray et al., 2014).

The Optimus South Africa study further estimates that approximately 35% of children have been sexually abused in their lifetime, and this was similar across genders, although girls reported more instances of rape than boys (Artz et al., 2018). Similarly, a nationally representative study of violence against children was conducted in South Africa and found that among the entire sample (n = 5631), approximately 10% of boys and 15% of girls reported some lifetime sexual victimization (Ward et al., 2018). This highlights that SA is widespread among children in South Africa, particularly for girls, and is associated with severe negative health outcomes (Ward et al., 2018).

Emotional Neglect. If a caregiver fails to meet their child's emotional and psychological needs to such a severe extent that it impedes their development, this is characterised as emotional neglect ([EN]; Bernstein et al., 2003). EN can be further characterised by dysfunctional parental relationship on which a child depends when learning to feel safe and independent in the world (Cohen et al., 2017). Some examples include ignoring the child or failing to adequately address the child's range of emotions, or withholding love or affection (Spies et al., 2019).

Physical Neglect. Physical neglect involves the failure of caregivers to provide for a child's primary needs for physical health and safety ([PN]; Bernstein et al., 2003). Practical

caregiving responsibilities, including the provision of food, shelter, clothing, and medical care are basic needs that are essential for healthy development during childhood (Schilling & Christian, 2014). PN can be as severe as providing inadequate supervision or exposure to dangerous environments (Cohen et al., 2017).

The Optimus South Africa study found that 12% of South African children reported neglect of any kind (Artz et al., 2018). However, global estimates indicate that neglect is the most prevalent form of childhood maltreatment – with approximately 1 in 5 children who will experience a form of neglect before age seventeen years (WHO, 2022). A multi-wave longitudinal study conducted in the United States among a diverse adolescent community sample (n = 508) found that the prevalence of abuse was 5.3% (PA, EA, and SA), and the prevalence of neglect was 17.4% (Cohen et al., 2017). However, these numbers reflect a minority of the children who suffer from maltreatment. For instance, data from the initial Adverse Childhood Experiences studies (ACES) have shown that more than a quarter of adult men and women are estimated to have been physically abused during childhood, indicating that many cases of child abuse have been going unreported for decades (Felitti et al., 1998).

From these statistics, it is evident that child abuse is highly prevalent in South Africa, and young people across the country are exposed to many forms of trauma and violence. While many children show astonishing resilience, repeated exposure to stressors may negatively affect their ability to cope and place them at heightened risk for the onset of psychiatric disorders in adulthood (Cluver et al., 2015).

Impact of child abuse. The outcomes of experiencing different types and severity levels of abuse have been extensively studied and correlated with several psychopathologies, including suicidal behaviour and PMDD (Soydas et al., 2014). A South

African study found that as the number of traumatic early life experiences accumulates, there was a graded increase in suicide risk (Cluver et al., 2015). The researchers deduced that a strong graded relationship between child abuse and suicide exists in South Africa (Cluver et al., 2015).

In research over the last decade, women with PMDD have been shown to be more vulnerable to experiencing child abuse when compared with healthy women (Bertone-Johnson, 2014; Perkonigg, 2004; Soydas et al., 2014). Premenstrual symptoms can be increasingly challenging for women who have been abused as children, due to emotional dysregulation, which may in turn trigger an abnormal stress response and increase premenstrual distress (Azoulay et al., 2020). Therefore, the experience of abuse during childhood increases vulnerability to the onset of PMDD in adulthood, and can exacerbate symptom severity (Younes et al., 2021).

1.3 Study rationale

Current research in South Africa indicates that mental illness and suicide are common and affect university students to a greater extent than the general population (Pillay et al., 2020). After the pandemic in 2020, the rates of mental illness and suicidal behaviour have increased among students (Rousseau et al., 2020). Therefore, there is an urgent need to identify, treat, and prevent suicide among students experiencing psychological distress (Bantjes et al., 2019). This increase in the number of university students experiencing psychological distress motivated the sample choice for this study. Women enrolled in university are a particularly vulnerable group for the onset of psychopathologies and suicidal behaviour (Richardson et al., 2022). This is due to gender differences in which women experience significantly more psychological distress and suicidal behaviour than men (Hersi et al., 2017).

Despite the existing literature placing PMDD as a highly prevalent disorder in many African countries, my initial literature search revealed a lack of research on women with PMDD in South Africa. The higher rate of positive screenings of PMDD found among female South African university students by Roomaney and Lourens (2020) indicated that this was a vulnerable age group for PMDD symptoms, and this finding served as the primary rationale for my research.

Global quantitative research has depicted that PMDD symptoms are strongly correlated with suicidal behaviour, and a strong correlation between PMDD and child abuse, but none had used an integrative model to further understand the pathways between these variables (Osborn et al., 2021). There is ample quantitative literature on other mood disorders showing a definitive correlation with suicidal behaviour (Gili et al., 2019), and other studies showing childhood abuse predicts the development of these mood disorders among university students (Auerbach et al., 2016; Karetekin et al., 2017). However, a gap exists in research which looks to determine a model of the progression from PMDD symptoms to suicidal behaviour, and whether this relationship is affected by the presence of a history of child abuse. Based on my extensive search of the available literature, this the first study to explore the relationship between PMDD and suicidal behaviour, and the effects of child abuse in an integrated model among female university students in the South African context.

1.4 Aims and objectives

The overall aim of the research was to test a model based on Joiner's (2005) IPT of suicide to partially explain the pathway from PMDD symptoms to suicidal behaviour and the influence of child abuse on this pathway. The aim was operationalised using the following objectives:

Objectives

- To determine the latent variables that contribute to risk for suicidal behaviour among young women
- To determine the pathways between the latent variables and their outcomes.

In Chapter 2, the variables and hypothesised relationships between them are detailed and visually depicted in a conceptual model (Figure 2.1 in Chapter 2). These were then translated into path-specific hypotheses and statistical hypotheses in Chapter 3.

1.5 Scope and limitations

The main research goal was to determine whether a relationship exists between PMDD symptoms and the three components of Joiner's (2005) model of suicidal behaviour among women, and how this relationship is affected by a history of child abuse, based on findings from the literature review to be discussed in Chapter 2. Thus, sample of female students from which data was collected were enrolled at Stellenbosch University. The IPT of suicide formed the study framework to develop a model that would depict how these variables influence each other to confer risk for suicidal behaviour (Joiner et al., 2005).

The sub-types of child abuse and suicidal behaviour were also measured, apart from the overall constructs. However, while childhood abuse comprises five sub-dimensions, individual hypotheses testing the relations among the subdimensions and PMDD or suicide were not stated. This is because emphasis is rather placed on hypotheses related to childhood abuse as a general construct.

Instead, hypotheses relating to the specific components of the IPT model of suicide (perceived burdensomeness, thwarted belongingness, and acquired capability for suicide) were tested. Thwarted belongingness (TB) and perceived burdensomeness (PB) are the two interpersonal components which together confer risk for suicidal cognitions, and an acquired capability for suicide (ACS) confers risk for suicidal acts. This is because the

theoretical framework adapted from Joiner's theory (2005) informed the hypotheses in this research, and these sub-dimensions encompass the full spectrum of suicidal behaviour, including both suicidal cognitions and suicidal acts.

A clinical diagnosis of PMDD was outside of this study's scope as I only screened for symptoms of PMDD. This is because there is controversy surrounding the diagnosis of the disorder, where feminist scholars' main critique is that the act of forming a diagnosis serves as a means of medicalizing women's moods, or pathologizing the biological process of menstruation (Chrisler et al, 2015). Consequently, this research refers to PMDD symptoms and does not refer to the DSM-5's psychiatric classification.

1.6 Conclusion

In conclusion, the first chapter of this thesis provides an overview of the background information necessary to understand the research conducted. By exploring the definitions and characteristics of PMDD, female suicidal behaviour, and the impact of childhood abuse, a rationale is established for investigating the relationships between these variables among young women, particularly university students in South Africa. The chapter highlights the urgency of addressing mental health concerns, such as PMDD symptoms and suicidal behaviour, within this vulnerable population and sets the stage for further exploration in subsequent chapters, aiming to fill gaps in existing literature regarding the relationships between PMDD, suicidal behaviour, and childhood abuse in the South African context.

1.7 Summary and thesis chapter outline

This chapter outlined the study context and explained the definitions of key constructs. A motivation was provided for the choice of the IPT of suicide to develop the conceptual model depicted in Chapter 2 of the relationships between the study variables. An argument

was made for the relevance and scope of the problem, and the study's aim and objectives are outlined. The remaining thesis chapters are briefly summarised below.

Chapter 2 comprises the theoretical underpinnings and a detailed synthesis of literature which follows a systematic structure that is used to motivate and discuss the relevant variables in this study. The theoretical framework is explained to indicate how the conceptual model was developed and to test the current study's hypotheses

In Chapter 3, the research design and methodology are presented, which is supported with evidence from existing literature. A detailed discussion of the research process, motivating the chosen research design, the sample participants, methods and procedure of data collection, and the statistical analyses is discussed in detail. Important concepts, such as reliability, validity, sampling error etc. are also taken into consideration in this chapter, and I provide insight into how I ensured my study addressed these factors.

Chapter 4 is a detailed discussion on the results of the statistical analyses and presents both descriptive statistics, followed by inferential statistics. This begins with an overview of the demographic characteristics of my participants. I then present the inferential statistical results, which will cover the multiple regression analyses, Confirmatory Factor Analyses (CFA), and SEM. Finally, the hypotheses are interpreted.

In Chapter 5, I discuss my results while drawing departures from and similarities to the literature reviewed in Chapter 2. Chapter 5 will also highlight the study's limitations, before outlining the practical implications of these results. Based on the limitations and implications, I will give recommendations for future research and concluding remarks.

Chapter 2: Theoretical Framework and Literature Review

2.1 Introduction

Chapter 2 is a synthesis of the current research relating to PMDD, female suicidal behaviour, and child abuse as well as the intersection between these variables. By integrating findings from multiple studies that have utilized the IPT, this chapter proposes an adapted model tailored to the unique context of South African university settings, aiming to elucidate the underlying mechanisms that link PMDD symptoms, experiences of childhood abuse, and suicidal behaviour among young women.

2.2 Theoretical Framework

The IPT of suicide was developed by Thomas Joiner (2005) to ascertain “why people die by suicide” (Joiner, 2005, p4). The IPT is a model composed of three distinct and interrelated constructs: thwarted belongingness (TB), perceived burdensomeness (PB), and an acquired capability for suicide (ACS). TB occurs when the interpersonal need of a human being to be connected to others on a familial, societal and cultural level goes unmet (Klibert et al., 2014). PB occurs when a person develops a belief that they are a liability to the people within their social networks and this is accompanied by the additional belief that people they cared about would fare better in their absence (Van Orden et al., 2010). Finally, ACS is defined as an increased tolerance for pain and fearlessness about death that combine to deactivate self-preservation instincts (Klibert et al., 2014).

Joiner (2007) attempts to explain the mechanisms behind the movements from one phase of the spectrum of suicidality utilising the connections that exist between these three constructs (Joiner, 2007). PB and TB are distinct but related constructs and when both are present, they confer risk for suicidal cognitions (Joiner, 2005). Joiner theorises that there are many factors which could precipitate the onset of PB and TB, one of which is

psychopathology (Kleinman et al., 2014). This is the proposed explanation for why certain people with mental illnesses experience suicidal thoughts and desires. However, even if the psychiatric symptoms are severe enough to result in suicidal cognitions, Joiner (2007) posits that it is only in the presence of the third construct, ACS, in which risk for suicidal acts is conferred. Van Orden et al. (2010) found that an ACS can arise from an experience which results in an accumulated tolerance for physical pain and a level of fearlessness towards death. This could be any painful or severely stressful life experience, such as childhood abuse (Christensen et al., 2014).

I adapted Joiner's model to encompass symptoms of PMDD as a psychological factor which I hypothesise will directly affect both TB and PB. Furthermore, I included child abuse as an environmental factor which I propose will directly affect the development of an ACS. These adaptations ensure that the model is contextually relevant as it accounts for variables that exert influence both within and outside of the individual. Figure 2.1 provides a visual representation of the theoretical model, and the hypotheses are as followed:

Hypothesis 1: PMDD symptoms will have a significant positive relationship with thwarted belongingness.

Hypothesis 2: PMDD symptoms will have a significant positive relationship with perceived burdensomeness.

Hypothesis 3: Thwarted belongingness will have a significant positive relationship with an acquired capability for suicide.

Hypothesis 4: Perceived burdensomeness will have a significant positive relationship with an acquired capability for suicide.

Hypothesis 5: Child abuse will have a significant positive relationship with PMDD symptoms.

Hypothesis 6: Child abuse will have a significant positive relationship with an acquired capability for suicide.

Hypothesis 7: Thwarted belongingness will significantly mediate the relationship between PMDD symptoms and an acquired capability for suicide.

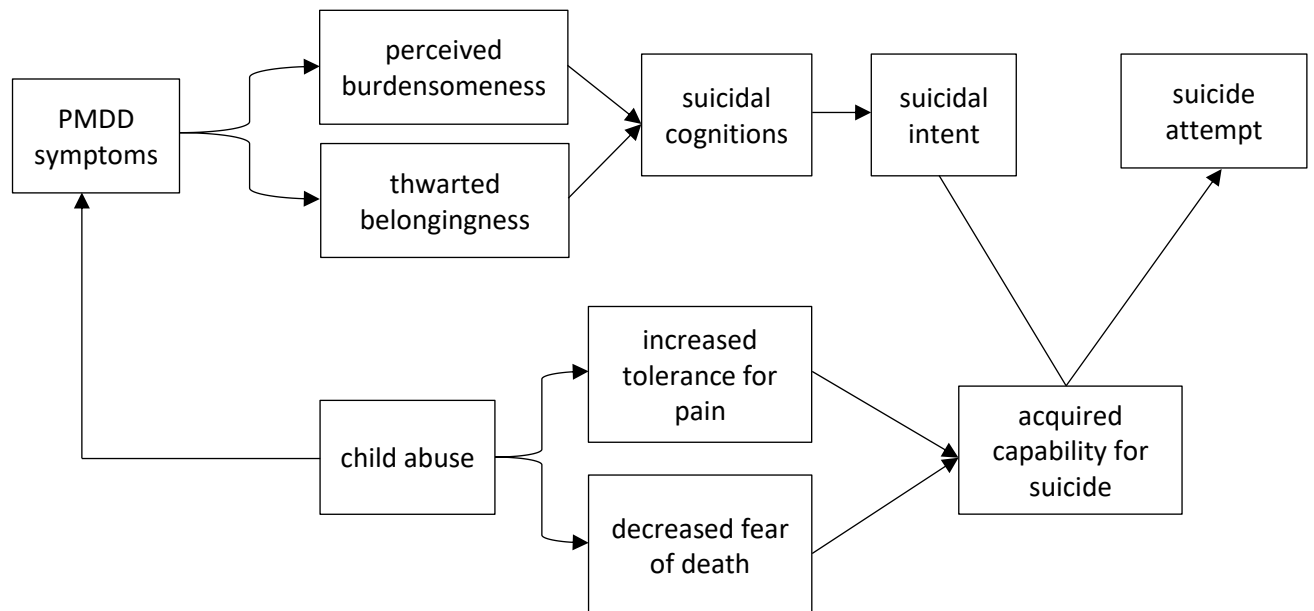
Hypothesis 8: Perceived burdensomeness will significantly mediate the relationship between PMDD symptoms and an acquired capability for suicide.

Hypothesis 9: Child abuse will have a significant moderating effect on the relationship between thwarted belongingness and an acquired capability for suicide.

Hypothesis 10: Child abuse will have a significant moderating effect on the relationship between perceived burdensomeness and an acquired capability for suicide.

Figure 2.1

Theoretical Model



Symptoms of PMDD are associated with psychological distress which function to enhance a person’s vulnerability to risk for suicidal behaviour (Ducasse et al., 2016).

Coupled with the impact of a history of child abuse, the severity of the symptoms of PMDD

reduce a woman's ability to cope (Eisenlohr-Moul et al., 2019). From this, it can be deduced that PMDD symptoms have potential to predict the onset of TB and PB, which Joiner (2005) purports to be adequate triggers for passive suicidal thoughts.

The concurrent presence of both PB and TB causes a sense of hopelessness that is adequate to trigger the onset of active suicidal ideation and desire (Joiner, 2005). Hopelessness has been a reported component of PMDD (Osborn et al., 2021) and assists in comprehending suicidal behaviour as it can prompt suicidal thoughts when followed by stressful life events (Joiner et al., 2007; Wasserman et al., 2021). Thus, I deduce that when suffering from PMDD, women experience a state of hopelessness brought on by TB and PB. This state could lead to the distorted perception of a lack of solutions and identify suicide as their only option (Eisenlohr-Moul et al., 2019).

The pathway from these interpersonal needs to suicidal acts is mediated by the presence of an ACS (Klibert et al., 2015). ACS develops from a combination of interactions between genetic and environmental factors. When people who are at-risk for suicide are exposed to physical and psychological pain through the experience of traumatic and stressful life events over time, they acclimatise to the pain and fear associated with suicide (Van Orden et al., 2010). The joint presence of a decreased fear of death and suicidal desire is hypothesised to result in the movement suicidal intent. A near-lethal or lethal suicide attempt is most likely to occur in a state of hopelessness brought on by the combined presence of TB and PB, a fearless attitude towards death by suicide, and enhanced pain tolerance (Wolford-Clevenger et al., 2020).

My study expects that a positive screening for PMDD symptoms will have a direct effect on both PB and TB. These constructs are indicative of risk for suicidal cognitions. An ACS, the third construct of the IPT, is required to advance from suicidal cognitions to suicidal

acts, including suicide attempts and suicidal intent (Van Orden et al., 2010). The strength of the relationship between the two interpersonal components, perceived burdensomeness and thwarted belongingness, and the third component (ACS) is expected to be influenced by the presence of child abuse.

This study suggests that a positive screening for symptoms of PMDD and the presence of a history of child abuse will reflect the greatest degree of risk for suicidal behaviour. In essence, the risk for a near-lethal suicide attempt is highest in the context of all three components of Joiner's (2005) model, as well as in the presence of a positive screening for PMDD symptoms and a history of childhood abuse.

This integrative model is selected as the approach is cognisant of all proximal suicide risk factors ranging from persons showing passive suicidal ideation to those displaying current risk for engaging in lethal suicidal acts (Wolford-Clevenger et al., 2020). This will allow precise and reliable identification of those people that are at risk for future suicidal acts, thereby guiding suicide prevention.

2.3 PMDD

This section is a compilation of the current research relating to PMDD. It begins with a brief overview of the history of PMDD, before looking at the aetiology, impact, and treatment of the disorder. Lastly, the section concludes with a review of the various factors associated with PMDD.

2.3.1 Overview: History of PMDD

The medicalisation of women's moods. Medical reports of the menstrual cycle on mood and behaviour have existed since the time of the ancient Greeks (Simon, 1978). Hippocrates deduced that numerous negative psychological and behavioural symptoms could be attributed to "retained menstrual blood" (Simon, 1978, p 201, cited in Di Guilio &

Reissing, 2006). Showalter (1985, cited in Cohen & Hartmann, 2021) gave a sociohistorical analysis of women and madness, showing how labels of mental illness have been used to halt women's independence from men on all fronts. Feminists purport that there is a tendency for psychiatry to depict women as the "monstrous feminine" – who are at the mercy of their bodies and their "raging hormones" (Chrisler & Caplan, 2002, p 274). The medicalisation of women's moods is a long-standing pattern in history and serves to maintain the boundaries of normative femininity (Cohen & Hartmann, 2021, p 9; Cosgrove & Riddle, 2003).

PMDD was recently added as a separate category in the DSM-5, resulting in controversy about whether it may pathologise the natural process of menstruation and subject women to stigmatisation (Epperson et al., 2012). For instance, Cohen and Hartmann (2021) argue that PMDD is an example of a "feminised" mental disorder which serves to justify the restriction of women's roles in the workplace and reinforces the cliché that "a woman's place is in the home" (Cohen & Hartman, 2021, p 1). Feminist scholars argue that under neoliberalist conditions, psychiatry is a powerful site of patriarchal power in which the DSM-5 is the tool for reinforcing social control over women (Offman & Kleinplatz, 2004). Despite the controversial inclusion of PMDD in the DSM-5, this inclusion has provided legitimacy for the diagnosis of PMDD for the women around the world who experience very real premenstrual distress (Eisenlohr-Moul, 2019).

The debate on how the menstrual cycle influences mood and behaviour has taken two ineffective stances: firstly, the argument that all women predictably and cyclically suffer from premenstrual changes, which is unsupported by research (McHugh, 2020). Secondly, the argument that menstrual cycle effects on behaviour and mood are bound by culture, which is also unsupported (McHugh, 2020). These approaches should be discarded and

replaced by the more nuanced and accurate position that most women do not experience significant cyclical changes in their emotions, cognitions, or behaviour (Chrisler et al, 2015). Instead, it is a minority of women (such as those with PMDD) who do experience impairing hormone-related changes in behaviour and mood which warrants recognition, diagnosis and treatment (Eisenlohr-Moul, 2019).

Key historical events. The history of research on PMDD can be summarized by five key events. The origin of the disorder can be traced back to Robert Frank's 1931 study, where the term "premenstrual tension" was coined to describe the symptoms which manifest during the latter half of the menstrual cycle ([PMT]; Frank, 1931). Frank (1931) attributed these symptoms to fluctuations in oestrogen that were inherently dysfunctional until Karen Horney countered that PMT was not necessarily pathological and was a part of healthy women's menstrual cycles as well (Ussher, 2003). Feminists critiqued that Frank's research coincided with the Great Depression and was politically motivated to limit women's ability to enter the workforce during economic decline (Chrisler et al., 2015).

In the 1950s, British endocrinologist Katharine Dalton was the first to introduce the term "premenstrual syndrome" (Dalton, 1964). In doing so, Dalton also unintentionally contributed to the medicalization of women's moods and the menstrual cycle (Offman & Kleinplatz, 2004). Despite issues with replicability and methodological limitations, the results of Dalton's study affirmed that girls' academic performance was negatively impeded by their premenstrual symptoms, and premenstrual women were prone to criminality (Cohen & Hartmann, 2021). Ultimately, Dalton's work reinforced the notion that women were sensitive to and incapacitated by hormonal imbalances during the premenstrual phase, a notion which persists today (Bobel et al., 2020).

The third and arguably most significant event unfolded in the 1980s, when PMS gained public prominence when Dalton appeared in a national court case and testified that premenstrual hormone fluctuations could lead to violent outbursts (Dalton, 1986). This narrative was amplified by the media and further embedded the belief that all women suffered from PMS, especially in the Western world (Cosgrove & Wheeler, 2013).

Following the court case, a panel of psychiatrists convened to debate the addition of a new diagnosis to the DSM for severe PMS cases. In 1987, the DSM introduced “late luteal phase dysphoric disorder” (LLPDD), a mood disorder linked to changes in the menstrual cycle (APA, 1980). This disorder resembled PMS but was more severe and affected a smaller percentage of women. Feminist groups strongly opposed LLPDD, arguing that there was a lack of evidence support the diagnostic label and the potential economic harm such labelling could inflict on women (Maracek & Gavey, 2013). As a result, LLPDD was relegated to the appendix of the DSM.

PMDD replaced LLPDD in the DSM-IV in 1994, featuring slight changes in classification and symptoms (APA, 1994). Despite lingering controversy, PMDD was included in the main text of the DSM-5 in 2013 (APA, 2013). The history of PMS and PMDD underscores the political context in which these disorders emerged, revealing their use to medicalize the premenstrual experience to justify restricting women’s roles to the household (Cohen & Hartmann, 2021). Feminists have argued against the diagnosis of PMDD, and how this can be used to stigmatise women (Chrisler et al., 2015). However, over time, more research is showing there is only a small percentage of women who experience severely distressing premenstrual symptoms which impact every aspect of their lives (Epperson et al., 2012).

An establishment of a formal diagnosis should serve as potential relief for women suffering from PMDD’s debilitating symptoms (Rapkin & Winer, 2009). Unfortunately, even

with a clinical diagnosis, the reality is that women with PMDD face a continued battle for healthcare due to uncertainty around PMDD's legitimacy as a disorder, and stigma in the medical community around the menstrual cycle (Bobel et al., 2020; Osborn et al., 2020).

2.3.2 Aetiology

The definitive aetiology of PMDD is unknown but is likely to involve a complex interaction of biopsychosocial factors (Di Giulio & Reissing, 2006). These include hormonal changes, neurotransmitter imbalances, psychosocial factors, and cultural factors.

Hormonal changes. In the systematic review of PMDD, Epperson et al. (2012) discussed the research pointing towards the role of reproductive hormones in the pathogenesis of PMDD. This can be attributed to several studies' finding that PMDD severity is significantly correlated with levels of estradiol, progesterone, and neurosteroids such as allopregnone (Epperson et al., 2012).

In more recent research it has been widely supported that PMDD is caused by a hypersensitivity to the normal hormonal changes across the menstrual cycle, and not by abnormal or disordered reproductive hormones (Eisenlohr-Moul., 2019). However, the precise mechanism of this abnormal sensitivity remains unknown and accepted explanations as to why certain women are more hormone-sensitive than others are lacking (Hofmeister & Bodden, 2016). Therefore, hormone levels alone cannot fully explain the onset of PMDD. As PMDD has been classified as a mood disorder, it is reasonable to assume that neurotransmitter systems could play a role.

Neurotransmitter imbalances. The involvement of the dysregulation of the serotonergic system in the onset of PMDD is one of the most plausible and well-researched etiological theories of the disorder (Yonkers & Simoni, 2018). Low levels of serotonin have been linked to symptoms that overlap with those of PMDD, including mood

instability, irritability, impulse control, anxiety, aggression, low pain tolerance and difficulty concentrating (Di Scalea & Pearlstein, 2017).

Treatment studies also support the serotonin hypothesis of PMDD aetiology, and selective serotonin reuptake inhibitors are considered the first line of treatment ([SSRI]; Di Scalea & Pearlstein, 2017). The Cochrane review included several clinical trials which confirmed the efficacy of SSRIs in alleviating the psychiatric symptoms and premenstrual symptoms which accompany PMDD (Hantsoo & Epperson, 2015). The paucity of research supporting the effectiveness of SSRIs in treating PMDD strongly suggests a link to the serotonergic system (Sepede et al., 2016). However, neurotransmitter imbalances alone cannot explain the full clinical picture as other psychosocial factors have been implicated in the expression of PMDD (Eisenlohr-Moul, 2019).

Psychosocial factors. There is evidence that PMDD is influenced by various psychosocial factors, but the research behind how these factors contribute to the disorder's aetiology is limited (Eisenlohr-Moul, 2019). A factor which has received the most focus is stress and trauma exposure (Eisenlohr-Moul et al., 2016). Several studies spanning the last 20 years have shown a correlation between a history of trauma and the development of PMDD (Azoulay et al., 2022; Bertone-Johnson et al., 2014; Wittchen et al., 2003).

An Australian study found that childhood trauma of any kind was more common among women with PMDD than the general female population, where 83% of women with PMDD had experienced childhood trauma (Kulkarni et al., 2022). The association suggests women with past trauma may be more vulnerable to hormonal fluctuations and stress reactivity via dysregulations in the hypothalamic-pituitary-adrenal (HPA) axis, which can result in the onset of PMDD symptoms and influence their severity (Eisenlohr-Moul et al., 2016).

Psychosocial factors, including perceived stress, neuroticism, agreeableness and coping strategies have been shown to be related to PMDs (del Mar Fernández et al., 2019). There is an established link between psychological stress and PMDD symptom severity (Petersen et al., 2016). A recent German study found that when compared to healthy controls, women with PMDD reported significantly higher daily life stress and high arousal negative affect towards stressors during the luteal phase (Beddig et al., 2019).

Interpersonal relationships and social support play a crucial role in the manifestation of PMDD (Ussher & Perz, 2017). A recent qualitative study on the impact of PMDD symptoms on women's quality of life revealed that women reported that their interpersonal relationships were the most negatively impacted aspect of their lives (Jurvanen, 2017). Women with PMDD often report heightened relationship conflicts and lower levels of social support than women without PMDD (Ussher & Perz, 2013). A study among female university students in Ethiopia showed that poor social support was a statistically significant predictor of PMDD (Chekol et al., 2024).

Cognitive behavioural interventions have been shown to be effective in treating PMDD based on the premise that women who struggle prior to menstruation tend to frame their symptoms as out of their control and hold maladaptive beliefs which contribute to their experience of the disorder (Di Giulio & Reissing, 2006). Feminist accounts have theorised that women who abide by hegemonic constructions of femininity attribute their premenstrual changes to their "PMS self" and not their "real self" (Chrisler et al., 2015, p 139). This means that these women often split themselves into two separate entities, being their real selves (when not experiencing PMS) and their PMS selves.

CBT may include beneficial alterations in behaviour and coping mechanisms and has been proven as a successful adjunct to antidepressant treatment in the short-term (Rapkin

& Lewis, 2013). Such interventions involve a combination of strategies such as relaxation training, coping skills, social support, and anger management, combined with cognitive reframing to overcome the sense of overwhelm and helplessness which often accompanies PMDD symptoms (Ussher & Perz, 2017). CBT has been shown to be more effective than SSRIs at long term follow-up in terms of reducing premenstrual anger and distress and improving coping ability (Rapkin & Lewis, 2013).

Cultural and societal factors. Cultural attitudes and stigma surrounding menstruation and mental health can influence the prevalence, perception, manifestation, and management of PMDD (Mishra et al., 2015). It is well-known that our experience and reporting of distress is shaped by culture, and this includes PMDD (Browne, 2014). In cultures where menstruation is stigmatised, women may feel additional stress and shame, which can exacerbate symptoms and serve as a treatment-seeking barrier.

One of the explanations for why symptoms of PMDD only occur once a month is because women are socialised to repress their emotion, but it is expected within society that during the premenstrual phase women will experience mood fluctuations (Emran et al., 2020). Typically, this is why a sense of feeling overwhelmed or out of control occurs during the premenstrual phase, as it serves as a form of emotional release after three weeks of self-silencing (Emran et al., 2020).

A mixed-methods study explored the relationship between self-silencing and premenstrual distress among a sample of 257 women and found that women with PMS adopted hegemonic ideas of femininity from which to compare themselves (Perz & Ussher, 2006). The authors suggest that women with PMS tend to repress emotions and behaviours which deviate from these ideals or attribute them to their menstrual cycles (Perz & Ussher, 2006). Furthermore, this could explain why anger and irritability are common symptoms of

PMDD, as these are emotions that do not conform to hegemonic ideas of femininity (Emran et al., 2020). The study found that women with PMS directed their anger externally once a month, instead of internalizing their symptoms and becoming depressed (Perz & Ussher, 2006). Through utilising such cultural beliefs, women expressed their anger or distress during the premenstrual phase because it is the culturally sanctioned time in which such negative emotions can be biologically acceptable (Chrisler & Gorman, 2014).

While the argument that PMDD is a culturally bound syndrome is compelling, epidemiological studies have confirmed the existence of the disorder worldwide in samples of women from the United States (Pilver et al., 2013), Europe (Ducasse et al., 2016), China (Chan et al., 2021), India (Thakrar et al., 2021), and Africa (Eldeeb et al., 2021; Roomaney & Lourens, 2020). However, there are differences in the symptom expression of PMDD across countries and prevalence rates.

Prevalence rates of PMDD in North America and Europe ranges between 4 – 23% among community and clinical samples (Ducasse et al., 2016; Pilver et al., 2013), whereas in non-Western countries such as Africa and Asia, PMDD rates are between 10 – 37% (Alemu et al., 2016; Mishra et al., 2015). The variation in prevalence supports the notion that culture does have some influence on which symptoms are expressed and their corresponding meaning (Mishra et al., 2015).

Among female university students, two African studies found that stressor types and levels, cultural perspectives of females' roles at university, and sociocultural aspects play an essential role in the onset of PMDD and could contribute to these disparities in prevalence rates of the disorder (Eldeeb et al., 2021; Shehadeh & Hamdan-Monsour, 2017). Eldeeb and colleagues (2021) conducted a cross-sectional study among 755 students in Egypt and found that 21% of the sample screened positive for PMDD using the PSST, and that PMDD was

more common among medical students than commerce students. This is consistent with findings of Shehadeh and Hamdan-Monsour (2017) among 858 students in Jordan and indicates that the academic pressure and stressors associated with studying medicine influence PMDD expression.

Despite the similar cultural landscape shared between Egypt and Jordan, the authors found a lower prevalence rate of 7.7% for PMDD, which was diagnosed using the Daily Record of Severity of Problems tool ([DRSP]; Shehadeh & Hamdan-Monsour, 2017). This discrepancy can be attributed to variations in sample size and characteristics and different methods of measuring PMDD. Overall, an understanding of the psychosocial factors contributing to PMDD is essential for developing holistic treatment approaches that address the biopsychosocial aspects of the disorder (Ussher & Perz, 2017).

Given the current literature on aetiology, it is evident that diagnosis and treatment need to reflect the multifaceted nature of PMDD. A focus on a single causal factor may be clinically misleading and contextually irrelevant to the experiences of women with PMDD symptoms. However, a new problem arises as the complex biopsychosocial perspective of PMDD poses a specific caveat for reaching a valid and reliable diagnosis (Sepede et al., 2016).

2.3.3 Impact of PMDD

For women with PMDD, the symptoms impede their social and occupational functioning to similarly to mood disorders (Reed et al., 2014). On average, a woman will have 450 menstrual periods in her lifetime. This is indicative of a severe illness burden in which a woman with PMDD could lose up to 10 years of her life (Holland, 2018).

Studies in Africa and India have investigated the impact that symptoms of PMDD have on female university students (Eldeeb et al., 2021; Shehedah & Hamdam-Monsour, 2017;

Thakrar et al., 2021; Tsegaye & Getachew, 2019). One Ethiopian study found an alarmingly high prevalence rate (66%) of PMDD symptoms among the sample of female university students ($n = 254$; Tsegaye & Getachew, 2019). The studies' consensus are that female university students' functioning in all spheres of life was severely impaired by PMDD symptoms (Thakrar et al., 2021).

It has become clear that the illness burden associated with PMDD is high, and that PMDD negatively affects female students' cognitive and emotional regulation abilities (Reuveni et al., 2016), academic performance (Shehedah & Hamdam-Monsour, 2017), eating behaviour (Çoban et al., 2021), thus causing significant psychological distress and impairment (Fukushima et al., 2020). Therefore, certain symptoms of PMDD could hinder women's career opportunities and education if they go untreated for many years (Osborn et al., 2020). Notably, a study screened female university students in India ($n = 661$) for PMDD with the Premenstrual Symptoms Screening Tool (PSST) and found that the symptoms negatively affected students' overall quality of life (QoL), especially their social relationships (Thakrar et al., 2021).

A study conducted among female university students in India compared psychiatric morbidity rates between women with and without PMDD and found that students with PMDD had significantly higher levels of depression and anxiety than students without PMDD (Singh et al., 2017). Symptoms of PMDD can have a severe impact on psychological wellbeing and research is showing women with PMDD have a great propensity to display suicidal behaviour (Osborn et al., 2020). An example of this can be seen in the study by De Carvalho et al. (2018) which showed that women with PMDD were three times more likely to exhibit suicidal behaviour than women without PMDD.

Research has shown that psychological distress is more prevalent among female than male university students (Hersi et al., 2017). Psychological distress, especially among young women, is of growing concern as a recent study found more than 20% of female university students were experiencing symptoms of depression and/or anxiety, and less than a third had received professional help (Bernhardsdóttir & Viljálmsón, 2013). In light of this, it is important to detect PMDD early and accurately to prevent women from experiencing enduring psychological distress. To achieve this, there needs to be a greater understanding and awareness of PMDD within both the medical and general community (Covaleski, 2019).

2.3.4 Diagnostic challenges

The primary barrier to treatment for PMDD is the delay in receiving a diagnosis, and the stigma associated with PMDDs in the medical community (Eisenlohr-Moul, 2019). A review of current studies on PMDD found that due to the complexity of diagnosis and lack of awareness of PMDD by health-care providers, women can experience up to 20 years of symptoms going unrecognized and untreated, and receiving misdiagnoses (Osborn et al., 2020).

A study conducted in North America examined a group of licensed mental health clinicians' ability to accurately diagnose PMDD based off a fictional case study (Covaleski, 2019). Results indicated almost half of the clinicians misdiagnosed the case study (49%), and most offered incorrect treatment interventions (Covaleski, 2019). Interestingly, the number of years licensed was not correlated with accurate diagnosis. However, female clinicians were significantly more likely to make a correct diagnosis than their male counterparts (Covaleski, 2019). While the results of this study cannot be applied to all clinicians worldwide, this highlights that there is a lack of awareness in the medical community about

PMDD which contributes towards a delay in receiving diagnosis and treatment (Covaleski, 2019).

Among female university students living in India, a study found that the stigma that surrounds the menstrual cycle resulted in the underreporting of psychological distress and other domains of quality of life which are impacted by symptoms of PMDD (Thakrar et al., 2021). When women with PMDD are left undiagnosed and untreated, they can develop significant difficulties in their attempts to cope (del Mar Fernández et al., 2019), including eating disorders (Çoban et al., 2021; Nobles et al., 2016), substance abuse problems (Reed et al., 2014), and serious suicidal behaviours which are likely to further complicate the clinical picture (Eisenlohr-Moul et al., 2019).

High comorbidity rates are another significant diagnostic challenge and barrier to treatment (Blanco et al., 2017). PMDD is highly comorbid (30 – 70%) with other mental illnesses, especially mood disorders (Sepede et al., 2016). Past mood disorders influence the course and prognosis of PMDD, which could account for why PMDD's diagnostic criteria and treatment are still widely contested since its addition to the DSM-5 (APA, 2013; Epperson et al., 2012).

2.3.5 Treatment and intervention

The goal of treatment of PMDD is to relieve the debilitating mood disruptions and physical symptoms which occur premenstrually (Di Scalea & Pearlstein et al., 2017). Factors to be considered include treatment severity, prior treatment responsiveness and modality preferences, and other psychiatric comorbidities (Nevatte et al., 2013).

A systematic review of the current treatments and interventions available for PMDD indicates that the treatment as a primary mental disorder is still debated because of the high rates of comorbidity with other mental illnesses (Sepede et al., 2016). Regardless, the

treatment guidelines for women with PMDD without any comorbidities are unclear (Blanco et al., 2017). The majority of the 55 studies included in the review related to pharmacological treatments and few explored non-pharmacological interventions. The conclusion of the review was that SSRIs, particularly fluoxetine and paroxetine, and low doses of ovulation suppressants are the first line of treatment for PMDD without any comorbidities (Sepede et al., 2016).

SSRIs can be effective when prescribed for either daily or intermittent use for during symptomatic days (di Scalea & Pearlstein et al., 2017). Ovulation suppression options could include oral contraceptives, transdermal estrogen, or Gonadotropin-releasing hormone agonists ([GnRH]; Eisenlohr-Moul, 2019).

Complementary and alternative options, such as cognitive behavioural therapy (CBT), calcium supplements, and herbal medicines are showing some promise (Maharaj et al., 2015). Dietary changes (Saglam & Orsal, 2020), low-intensity aerobic exercise and yoga (Ghaffarilaleh et al., 2019), and mindfulness techniques (Begum et al., 2016), have been shown to be effective in reducing symptoms of mild cases of PMDD. The last line of treatment is surgical in nature, and arguably the most extreme, involves a total hysterectomy and bilateral oophorectomy, which initiates menopause and results in the elimination of PMDD symptoms (Eisenlohr-Moul, 2019).

Even with a clinical diagnosis and a paucity of research on treatment options, many women struggled for adequate validation and care from clinicians, who often refused to recognise PMDD as a legitimate disorder and address the severe impact the symptoms inflict on women's quality of life (Osborn et al., 2020).

2.3.6 Factors associated with PMDD

Psychological stress, trauma and abuse. Similarly to other mental illnesses, it is likely a relationship exists between environmental factors such as current stress and past trauma exposure and the onset or expression of symptoms of PMDD (Epperson et al., 2012). Del Mar Fernández (2019) have suggested that the simultaneous presence of psychological factors and physiological menstrual cycle fluctuations results in severe psychological distress associated with PMDD symptoms (del Mar Fernández, 2019).

Many of the common symptoms of PMS overlap with the signs of stress, such as tension, irritability, headaches, backaches, crying, and fatigue (Beddig et al., 2019). This aligns with findings from Peterson et al (2016) which indicated that women who report that they suffer from PMS frequently reported high levels of stress in their lives.

Del Mar Fernández et al. (2019) conducted a case control study in Spain exploring factors associated with PMDD found that perceived stress had a direct effect on PMDD. This corroborates previous research showing a significant positive relationship between perceived distress and PMDD, when compared to non-PMDD women (Peterson et al., 2016). However, the same correlation was not replicated by Roomaney and Lourens (2020). The discrepancies between these studies can be explained by sample variations in size and characteristics and by differing data collection tools for perceived stress.

A history of trauma has been shown to have an impact on the onset of PMDD, although the results are mixed (Epperson et al., 2012). Cross-sectional research shows evidence of a potential link between exposure to trauma and abuse and PMDs (Azoulay et al., 2020). Soydas et al (2014) found a statistically significant relationship between PMDD and childhood trauma. In their Turkish study, 70 women with PMDD had higher scores on

the Childhood Trauma Questionnaire (CTQ) than 78 healthy controls, particularly for EA and EN.

Azoulay et al. (2020) found that of women with PMDD, approximately 29% reported trauma exposure during childhood versus a minority of women without any PMDD (10%). The study also found higher childhood trauma scores in the PMDD group than in the healthy control group. However, the study only included 16 women with PMDD (Azoulay et al., 2020). The limited research highlights the need to determine the prevalence of child abuse to determine whether the experience of child abuse enhances risk for the onset of PMDD.

If abuse is an integral environmental factor which contributes to the aetiology of PMDD, then concentrating efforts on the biological level may provide some symptomatic relief, but ultimately would not address the root cause of the suffering (Browne, 2016). More data is required to definitively draw conclusions about the pathways by which stress and trauma causes increases in PMDD symptoms.

PMDD and mood disorders. PMDD is significantly correlated with depressive and anxiety disorders, (Di Scalea & Pearlstein et al., 2017). Considering the symptom overlap of PMDD with other mood disorders, it is reasonable to see why this association exists (Epperson et al., 2012).

A study assessed the lifetime prevalence of mental disorders among women diagnosed with PMDD (Kepple et al., 2016). The authors found that while 45% of the sample had no psychiatric comorbidities, MDD was the most common comorbid mental disorder in women with PMDD ([31%]; Kepple et al., 2016). Other frequent comorbidities were anxiety disorders (15%), and substance use disorder (18.6%). This is in line with other data reporting MDD is the most common mental disorder seen in women with PMDD (Epperson et al., 2012).

While some women with PMDD do not experience symptoms of depression, the similarity between the symptomatology of PMDD and MDD are apparent (Epperson et al., 2012). In fact, the severity of PMDD symptoms has been known to be comparable to that of a full depressive episode (Di Giulio & Reissing, 2006). Some of the overlapping symptoms are depressed mood, suicidal thoughts, irritability, anhedonia, concentration issues, and changes in sleep and appetite patterns (APA, 2013).

A hallmark feature of PMDD is anger and irritability, frequently reported as a significantly distressing component of the disorder as it directly impacts women's relationships (Akyol et al., 2013). One of the reasons for this could be that women with PMDD report significantly more behavioural impulsivity and difficulties in emotional regulation than women without PMDD (Petersen et al., 2016). The culmination of these severe symptoms, and the negative effect they have on interpersonal relationships, enhances women's vulnerability to a several negative outcomes, including suicidal behaviour (Osborn et al., 2021).

2.4 Suicidal behaviour

2.4.1 Overview: The spectrum of suicide

The spectrum of suicidal behaviour exists on a continuum of severity which evolves from weariness of life to death wishes and suicidal thoughts, leading to suicide attempts, and completed suicide (Chan et al., 2021). Thus, progressions between phases of the spectrum often reflect an increase in severity and risk for suicide (Wasserman, 2016).

Predisposition for suicide may be sudden, enduring, or dormant (Giner et al., 2016). Studies of the suicidal process in suicide attempts among university students show that most suicidal acts are precipitated by their own unique process and timeline (Grasdalmoen et al., 2020; Bantjes et al., 2017). The suicidal process usually spans over several months.

However, for some individuals it could persist for more than a year; and for others with chronic psychopathology or addiction problems, it can be lifelong (Wasserman, 2016).

Within the spectrum of suicidal behaviour, the distinction between suicidal cognitions and suicidal acts is not rigid but rather fluid, with outcomes influenced by a combination of risk factors, the absence of protective elements, and individual predispositions (Wasserman, 2016). Suicide is viewed as a complex interplay of cognitive, emotional, and communicative facets (Schmaal et al., 2020). While intervention can halt the progression of suicidal tendencies, these tendencies may also naturally subside over time (Bruffaerts et al., 2018). Thus, to have a holistic understanding of suicidal behaviour, an examination at the individual level of interpersonal dynamics and of the broader societal contexts is integral (Joiner et al., 2007).

2.4.2 Gender-differences in suicidal behaviour

Gender differences in suicidal behaviour have been a topic of extensive research, revealing distinct patterns in prevalence, risk factors, and underlying mechanisms between males and females (Miranda-Mendizabal et al., 2019). Historically, suicide rates have been consistently higher in males across various age groups and cultures (Lehmann, 1995; Richardson et al., 2021). However, there is a concerning rise in suicide rates among young women, highlighting the need for focused research efforts to address this growing public health issue (Wasserman, 2016; Vijayakumar, 2015).

Traditionally, males have exhibited higher rates of completed suicide, often attributed to factors such as higher impulsivity, better access to lethal means, and lower help-seeking behaviours than females (Richardson, 2021). In contrast, females have been more prone to non-fatal suicidal behaviours, including suicidal ideation, deliberate self-harm, and suicide attempts than males (Richardson, 2021). These gender differences reflect variations in

coping strategies, socialization patterns, and societal expectations surrounding emotional expression and help-seeking (Richardson, 2021).

Despite the higher prevalence of suicide deaths among males, evidence from literature shows that females are disproportionately affected by suicidal behaviours, particularly suicide attempts (Maselko & Patel, 2008). Studies have identified numerous risk factors contributing to this disparity, including experiences of interpersonal violence, sexual abuse, bullying, and mental health disorders such as depression, anxiety, and eating disorders (Miranda-Mendizabal et al., 2019). Moreover, societal pressures related to body image, perfectionism, academic achievement, and romantic relationships can exacerbate psychological distress and increase vulnerability to suicidal thoughts and behaviours among young women (Eisenlohr-Moul et al., 2022).

It is essential to recognize the unique challenges faced by young women and the need for tailored prevention and intervention strategies (Vijayakumar, 2015). However, research focusing specifically on understanding the factors driving suicidal behaviour in this demographic remains limited compared to studies on the general population, or adolescent or male samples other population groups (Richardson, 2021; Rhodes et al., 2014). This knowledge gap underscores the urgency for increased research efforts to elucidate the underlying mechanisms and risk factors contributing to suicidal behaviour among young women (Vijayakumar, 2015).

While gender differences in suicidal behaviour have long been recognized, the emerging trend of increasing suicide rates among young women highlights the need for enhanced research efforts and targeted interventions. By addressing the unique challenges and risk factors faced by this demographic, we can work towards reducing the burden of suicidal behaviour and promoting mental well-being among young women.

2.4.3 Female suicidal behaviour

Globally, suicide is the third leading cause of death in young women, with more than 50% of female suicides occurring between ages 15-29 (WHO, 2019). A synthesis of the available literature on women has shown the consistent finding that women attempt suicide more frequently than men (Vijayakumar, 2015).

While in the general population the suicide rate may be higher among men than women, a recent study conducted among a national university student population in the UK showed that deaths by suicide among university students were equal between sexes ($n = 94\ 922$; Farrell et al., 2017). In South Africa, 12-month prevalence estimates were determined for all stages in the spectrum of suicidal behaviour among university students ($n = 633$), and the researchers found that identifying as female, black, or non-heterosexual were associated with a higher risk of all stages of suicidal behaviour (Bantjes et al., 2020). Despite this finding, there are few studies which have specifically focused on suicidal behaviour among female university students in South Africa.

2.4.4 Female-specific risk factors

It is well known that knowledge of the most important risk indicators is important because it guides effective suicide prevention strategies (Bantjes et al., 2020). However, there is limited literature on factors influencing risk for suicidality in women living in developing countries (Kavak et al., 2018; Devries et al., 2011). This could be attributed to a common misconception that suicidal behaviour, particularly in females, is attention-seeking or manipulative and therefore, should not be taken seriously (Vijayakumar, 2015). Another explanation could be that statistically, men have a higher probability than women of dying by their suicide attempts (Bantjes & Swartz, 2019), as men tend to have better access to

fatal methods of suicide, such as firearms, hanging, and jumping from heights (Richardson et al., 2021).

History of previous suicide attempts. A history of previous suicide attempts is arguably the strongest indicator for future suicidal behavior, particularly among young women in South Africa (Kootbodien et al., 2020). Research indicates that individuals who have attempted suicide in the past are at a heightened risk of subsequent attempts, with each attempt increasing the likelihood of future suicidal behavior (Wasserman, 2016).

Among young women in South Africa, factors such as interpersonal violence, sexual abuse, and societal pressures could influence the elevated risk of suicide attempts (Gibbs et al., 2018). Moreover, a lack of access to mental health resources, and stigma surrounding help-seeking behaviors further exacerbate the vulnerability of young women to suicidal tendencies (Kavak et al., 2018).

Recognizing the impact of previous suicide attempts as a critical risk factor, interventions aimed at suicide prevention in South Africa should prioritize early identification, comprehensive assessment, and targeted support for young women with a history of suicidal behaviour (Bantjes & Swartz, 2019). Efforts to address the underlying social, economic, and psychological determinants driving suicidal behavior are essential for reducing the burden of suicide among this demographic (Gibbs et al., 2018).

Menstrual cycle and PMDs. Current literature indicates that the menstrual cycle is a significant contributor towards suicidality among women, particularly for those with PMDs (Eisenlohr-Moul, 2019). A systematic review of studies conducted globally indicates that a consistent and statistically significant direct correlation exists between PMDD symptomatology and risk for suicidal behaviour (Osborn et al., 2021). For instance, one of these studies demonstrated that women that are suffering from PMDD were up to 3 times

more probable to display suicidal behaviour than what a healthy woman was (de Carvalho et al., 2018). While the research has consistently demonstrated a statistically significant relationship between PMDD and suicide, it is unclear if a similar relationship exists in the South African context.

Owens and Eisenlohr-Moul (2018) conducted a review which determined that menstrual cycle triggers several alterations in mechanisms that enhance vulnerability for suicidal behaviour, particularly among women who are sensitive to hormone changes. In essence, cyclical changes in experiences of and responses to stressful or traumatic life events may increase risk for suicidal behaviour among these premenstrual women (Prasad et al., 2021). PMDD symptom onset occurs one week before the onset of menstruation, it could be assumed that for women with PMDD, suicide attempts would be more frequent during the late luteal phase of the menstrual cycle (Yan et al., 2021).

There are several plausible mechanisms for this enhanced vulnerability to suicidality, these include inhibited emotional regulation, dysregulations in HPA-axis functioning, or increased impulsivity (Owens & Eisenlohr-Moul, 2018). Periodic alterations in hormone levels are bound to cause changes in biological systems responsible for regulating emotions and cognitive processes relevant for suicide risk (Yan et al., 2021).

Despite this literature, there have been few definitive conclusions drawn regarding the extent of the menstrual cycles' influence on female suicide risk. Both Shams-Alizadeh et al. (2018) and Ducasse et al. (2016) compared the menstrual phase between suicide attempters with and without PMDD and found no statistically significant differences between the groups. It was found that among women who had attempted suicide, the sample was evenly split between the follicular and luteal phase. The studies findings emphasises that the menstrual phase had no relation to attempting suicide (Shams-Alizadeh

et al., 2018). A possible reason for this could be that for many women with PMDD, their symptoms are not isolated to the luteal phase and can experience premenstrual distress for up to three weeks in any month of their cycle (Eisenlohr-Moul, 2019).

Importantly, these results discredit the common misconception that all women experience premenstrual distress that negatively influences their mood and behaviour. Rather, evidence emphasises that a small number of hormone-sensitive women experience debilitating premenstrual distress. Independent of the cycle phase, it is these changes that may lead to increased risk for suicidal behaviour. (Prasad et al., 2021; Yan et al., 2021).

The age of menarche is the time when women begin to experience hormone cycling and menstrual bleeding and coincides with when the risk for depression and suicidality emerges (Owens & Eisenlohr-Moul, 2018). This risk gradually declines as women enter menopause (Owens & Eisenlohr-Moul, 2018). Consequently, this female-specific risk can be partially attributed to women's greater exposure to hormone fluctuations throughout their lifetime (Eisenlohr-Moul, 2019). PMDD is characterised by marked changes in mood and behaviour across the menstrual cycle and may help to explain why differences between males and females in depression rates and suicide risk are detectable primarily during women's reproductive lifespan (Osborn et al., 2020).

Intimate Partner Violence. Gender-based violence plagues the lives of women and children in South Africa, in which 25% of the nation's women will be raped and over 30% will experience lifetime intimate partner violence (IPV) at some point (WHO, 2021). Studies show that IPV is one of the strongest female-specific risk factors of suicidal behaviour (Devries et al., 2011; Gibbs et al., 2018; Kavak et al., 2018; Vijayakumar, 2015).

A study conducted in the United Kingdom explored the risk factors for female suicidal behaviour in developing countries such as Thailand, Namibia, Ethiopia and Brazil. It was

found that IPV was the most common form of violence at a rate of 40% among participants. Suicidal thoughts had a prevalence ranging from 7-29%, while suicide attempts ranged between 1-12% (Devries et al., 2011). After controlling for other mental illnesses, the researchers discovered that the most stable risk factors for suicide attempts were childhood sexual abuse (19.5%), GBV, and the trauma from witnessing a mother experience IPV (Devries et al., 2011).

Based on the current evidence, it can be deduced that a direct relationship exists between exposure to violence and abuse and suicide risk for women living in developing countries. Moreover, GBV can be considered a female-specific risk factor for suicidal behaviour and should be a focus area for prevention efforts.

Childhood trauma and abuse. The exposure to violence, trauma and abuse is a well-established risk factor for the full spectrum of suicidal behaviour, including completed suicide (Joiner et al, 2007). Specifically, research shows that people who have been abused as children can be four times more likely to attempt suicide in young adulthood (Smith et al., 2017). For women in developing countries, they are at an increased risk for exposure to many different forms of violence and trauma, as well as abuse during childhood, making women particularly vulnerable for suicidal behaviour later in life (Vijayakumar, 2015).

There is a clear, graded relationship between childhood abuse and suicide risk in women living in developing countries (Vijayakumar, 2015). As the number of previous childhood traumatic experiences increases, so does the risk for a suicide attempt in adulthood (Cluver et al., 2015). Prolonged exposure to violence and abuse during childhood enhances risk for mental illness and for suicide later in life, although the mechanisms behind this relationship are unclear (Angelakis et al., 2019). It has been proposed that the

relationship between child abuse and suicide could be mediated by the presence of psychopathology (Sachs-Eriksson et al., 2017).

Psychopathology. Psychopathology, including PMDD and other depressive disorders, is a female-specific risk factor for suicidal behavior as women face an increased vulnerability to mental illness due to various interconnected factors (Vijayakumar, 2014). Women are more likely to experience conditions such as depression, anxiety, and Posttraumatic stress disorder (PTSD) than men (Richardson et al., 2021). In South African studies, this has been attributed to certain societal factors such as GBV (Gibbs et al., 2018), and traumatic experiences like childhood abuse (Jina et al., 2012). Childhood experiences play a significant role in shaping mental health outcomes later in life, and unfortunately, women across the world are disproportionately affected by abuse during critical developmental periods (Buckingham & Daniolos, 2013).

Depression is associated with propensity for suicide, with more than 60% of completed suicides having occurred in people with MDD globally (WHO, 2019). MDD is a common psychiatric illness, with a prevalence of close to 6% in the South African female population (Gibbs et al., 2018). A French study conducted among sample of 232 women that had been hospitalized for a suicide attempt showed that depression more frequently occurred in women with PMDD compared to women without PMDD (Ducasse et al., 2016).

Among a sample of 109 pregnant women in South Africa, researchers found that women with a history of a depressive episode were a 30% greater vulnerability for suicidal ideation when compared to pregnant women with no history of depressive episodes (Rochat et al., 2013). These studies depict an intricate relationship between depression and suicidality among women in Southern Africa (Rochat et al., 2013; Gibbs et al., 2018).

Future research should focus efforts on identifying female-specific factors that influence suicide risk (Pilver et al., 2013). Prevention and intervention efforts should utilise a trauma-informed approach that provides individualized mental health support and addresses larger systemic issues contributing to women's vulnerability to suicide.

2.5 Child abuse

Child abuse is an umbrella term which encompasses the different forms of violence and abuse, as well as neglect and exploitation that inflicts harm to a child's wellbeing and development in the context of a relationship that is characterized by trust, control, or responsibility (Younes et al., 2021). The different types of child abuse were introduced in Chapter 1. In this section of the Literature Review, I will give an overview of child abuse within the South African context and the impact on the mental health of university students in terms of the development of symptoms of PMDD and suicidal behaviour.

2.5.1 Overview: Child abuse in the South African context

It is important to understand the context in which child abuse occurs to fully conceptualise the different manifestations and consequences, particularly among vulnerable populations such as female university students (Adonis, 2017). The economy, history, and cultures influence the nature of child abuse in South Africa (Artz et al., 2018).

South Africa has a traumatic and turbulent history, and the aftermath is reflected in its people (Adonis, 2017). The legacy of colonialism and apartheid continues to impact South African society, exacerbating socio-economic gaps and intergenerational trauma which have disproportionately affected previously disadvantaged groups, rendering these children more vulnerable to violence and exploitation (Das-Munshi et al., 2016). Furthermore, many university students in South Africa struggle with mental illness, particularly PTSD,

depression, alcohol use disorder, and other common mental disorders ([CMDs]; Bantjes et al., 2019).

The South African Stress and Health (SASH) study was the first large-scale population-based study of CMDs in the country ($n = 4\,351$; Herman et al., 2009). The SASH study found that the lifetime prevalence estimates for mental illness are approximately 30% (Herman et al., 2009). This reflects the collective suffering which occurred during Apartheid and shapes the socio-cultural dynamics which create the landscape for child abuse to occur (Myers et al., 2021).

South Africa has a diverse cultural landscape characterized by many traditions, languages, and belief systems (Buqa, 2022). Simultaneously, the country has one of the highest prevalence rates of rape, murder, and abuse in the world, where many of the victims are women and children (Enaifoghe et al., 2021; Gibbs et al., 2018). Integral to this cultural landscape of South Africa, is the pervasive patriarchal norms which perpetuate gender inequality and power imbalances with families and communities (Mathews et al., 2016). These notions contribute to the normalization of violence, particularly against women and children, and reinforce cycles of abuse across generations (Buqa, 2022).

Cultural taboos which surround discussions around trauma, abuse, and mental illness contribute to a culture of silence and stigma – which serves as a barrier to young women's ability to seek help and access treatment (Mienck et al 2015). Furthermore, in a culture where violence is normalized, it is possible many abused children grow up believing that what they endured was not abuse and could come to the realization at university when the impact of the trauma manifests as a mental illness (Karatekin, 2018).

2.5.2 The Intersection: PMDD, suicidal behaviour, and child abuse

Researchers in South Africa have shown childhood abuse influences vulnerability for suicidal behaviour, and it is also linked with other mood disorders, by which women are disproportionately affected (Cluver et al., 2015; Vijayakumar, 2015). As PMDD is a mood disorder recently added to the DSM-5 that exclusively impacts women and is shown to be related with both early life abuse and suicidal behaviour (Soydas et al., 2014), it is reasonable to deduce a correlation exists between PMDD, child abuse, and suicide in women.

While research provides evidence for a significant association between PMDD symptoms and suicidal behaviour (Osborn et al., 2021), few studies have utilized SEM to explain the pathways from PMDD to suicidal behaviour (Yan et al., 2021). Additionally, it is unclear how this relationship is influenced by childhood abuse, in an integrated model (Kim et al., 2021). My research is hoped to address this gap but testing a SEM based on data collected from a female sample aged between 18 – 25 years old in South Africa – a country where the association of PMDD symptoms with suicide risk has not been previously examined.

2.5.2.1 The relationship between PMDD and suicidal behaviour

Studies which explored the links between PMDD symptoms and suicidality among women were categorised according to the phases on the suicidal behaviour continuum (Wasserman et al., 2016; Joiner et al., 2007).

PMDD and suicidal cognitions. De Carvalho et al., 2018 found among a sample of 727 young women (18-24 years) in Brazil that the PMDD group reported current suicide risk 3 times more often than the non-PMDD group. The study did not elucidate specific risk factors involved, but similar studies found corresponding results. Hong et al. (2012) and Pilver et al.

(2013) undertook epidemiological studies that measured suicidal cognitions from females with PMDD and compared them to a non-PMDD control group of “healthy” women. The results showed that suicidal ideation was significantly more common among PMDD women (45.8%; 37.4%) than healthy control groups (17.3%; 13.3%) (Hong et al., 2012; Pilver et al., 2013). Similarly for suicidal intent, a prevalence of 16.9% and 19.1% was found for the PMDD group, and a prevalence of 4.2% and 4.6% was found for the non-PMDD group (Hong et al., 2012; Pilver et al., 2013). PMDD was still strongly associated with suicidal cognitions even after controlling for other psychiatric disorders, suggesting that both suicidal ideation and intent could be features of PMDD (Hong et al., 2012). The findings from these studies were uniform across cultures and were independent from confounding variables (Osborn et al., 2021). Therefore, women with PMDD have a higher probability of exhibiting suicidal cognitions and the pathways behind this relationship should be further understood.

In outpatient settings in Taiwan a study was conducted among a sample of 383 women (ages 18-65) diagnosed with mood disorders (Chan et al., 2021). The researchers collected data via interviews on women’s experiences with suicidality, and 13.8% women were found to have symptoms of PMDD. It was concluded that PMDD symptoms were correlated with suicidal acts in women with non-acute mood disorders (Chan et al., 2021).

Interestingly, after Chan et al. (2021) controlled for several covariates, symptoms of PMDD were not a risk factor for suicidal intent. Instead, PMDD symptoms were independently and directly associated with women’s attempts to take their own lives (Chan et al., 2021). It was suggested that the discrepancy could be explained by differences in sample demographic characteristics. The results could differ on the basis that the sample were diagnosed with a mental illness, which was not a prerequisite in the population-based studies.

Suicidal acts. Several studies have compared suicide attempt rates among women with and without PMDD via the collection of self-report data (Chan et al., 2021; Hong et al., 2012; Pilver et al., 2013; Soydas et al., 2014), and records of inpatient hospitalisations (Ducasse et al., 2016; Shams Alizadeh et al., 2018). Chan et al. (2021) proposed that PMDD symptoms could influence risk for the development from suicidal plans and ideas to suicide attempts (Chan et al., 2021).

Hong et al. (2012) and Pilver et al. (2013) interviewed women for the presence of a history of previous lifetime suicide attempts. Both samples reported significantly higher rates of suicide attempts among those with PMDD (13.6% and 16.2%) than those without (3.9% and 4.9%). Soydas et al. (2014) found similar results in a sample of Turkish women where 70 were diagnosed with PMDD and 7% of these women reported previous suicide attempts. There were no reported histories of suicide attempts among healthy controls (Soydas et al., 2014).

Two studies screened for symptoms of PMDD in female samples who were hospitalised as a result of a prior suicide attempt (Ducasse et al., 2016; Shams-Alizadeh et al., 2018). The results of the first study, conducted among a sample of 232 French women, showed that more than a quarter of female suicide attempters displayed symptoms of PMDD (Ducasse et al., 2016). The study in Iran ($n = 240$) compared a control group of women who had never attempted to take their own lives with a matched group of women who had at least one past suicide attempt (Shams-Alizadeh et al., 2018). The authors made provisional diagnoses using interviews designed according to PMDD's diagnostic criteria (Shams-Alizadeh et al., 2018).

The results aligned with Ducasse et al (2016), where women who had attempted suicide were more likely to receive provisional PMDD diagnoses (30.8%) than women with

who had never attempted suicide ([5%]; Shams-Alizadeh et al., 2018). Consequently, the results show a robust relationship between PMDD symptoms and suicide attempts. Attempting suicide is the most severe phase on the spectrum of suicidality before suicide completion. People who attempt suicide have the potential to provide important insights into understanding suicidal behaviour, especially among women with PMDD who tend to show greater vulnerability for committing suicidal acts than women without PMDD (Chan et al., 2021).

2.5.2.2 The role of child abuse in the PMDD-suicidality link

Researchers in South Africa have shown childhood abuse significantly influences suicide risk, and it is also linked with other mood disorders, by which women are disproportionately affected (Cluver et al., 2015; Vijayakumar, 2015). As PMDD is a mood disorder that exclusively impacts women and is shown to be correlated with both a history of child abuse and suicidal behaviour (Soydas et al., 2014), it is reasonable to deduce a relationship exists between PMDD, child abuse, and suicide in women.

Evidence from research over the last 10 years depicts that the experience of trauma and abuse during childhood is highly probable among women with PMDD, and disproportionately in contrast to women without PMDD (Bertone-Johnson, 2014; Soydas et al., 2014; Yang et al., 2021; Younes et al., 2021). However, it is unclear whether this same relationship exists among South African female university students. A study among female university students found that specifically sexual and psychological abuse during childhood was directly associated with PMDD and significantly mediated by depression (Younes et al., 2021). In fact, Yang et al. (2021) state that women who reported even one adverse childhood experience can be more than 40% more likely to have PMDD compared to women without any adverse childhood experiences. These associations persisted after

controlling for psychiatric comorbidities (Yang et al., 2021). Interestingly, the researchers concluded that emotional neglect was the subscale that was the most strongly associated with PMDD symptoms (Yang et al., 2021), which corroborates with findings from Azoulay et al. (2020) that SA and EN are significantly correlated with premenstrual symptoms.

The results from Yang et al (2021) confirm similar results found by other researchers that childhood trauma is a risk factor for PMDD (Younes et al., 2021; Perkonig et al., 2004) and highlight the importance of targeting risk factors commonly experienced in early adulthood as this is when most women first report symptom onset (Bertone-Johnson et al., 2014). The cyclic changes in mood, behaviour, and cognition which occur each month may be more challenging for women with a history of child abuse due to their persistent dysregulation in systems of stress response (Girdler et al., 2007).

2.6 Methodological approaches and limitations of previous PMDD research

The studies on the relationship between PMDD and female suicidal behaviour originated from seven different countries and were published between 2012 and 2021. Three of the seven studies used nationally representative samples (de Carvalho et al., 2016; Hong et al., 2012; Pilver et al., 2013). A total of 8194 female participants aged between 13-65, including 198 control participants, were included in the review. Of these 8194 women, 565 were identified as having PMDD. Of these seven studies, four used a cross-sectional design (Chan et al., 2021; de Carvalho et al., 2018; Hong et al., 2012; Pilver et al., 2013), two used a case control design (Shams-Alizadeh et al., 2018; Soydas et al., 2014), and one was an epidemiological cohort study (Ducasse et al., 2016). Many of the studies accounted for and recorded sociodemographic factors such as age, socio-economic status, race/ethnicity, and marital status.

All seven of the studies reported that the participants were assessed for PMDD based on the DSM-5 diagnostic criteria, using methods such as psychiatric interviews (Shams-Alizadeh et al., 2018), the Structured Clinical Interview for the DSM-IV Axis 1 Disorders ([SCID-1]; Soydas et al., 2014), the Mini-International Neuropsychiatric Interview-Plus ([MINI-Plus]; de Carvalho et al., 2018), the Schedule for Affective Disorders and Schizophrenia Lifetime version ([SADS-L]; Chan et al., 2021), The World Mental Health CIDI ([WMH-CIDI]; Pilver et al., 2013), The Korean CIDI (K-CIDI) and the WHO-CIDI (Hong et al., 2012).

The present research highlights a need for a stringent diagnostic tool for PMDD to precisely ascertain the actual prevalence of PMDD in LMICs, as current literature has contradicting results, with ranging prevalence rates from as low as 5% to as high as 66% (Thakrar et al., 2021; Tsegaye & Getachew, 2019). The study by Thakrar et al. (2021) used the most psychometrically sound measurement instrument for PMDD, the Daily Record of Severity of Problems (DRSP) as it was the only study to track symptoms of PMDD daily across two menstrual cycles. In South Africa it is reasonable to consider the possibility that the prevalence rate could be higher than what current statistics are showing, particularly for young women in their twenties (Roomaney & Lourens, 2020). Therefore, future research should focus on whether the DRSP can be applicable to PMDD studies in the South African context, as the DRSP will provide reliable and valid insight into the true scope of PMDD in SA, and guide further research and prevention initiatives.

Suicidal behaviour was assessed according to structured diagnostic interviews for four of the studies, such as the MINI-Plus, the SCID and the K-CIDI (de Carvalho et al., 2018; Hong et al., 2012; Soydas et al., 2014). Other methods included questionnaires and self-report

measure about suicidal behaviour, which were consequently scored by researchers (Pilver et al., 2013).

The studies included in this literature review are further limited in their ability to mitigate the effect of the presence of other psychiatric disorders, due to the symptomatic overlap of CMDs with PMDD (de Carvalho et al., 2018).

In summary, although marked associations were observed between PMDD symptoms and suicidal cognitions and acts among women in the research, inferences cannot be drawn about the causal relationships due to their cross-sectional research design (Osborn et al., 2021).

2.7 Chapter summary and conclusion

This literature review provides a comprehensive examination of the intersection between PMDD, child abuse, and suicidal behaviour, particularly among South African female university students. The review began with the theoretical framework, the basis on which the current study was based. The IPT of suicide by Thomas Joiner (2005) was adapted to explain how symptoms of PMDD are related to suicidality, particularly in the presence of child abuse. The review encompasses various dimensions, including the history of PMDD and its controversial addition to the DSM-5. PMDD has a complex aetiology and a hoard of debilitating symptoms which impact women in all spheres of life. The review showed how PMDD has been shown to be associated with each stage of the spectrum of suicidality and is also related to trauma and abuse.

In conclusion, the literature presented in this chapter shows strong evidence of the link between trauma and abuse and the onset of PMDD. In light of an already-established relationship between suicide and child abuse, and between PMDD symptoms and suicidal behaviour, it is reasonable to assume an intersection exists between these variables. The

hypothesized model indicates how these variables interact with and influence each other to produce heightened risk for suicidality and justifies the current study's hypotheses and chosen research design and methodology.

Chapter 3: Research methods

3.1 Introduction

The study aimed to test a model which describes the pathways between PMDD symptoms, the constructs of suicidal behaviour according to the IPT, and child abuse. This chapter reports on the data collection and analysis methods. Specific attention is focused on the research setting and design, epistemology, sampling processes and methods and instruments for data collection and the statistical techniques utilised for data analysis. Lastly, the chapter discusses the ethical considerations.

3.2 Research hypotheses

The substantive research hypothesis is based on the theoretical underpinnings and literature synthesis presented in the previous chapter and explains the “why” behind the path from PMDD symptoms to suicidal behaviour. This model informs the purpose of the study. Relationships between several variables are investigated before the model was tested using SEM.

3.2.1 Substantive research hypothesis

Based on the theoretical model depicted in Chapter 2 (Figure 2.1), the substantive research hypothesis is that a positive screening for PMDD symptoms is more likely to be related to the two interpersonal components which lead to risk for suicidal cognitions, namely thwarted belongingness and perceived burdensomeness. This relationship is more likely to progress to suicidal acts in the presence of a history of child abuse, which will directly affect the relationship between TB and PB and an ACS. Thus, in the context of this research, the greatest risk for suicidal behaviour is more likely to exist in the presence of all three components of the IPT model (PB, TB, and ACS) as well as PMDD symptoms and a history of child abuse.

3.2.1.1 Overall aim

The proposed research methods and substantive hypothesis should serve the overall aim:

- To test a structural model based on Joiner's IPT of suicide to partially explain the pathway from PMDD symptoms to suicidal behaviour, and the influence of child abuse on this pathway.

3.2.1.2 Specific objectives

The literature presented in Chapter 2 discussed and proposed the various expected relationships between the variables. This was visually depicted in the theoretical model in the Literature Review chapter (Figure 2.1). This study's substantive research hypothesis is that the data will provide evidence supporting the proposed model, indicating that the presence of a history of child abuse accounts for a substantial percentage of the variance in suicidal behaviour among female students with PMDD symptoms. The specific objectives are:

- To identify the underlying latent variables that contribute to suicidal behaviour among young women.
- To identify the relationships between the latent variables and their outcomes

Path-specific research hypotheses are derived directly from the substantive research hypothesis and is visually depicted in Figure 3.1. Symptoms of PMDD were measured by the scores on the PSST. TB and PB are measured by the Interpersonal Needs Questionnaire (INQ), and together these two constructs of the IPT confer risk for suicidal cognitions. The third construct of Joiner's model, an ACS, is measured by scores on the Acquired Capability for Suicide Scale (ACSS) and confers risk for suicidal acts. Finally, child abuse is measured by scores on the short-form version of the Childhood Trauma Questionnaire (sf-CTQ).

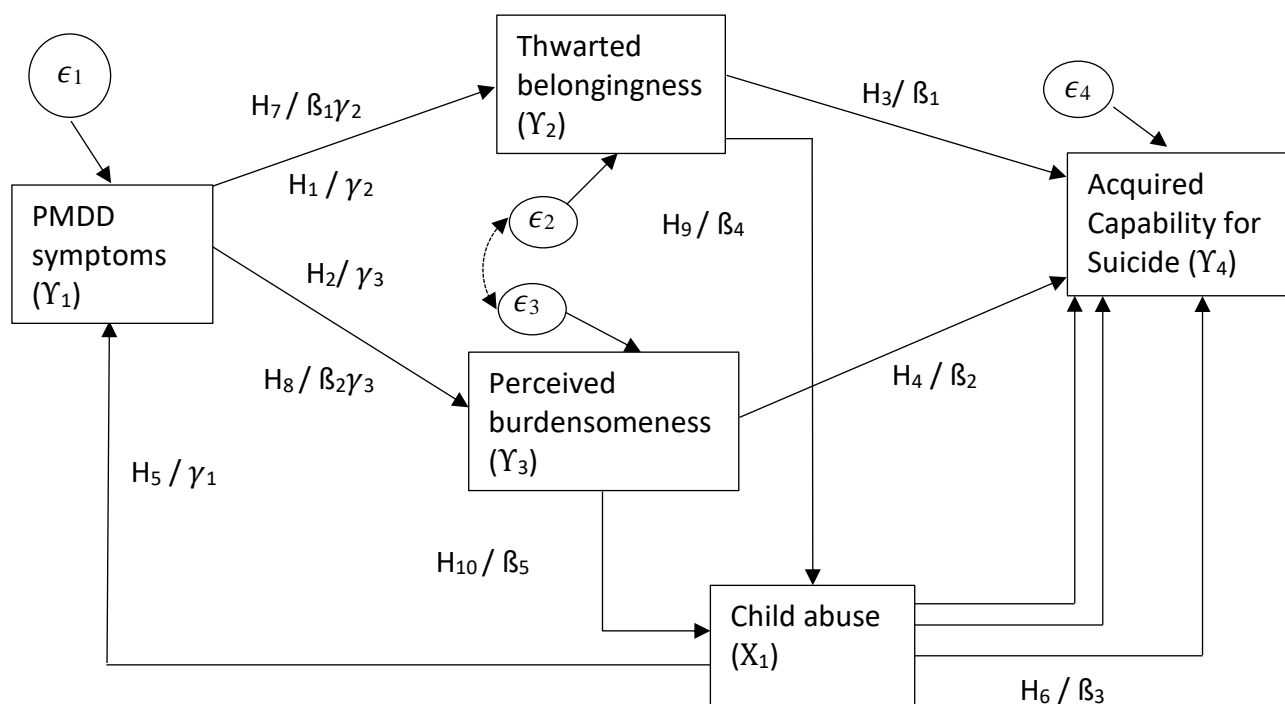
3.2.2 Statistical hypotheses

Statistical hypotheses are derived from the logic which underpins the theoretical framework, as well as the research design, and the chosen method of data analyses. The suggested structural model for the relationship between PMDD symptoms and the constructs of the IPT of suicide consists of one exogenous latent variable (ξ) and 4 endogenous latent variables (η). Endogenous variables are variables which are affected by other variables within the model (Thakkar, 2020). In a visual model any construct with a path arrow pointing towards it is considered endogenous (Thakkar, 2020). In contrast, exogenous variables which remain unaffected by the presence of any other variables in the model (Thakkar, 2020).

Figure 3.1 displays the suggested model shown as a structural path diagram. The model shows how the system of variables influence risk for suicidal behaviour among female students. The aim is to test the structural model to ascertain if the hypothesized paths among the variables presented in Chapter 2 are of statistical significance.

Figure 3.1

Proposed Structural Model



With regards to Figure 3.1:

Y_1 = PMDD symptoms

Y_2 = Thwarted belongingness

Y_3 = Perceived burdensomeness

Y_4 = Acquired capability for suicide

X_1 = Child abuse

Direct Effects

γ_2 = PMDD \rightarrow Thwarted belongingness

γ_3 = PMDD \rightarrow Perceived burdensomeness

β_1 = Thwarted belongingness \rightarrow Acquired capability for suicide

β_2 = Perceived burdensomeness \rightarrow Acquired capability for suicide

γ_1 = Child abuse \rightarrow PMDD

β_3 = Child abuse \rightarrow Acquired capability for suicide

Indirect Effects

$\gamma_2 * \beta_1$ = PMDD \rightarrow Thwarted belongingness \rightarrow Acquired capability for suicide

$\gamma_3 * \beta_2$ = PMDD \rightarrow Perceived burdensomeness \rightarrow Acquired capability for suicide

Moderation Effects

β_4 = Child Abuse * Thwarted belongingness \rightarrow Acquired capability for suicide

β_5 = Child Abuse * Perceived burdensomeness \rightarrow Acquired capability for suicide

Equation for PMDD (Y_1)

$$Y_1 = \gamma_1 X_1 + \epsilon_1$$

Equation for Thwarted Belongingness (Y_2)

$$Y_2 = \gamma_2 Y_1 + \epsilon_2$$

Equation for Perceived Burdensomeness (Y_3)

$$Y_3 = Y_1 = \gamma_1 X_1 + \epsilon_3$$

Equation for Acquired Capability for Suicide (Y_4)

$$Y_4 = \beta_1 Y_2 + \beta_2 Y_3 + \beta_3 X_1 + \beta_4 (Y_2 * X_1) + \beta_5 (Y_3 * X_1) + \epsilon_4$$

The model in Figure 3.1 is an adapted version of Joiner’s IPT of suicide model. PB, TB, and ACS are the three constructs within Joiner’s model, with TB and PB as distinct but related constructs and each have a relationship with the risk for suicidal cognitions and an ACS necessary for the progression from suicidal ideation to suicidal acts.

PMDD symptoms precipitate PB and TB and child abuse precipitates both PMDD symptoms and the development of an ACS. Hence, explaining why some people with PMDD might experience suicidal ideation, but never attempt or complete suicide unless the presence of child abuse exists to enable the development of an ACS.

To estimate the fit of the hypothesised model it is essential to test the degree to which the model aligns with the data collected from the survey. From the overarching substantive research hypothesis, 10 research hypotheses were derived and translated into path-coefficient statistical hypotheses:

Hypothesis 1: PMDD symptoms (Y_1) have a significant positive relationship with thwarted belongingness (Y_2).

$$H_{01}: \gamma_2 = 0$$

$$H_{a1}: \gamma_2 \neq 0$$

Hypothesis 2: PMDD symptoms (Y_1) have a significant positive relationship with perceived burdensomeness (Y_3).

$$H_{02}: \gamma_3 = 0$$

$$H_{a2}: \gamma_3 \neq 0$$

Hypothesis 3: Thwarted belongingness (Y_2) has a significant positive relationship with an acquired capability for suicide (Y_4).

$$H_{03}: \beta_1 = 0$$

$$H_{a3}: \beta_1 \neq 0$$

Hypothesis 4: Perceived burdensomeness (Y_3) has a positive relationship with an acquired capability for suicide (Y_4).

$$H_{04}: \beta_2 = 0$$

$$H_{a4}: \beta_2 \neq 0$$

Hypothesis 5: Child abuse (X_1) has a positive relationship with PMDD symptoms (η_1).

$$H_{05}: \gamma_1 = 0$$

$$H_{a5}: \gamma_1 \neq 0$$

Hypothesis 6: Child abuse (X_1) has a significant positive relationship with an acquired capability for suicide (Y_4).

$$H_{06}: \beta_3 = 0$$

$$H_{a6}: \beta_3 \neq 0$$

Hypothesis 7: Thwarted belongingness (Y_2) will significantly mediate the relationship between PMDD symptoms (Y_1) and an acquired capability for suicide (Y_4).

$$H_{07}: \gamma_2 * \beta_1 = 0$$

$$H_{a7}: \gamma_2 * \beta_1 \neq 0$$

Hypothesis 8: Perceived burdensomeness (Y_3) will significantly mediate the relationship between PMDD symptoms (Y_1) and an acquired capability for suicide (Y_4).

$$H_{08}: \gamma_3 * \beta_2 = 0$$

$$H_{a8}: \gamma_3 * \beta_2 \neq 0$$

Hypothesis 9: Child abuse (X_1) has a significant moderating effect on the relationship between thwarted belongingness (Y_2) and an acquired capability for suicide (Y_4).

$$H_{09}: \beta_4 = 0$$

$$H_{a9}: \beta_4 \neq 0$$

Hypothesis 10: Child abuse (X_1) has a significant moderating effect on the relationship between perceived burdensomeness (Y_3) and an acquired capability for suicide (Y_4).

$$H_{010}: \beta_5 = 0$$

$$H_{a10}: \beta_5 \neq 0$$

3.3 Research design and setting

A cross-sectional study design was chosen to address the aim and test the hypotheses of the present study and deemed appropriate for gathering quantitative data to examine the relationships between the variables. An online survey questionnaire was used as the primary method of data collection in which responses were recorded from young women enrolled at Stellenbosch University (SU) in the Western Cape. As of June 2023, SU has over 33 000 students in enrolment, 19 000 of which are women. SU offers courses in several faculties, including Arts and Social Sciences, Agricultural Sciences, Engineering, Economics and Management Science, Medicine and Health Sciences, Law, Education, Theology, and Military Sciences (Stellenbosch University, 2024). Female students make up the majority in Arts and Social Sciences, Education and Medicine and Health Sciences (Stellenbosch University, 2024).

This research design reflects a positivist epistemological approach and deductive reasoning as it was informed by a theory that led to the proposed theoretical model (Park et al., 2020). Positivism rests on the belief that knowledge is objective, observable, and independent of the researcher (Bryman, 2012). Furthermore, a positivist approach

encourages using quantitative methods for statistical analysis of data, such as regression analysis, which can provide quantitative evidence of relationships between my variables (Park et al., 2020). Therefore, the research objective was to test a model to examine the relationship between PMDD, suicidal behaviour, and child abuse, this approach was best suited to achieve this aim.

According to Wilson (2019), quantitative data is particularly advantageous as it can be easily collected from a larger sample than qualitative data. The larger sample size enhances the representiveness of the sample, thus possibly increasing the accuracy and credibility of research findings (Wilson, 2019). Furthermore, quantitative data can be readily subjected to statistical analysis and inferences can be made with a certain degree of confidence (Bryman, 2012). However, quantitative numerical data is limited in its ability to take on any other form and thus it is likely that valuable information is missed which could provide deeper insight into the research question (Wilson, 2019).

A cross-sectional design provides a snapshot of the associations among several variables simultaneously (Spector, 2019). It is desirable for its cost-effectiveness and its relative efficiency in identifying the initial relationships between variables – such as the associations among PMDD, child abuse, and suicidality. However, a cross-sectional design is limited in that it cannot establish causality, which in this case makes it challenging to definitively know if PMDD leads directly to suicidal behaviour (Bryman, 2012). Additionally, because data collection only takes place once, this design is unable to track changes over time, which limits the insights gained (Bryman, 2012).

3.4 Sampling process

3.4.1 Sampling technique

Convenience sampling is a non-probability sampling technique in which the sample is selected according to what is convenient to the researcher and the participants (Wilson, 2019). Therefore, this technique was chosen because participants were recruited based on their availability and desire to complete an online survey questionnaire, rather than randomly selecting them from the entire population of female university students.

Convenience sampling is known for being easy, cost-effective and the least time-consuming sampling method (Bryman, 2012).

Data were collected via an online survey. There is potential for bias in the selection of the sample, as those who decided to complete the online survey may not be representative of the target population. For instance, there is a possibility that women who do not struggle with premenstrual distress chose not to participate on the basis that the questions would not be applicable to them. This would give skewed results, possibly reflect higher prevalence of PMDD in the sample compared to the population, and potentially limit the study's generalizability.

Recruitment emails were sent out to the entire female student body enrolled at SU, and those willing to complete the survey followed the link provided in the recruitment email (Appendix 1). It is important to consider that utilising recruitment emails can introduce bias and potentially limit the study's generalizability to the entire population of female university students.

3.4.2 Inclusion and exclusion criteria

The target population in this study was all the registered female students at Stellenbosch University. “Female students” were defined as all individuals who identified as female, who registered students at the university, and who were between the ages of 18-24 years old.

Female students who experienced a menstrual cycle were included because the study’s research question relates to data on PMDD, a menstrual disorder in which symptoms occur in the week prior to menstruation, and thus required participants to have experienced a menstrual cycle.

Participants were required to be literate in English to answer the questions in the online survey. Participants were included if they were in either their 1st, 2nd 3rd, or 4th year and above (including postgraduates) from the eight different faculties at SU. The reason for this was to counter the risk of achieving a low response rate, and to maximise the reach of the survey to ensure the recruitment of a sample with adequate statistical power for SEM (Kline, 2023).

Participants were excluded if they did not identify as female and or did not experience a menstrual cycle. Male students were automatically excluded as only registered female students received the recruitment email. Staff of SU were not permitted to complete the online survey as they did not form part of the population under investigation.

3.4.3 Sample size

The sample size directly influences statistical power – the higher the statistical power, the lower the probability of falsely accepting the null hypothesis ($n > 150$; Kline, 2023). The following factors influence the choice of sample size, and the analysis conducted (Wolf et al., 2013): (1) Whether the population is infinite or not. In the current study, the target population can be considered as finite, as the female student population does not fluctuate

significantly over a three-month data collection period. (2) Resource constraints, such as time. As mentioned previously, data collection took place over three months to avoid spamming students with recruitment emails. (3) The number and complexity of traits and variables which need to be mirrored by the sample. Female students have many different characteristics, and the population at SU is expected to be heterogeneous. (4) The desired precision and accuracy of sample results. A large sample size enhances precision and accuracy, thereby ensuring the integrity of my data (Wilson, 2019).

The robustness of SEM is partly dependent on meeting a minimum requirement for sample size (Hair et al., 2016). Using a power and risk error of 95%, G*power determined my minimal sample size was 232 female university students needed for the study (Kline, 2023).

3.4.4 Sampling procedure

The recruitment of research participants is essential for the overall success of any study (Manohar et al., 2019). The sampling process includes identifying potential participants and providing them with the information needed to evoke enough interest to voluntarily join a proposed research study. This is a crucial step, as inappropriate recruitment can significantly impact the findings of research (Manohar et al., 2019). In this step, I performed data collection over a period of approximately three months through recruitment emails sent to registered female students via SU's online survey platform, SUNSurvey (Appendix 1).

I obtained ethical approval from the Health Research Ethics Committee (HREC) at SU (Appendix 2). After ethical approval was granted, I gained access to email lists of registered female students at SU from the Information Government Office and sent out electronic recruitment invitation e-mails via SUNSurvey from my university email address to prospective participants. The email explained the study details and the link to direct

participants to the online survey, which took an estimated time of 10 – 15 minutes to complete. All students were able to access the survey on their computers, laptops, smartphones, or tablets.

Once participants had access to the survey link via the SUNSurveys platform, they were presented with the online informed consent form (Appendix 3). The form briefly outlined the study's aims and objectives and reassured participants that confidentiality and anonymity would be maintained throughout the research process. .

A disclaimer within the email warned participants of the potentially distressing nature of the survey content and reminded them of their right to withdraw from participating without consequence. I also provided access to mental health services on campus should the participants have felt they needed psychological assistance after survey completion, including the Welgevallen Community Psychology Clinic ([WCPC]; Appendix 4) and the Centre for Student Counselling and Development ([CSCD]; Appendix 5). However, data cannot be withdrawn after participation because data was collected anonymously. After this information, students selected whether they agreed to start the survey, or leave the SUNSurveys platform accordingly. The recruitment email was sent out once per month for three months, between March to June 2023.

3.5 Data collection

A battery of measures was compiled to create an online survey questionnaire that followed the guidelines stipulated by Regmi et al. (2016) that researchers aiming to utilise online questionnaires will only produce valid and meaningful results if: (1) the layout and content of each item in the questionnaire is clear and precise; (2) the questionnaire is appropriate for the target sample; and (3) if the questionnaire is consistently asked across all participants.

To ensure the questionnaire design was methodologically sound, several principles were adopted, such as ensuring simplicity and feasibility of each included item, cultural and ethical sensitivity, completeness, and neutrality. These principles stipulated by Regmi et al. (2016) were particularly relevant for this research, as the questions had to reflect those outlined by the original authors who developed the screening tools adopted in the current study, such as the Premenstrual Symptoms Screening Tool ([PSST]; Steiner et al., 2003), the short-form version of the Childhood Trauma Questionnaire ([sf-CTQ]; Bernstein et al., 2003), the Interpersonal Needs Questionnaire ([INQ]; Van Orden et al., 2012), and the Acquired Capability for Suicide Scale ([ACSS]; Van Orden et al, 2008).

Online survey questionnaires are particularly useful when the research topic relates to sensitive issues (Bryman, 2012). It was important that participant anonymity was ensured as the survey contained questions relating to suicidal behaviours and child abuse. Students could complete the survey privately and anonymously, and this convenience would have facilitated the sharing of these potentially difficult experiences.

Wolf et al., (2013) states that the main advantages of utilising survey questionnaires are that lower costs are involved, and participant anonymity is ensured. However, a survey is limited in its ability to provide insight into why and how PMDD symptoms, suicidal behaviour and childhood abuse are related to each other. While surveys are objective, they are also detached and impersonal in nature, and there is a risk of bias if questions are not carefully worded (Regmi et al., 2016).

Another important consideration was the risk of a low response rate, a common disadvantage of questionnaires. However, using an online survey to collect data from young people may lead to higher response rates (Regmi et al., 2016). To further ensure an

adequate response rate, the survey was conducted over three months, a recruitment email was sent out monthly, and the email included an incentive to encourage responses.

3.5.1 Data collection procedures

The questions included in the online survey were closed-ended. This conveniently automated the data collection process, optimised the use of resources, and facilitated easier export to the Statistical Package for Social Sciences ([SPSS]; Version 29.0; IBM Corp, 2022) for data analysis (Regmi et al., 2016).

The survey consisted of five sections: the first section of the questionnaire asked questions relating to participants' demographic information, the second section screened for symptoms of PMDD, the third section screened for a history of childhood trauma, and the last two sections screened for suicide risk (Appendix 6).

At the end of the survey, there was a separate link that re-directed participants to a secure site where they added their university email addresses to enter the competition to win 1 of 3 spa voucher valued at R1000. After submitting their responses, the participants were presented with the contact details for the WCPC and CSCD if they needed support or counselling. I obtained approval letters for both organisations to offer these resources to the participating students (Appendix 4 and Appendix 5).

3.5.2 Data collection instruments

3.5.2.1 Demographic questionnaire

Several survey items collected information relating to participant demographics including age, faculty of study, age of first menarche, and previous confirmed diagnoses of any mental illnesses or PMDD.

3.5.2.2 Premenstrual symptoms screening tool (PSST)

The PSST is a 19-item tool used to screen for symptoms of PMDD among this sample of female university students (Steiner et al., 2003). Items on the PSST are rated on a score between one and four based on severity level. Fourteen items relate to different premenstrual symptoms and five items rate the extent to which these symptoms cause impairment in function (Steiner et al., 2003).

A positive screening for PMDD symptoms requires the following criteria: (1) “severe” is selected for at least one hallmark symptom: irritability, anxiety, heightened sensitivity to rejection, or a depressed mood; (2) “moderate” or “severe” selected for at least 4 supplementary symptoms; and (3) “severe” selected in at least 1 of the 5 items relating to impairment in function (Steiner et al., 2003). In this study, only 18 items were used and the item relating to “a sense of feeling overwhelmed or out of control” was accidentally omitted.

According to test developers Steiner et al. (2003), the PSST can be scored continuously (i.e., by evaluating the severity of symptoms) or used to screen for PMDD as a dichotomous variable (i.e., positive or negative screen). In this study, the dichotomous scoring type was used to give a clear classification of participants into PMDD-positive and PMDD-negative groups, which was essential for determining prevalence rates and for conducting SEM. Professor Martin Kidd in the Statistics Department at SU assisted with scoring the PSST. Specifically, for the SEM analysis, PMDD was used as a dichotomous variable to align with the requirements of the modeling process and facilitate hypothesis testing.

In a South African study conducted among a sample of female university students, the PSST was a valid and reliable screening instrument of PMDD symptoms within the South African context (Roomaney & Lourens (2020). Additionally, another cross-sectional study conducted among young women at a university in Lebanon utilised SEM and the PSST

demonstrated excellent internal reliability ([Cronbach's $\alpha = .94$]; Younes et al., 2021). In the present study, the PSST showed excellent internal consistency reliability (Cronbach's $\alpha = .90$) and the PSST was deemed a suitable method of measuring PMDD symptoms (Table 4.6).

3.5.2.3 Short-form childhood trauma questionnaire (sf-CTQ)

The sf-CTQ is a retrospective self-report questionnaire which broadly covers the following types of childhood traumatic experiences, which form five different subscales: emotional abuse (EA), physical abuse (PA), sexual abuse (SA), emotional neglect (EN), and physical neglect ([PN]; Bernstein et al., 1994).

Since its development, the CTQ has been validated in several studies across the world (Saini et al., 2019). A short form version of the CTQ was developed as a screening measure for both clinical and general population groups (Bernstein et al., 2003). The short version consists of 25 clinical items quantified on a 5-point Likert scale, with 1 = "never true" and 5 = "very often true." Scores on the sf-CTQ range between 25 – 125, with higher scores reflecting increased intensity of abuse (Bernstein & Fink, 1998).

Bernstein and Fink (1998) determined four categories of severity of child abuse: "None" (minimal), "Low" (to moderate), "Moderate" (to severe), and "Severe" (to extreme). They further recommended that subjects who fall in the none – mild range (total score < 52) are classified as "negative" for exposure to childhood trauma, and that subjects who score in the moderate to severe range (total score > 52) are classified as positive for exposure (Bernstein et al., 2003; Bernstein & Fink, 1998). Therefore, based on the authors guidelines, total scores on the sf-CTQ > 52 were seen as an indication of prevalence for a history of child abuse in this study.

The sf-CTQ is a psychometrically sound method of collecting child abuse data (Saini et al., 2019). In a recent study among a clinical sample in China, the sf-CTQ showed good internal consistency ($\alpha = .87$) and test-retest reliability of $.77$ ($n = 50$; Xiang et al., 2021). The original study by Bernstein et al. (2003) showed that scores on the subscales ranged between 5 – 25 and they each had strong internal reliability ($\alpha = .80$). Furthermore, the scale produced acceptable predictive validity in preliminary studies (Bernstein et al., 2003). This study's reliability analysis for the sf-CTQ produced a Cronbach's $\alpha = .93$ (Table 4.6). The subscales of the sf-CTQ produced Cronbach's Alpha values ranging between $\alpha = .64$ for PN, and $\alpha = .95$ for SA (Table 4.6).

3.5.2.4 Interpersonal needs questionnaire (INQ)

The Interpersonal Needs Questionnaire (INQ) is a 15-item Likert scale which measures “a desire to die as perceived by a lack of connection to others”, or thwarted belongingness (INQ-TB; Joiner, 2005, p 94) and “by overwhelming feelings of burdensomeness” (INQ-PB; Joiner, 2005, p 94). The INQ can be divided into these two subscales in which 9 items measure TB, and 6 items measure PB. Higher INQ scores translate to a greater degree of TB and PB. Response format is on a scale from 1 to 7, with 1 representing “not at all true for me” and 7 being “completely true for me.”

An initial examination of INQ's psychometric properties showed that the measure is both valid and reliable in samples that differ in age mental illness occupation (Van Orden et al., 2012). According to Klibert et al (2015), the INQ showed excellent internal reliability among a sample of 415 university students in North America ($\alpha = 0.92$) and is thus a reliable screening tool for predicting suicide risk. Specifically, the INQ has shown good predictive ability of suicidal ideation in prior research (Wang et al., 2021).

TB and PB are distinct but related constructs of the IPT of suicide that are measured in a single scale in which total scores indicate greater risk for suicidal cognitions (Van Orden et al., 2010). A study investigating the psychometric soundness of the INQ in Bangladesh found both subscales were highly reliable (TB: $\alpha = .87$; and PB: $\alpha = .92$). In the present sample of female South African university students, the INQ demonstrated excellent internal consistency, with a Cronbach's $\alpha = .940$. In this study, the INQ demonstrated excellent internal consistency across both subscales. TB yielded a Cronbach's $\alpha = .91$, while PB produced a Cronbach's $\alpha = .96$, indicating high reliability for both measures (Table 4.6).

3.5.2.5 Acquired capability for suicide scale (ACSS)

The acquired capability for suicide scale (ACSS) measures the third construct in Joiner's (2005) model which manifests as an individual's tolerance for physical pain and fearlessness towards death (Van Orden et al., 2010). The ACSS does not directly measure actual suicidal behaviours or previous exposure to painful life events, but instead examines the factors theorised to allow a person to develop an ability to enact in suicidal behaviour (Burke et al., 2016).

The ACSS is a 20-item 5-point Likert scale of acquired capability for lethal self-injury, in which higher scores represent increased capability for suicide (Joiner et al., 2007). ACS is measured and analysed as a separate variable to the first two components, as it is theorised to specifically indicate risk for suicidal acts (i.e., suicidal intent, suicide attempts).

The original studies showed the ACSS demonstrated good reliability and validity (Bender et al., 2006). Furthermore, the scale has showed good internal consistency in a more recent study ($\alpha = 0.84$; Wolford-Clevenger et al., 2020). In a study conducted among a sample of university students in the United States of America, both the sf-CTQ ($\alpha = .66 - .87$) and ACSS ($\alpha = .80$) were administered and found to have adequate internal reliability (Burke

et al., 2016). The ACSS showed limited ability to show differences between individuals along varying stages on the suicide spectrum in this study. However, the ACSS demonstrates good discriminant validity, indicating that it is a distinct construct from suicidal desire (Van Orden et al., 2010). In my study, the ACSS demonstrated excellent internal consistency ($\alpha = .87$; Table 4.6).

A recent study conducted among university students in Bangladesh investigated the psychometric properties of the INQ and the ACSS and found both scales showed acceptable levels of reliability ($\alpha = .84$, $\alpha = .76$) and validity (Arafet et al., 2022). Therefore, as both measures have been shown to be psychometrically sound in another low to middle-income countries (LMIC), among samples of university students, and in this current sample, both measures were appropriate for use in the study.

3.6 Data analysis

For this study, several quantitative analyses were used to interpret the data. These techniques encompassed: correlation analysis, confirmatory factor analysis (CFA), and structural equation modelling (SEM). Data analysis allowed for the determination of the correlations between the variables, the path coefficients within the proposed model, and investigate the research hypotheses. The statistical packages used to perform the data analysis was SPSS (Version 29.0; IBM Corp, 2022) and R (Version 42.0 R Core Team, 2023). I conducted the data analysis independently, in consultation with Professor Martin Kidd from the Statistics Department at Stellenbosch University.

3.6.1 Data cleaning

In total, I received 1714 responses to my survey, of which 458 were incomplete. Thus, I exported 1256 complete responses directly from SUNSurveys to Microsoft excel where I began cleaning my data. I reached a final sample size of 1218 after I removed responses

containing outliers and missing data. I assigned codes to each measure and ensured the items were numbered correctly before exporting the data for analysis to SPSS. I continued to clean my data in SPSS by reverse-coding certain items in the sf-CTQ (items 1 – 7 on EN subscale; and item 1 on PN), the INQ (Items 1, 2, 4, 7, 8 and 9 on thwarted belongingness sub-scale), and the ACSS (items 13 – 17), and calculating the total scores for each measure.

3.6.2 Descriptive statistics

The 1218 completed survey questionnaires yielded a combination of nominal and interval data. There were no missing values in the dataset as all questions required an answer in the online survey. The data was first analysed using descriptive statistics to characterize the study sample and to test for a normal distribution. The samples demographic characteristics was determined in terms of the proportions of female students in their respective faculty and year of study.

Descriptive statistics were also performed on the battery of measures. Measures of central tendency and dispersion were calculated. Based on the total scores on the PSST and sf-CTQ, the prevalence of PMDD and child abuse were determined. Respondents were assigned to their different categorical groups according to the scoring guidelines given for the measures (Bernstein & Fink, 1998; Steiner et al., 2003).

3.6.3 Assessing reliability and testing assumptions

Reliability estimates were then calculated for each of the measures using Cronbach's Alpha values and the average inter-item correlation coefficient as indicators for internal consistency (Table 4.6). Individual item statistics for each measure are included in Appendix 7. No items were deemed necessary for deletion. Data were analysed for missingness, normality, collinearity, and outlier issues. Skewness and kurtosis fell in acceptable ranges. The results of the tests for assumptions for PLS-SEM is detailed in Chapter 4.

3.6.4 Correlation analyses

Correlational analysis using a bivariate Pearson correlation test was used to examine whether significant relationships existed between the variables before the SEM analysis to test for Hypotheses 1 – 10. A weak correlation was identified as an r value below .30, a moderate correlation would fall between .30 – .50, and an $r > .50$ was considered a strong correlation (Cohen, 1988). A value of $p < .05$ (2-tailed test) was used as the level of significance (Field, 2018).

3.6.5 Confirmatory factor analysis (CFA)

To determine the fit of the data collection tools and test hypotheses relating to the factor structure of a particular construct, CFA was conducted (Field, 2018). Model fit was determined using the Root Mean Square Error of Approximation (RMSEA) value and the following ranges: “good fit” when $RMSEA < .05$, “reasonable fit” when $.05 < RMSEA < .08$, and “mediocre fit” when $.08 < RMSEA < .10$ (Field, 2018). An $RMSEA > .10$ indicates “poor fit” (Field, 2018).

In the instance where the measurement model shows good fit, all approximate factor loadings are large in magnitude and statistically significant ($p < .05$), then the proposed structural model and latent variables were successfully operationalised (Hair et al., 2016).

With the assistance of Professor Martin Kidd, I investigated the goodness-of-fit statistics, supplemented by the Confirmatory Fit Index (CFI), Normative Fit Index (NFI) and Standardised Root Mean Square Residual (SRMR) values. A graphical depiction of the factors in the measurement model can be found in Appendix 8. CFI measures the extent of how the model fits the data relative to the proposed theoretical model, while considering sample size (Field, 2018). Similarly, the NFI measures the potential fit improvements of a proposed model compared to a null model (Field, 2018). Both indices range from 0 – 1. Values close to

1 and above .90 are indicative of adequate fit, and values above .95 are considered good-to-excellent (Thakkar, 2020). SRMR measures the average difference between the observed and predicted correlations, and the recommended threshold for acceptable model fit is when SRMR is below .08 (Field, 2018). Several goodness-of-fit statistics were used to assess the validity of the measurement model.

3.6.6 Structural equation modelling (SEM)

As an alternative to maximum likelihood, the soft modelling approach of SEM or “Partial least squares (PLS)” was utilised in the present study (Hair et al., 2016). PLS was used early in the research process to validate an exploratory model and for this reason, it is beneficial for prediction-orientated research due to its exploration and prediction value (Hair et al., 2016). Therefore, PLS can explain endogenous variables. The PLS approach does not require the data to be normally distributed, as an additional advantage, as the approach is distribution-free (Hair et al., 2016).

To approximate fit of the model, the latent variables were evaluated by analysing the composite reliabilities and average variance extracted ([AVE]; Hair et al., 2016). A composite reliability above .70 is considered acceptable for the scales (Field, 2018). The AVE value measures the proportion of explained variance by common factors (Hair et al., 2016). It is advantageous as it is a more stringent reliability measure (Kline, 2023). An AVE > .50 implies that the indicator variables have construct validity (Field, 2018).

After reliability and validity of the latent variables has been confirmed, the structural model is analysed (Hair et al., 2016). This was done by testing for the presence of multicollinearity, as well as an interpretation of the R square values and the main and indirect effects.

3.7 Ethical Considerations

The present study was conducted in alignment with the SU Policy on Responsible Research Conduct, and the Department of Health's Guidelines on Ethics in Health Research: Principles, Processes, and Structures (2015). I recruited participants after ethical approval was granted by the HREC. To collect the data required to achieve the aim of my study, I required self-reported information from female university students regarding suicidal behaviour and potentially traumatic and stressful childhood events. Therefore, my study was deemed as "medium risk" and several precautions needed to be taken in the research process.

In alignment with the HREC guidelines, participants gave informed consent before starting the online survey. Participants were informed that participation in the survey was voluntary and could be revoked at any time. As a final measure of informing participant, the recruitment email (Appendix 1) provided a summary of all the aspects of the study alongside a detailed description of what would be required of the participants. The type of written information included in Appendix 1 was in accordance with the HREC and included the potential risks and benefits of my study, as well as my contact details. All students who received the email were informed that this study was a component of my Master of Arts in Research Psychology degree. Participant privacy was protected by making the survey questionnaires anonymous and confidential; and students were informed of this at the outset, in the recruitment email and consent form (Appendix 1 and 3).

Before agreeing to complete the survey, it was important that the sensitive nature of the question content was made known to the participants. If the participants found the question content distressing, I personally obtained written permission from these

organisations to provide resources and contacts for my study participants to utilise at their disposal (Appendix 4 and 5).

Data was collected and stored digitally on my laptop, my external hard-drive, and on Stellenbosch University's OneDrive with a protected password to maintain confidentiality. Only me and my supervisor for the study, Prof Rizwana Roomaney, had access to the data via the password. Participants' data will be kept for 5 years after study completion before being destroyed. I would also like to acknowledge that self-reports on traumatic events during childhood can be unreliable, and the inferences deduced from such data were made with caution.

As an incentive, participants opted to enter a lucky draw to win one of three Lanzerac Spa vouchers, valued at R1000 each. After completing all survey responses, participants had to agree to enter in the lucky draw by typing and submitting their university email addresses. All participants' addresses were assigned a number from 1 to 1218 and these numbers were entered in a secure online randomiser website, in which three different numbers were chosen at random. These numbers were then matched back to their respective email addresses. The incentive was included in the ethical clearance application and approved for the budget of the study.

3.8 Chapter summary and conclusion

In this chapter, the methods for this study were described in detail and justified. A cross-sectional design and positivist epistemological approach was used. This comprised of a quantitative research method for determining a structural equation model of the relationships between PMDD, suicidal behaviour, and child abuse. Data of this nature was provided by female students at SU and was collected from participants via an online survey

questionnaire, which were later analysed by descriptive and inferential statistics. The results of the data analysis are presented in Chapter 4 and discussed in detail in Chapter 5.

Chapter 4: Results

4.1 Introduction

The methods of data analysis described in Chapter 3 were implemented, and the results are provided in this present chapter. Several statistical analyses were run to test for relationships between PMDD, child abuse, and suicidal behaviour. In this chapter, results from data assessment, demographic characteristics, descriptive statistics, correlation analyses, Confirmatory Factor Analysis (CFA) and partial least squares Structural Equation Modelling (PLS-SEM) analyses are reported. After the tests for assumptions were completed, the descriptive statistics were determined, and correlation analyses were run. The fit of the measurement model was confirmed by a CFA. After determining an adequate measurement model fit, I conducted PLS-SEM for confirmation of the structural model fit and the hypotheses were interpreted. SPSS (Version 29.0; IBM Corp, 2022) and R (Version 42.0 R Core Team, 2023) were used to analyse the data. Finally, the findings are summarized to conclude the chapter.

4.2 Demographic characteristics

The first section of the online survey questionnaire collected demographic data relevant to this research, such as the current age of participants, as well as their respective faculty and year of study at university. Female students were asked to disclose their age of menarche, and whether they have previously received a PMDD diagnosis or any other psychiatric diagnosis prior to completing the survey. The results were as follows.

Table 4.1 shows the measures of central tendency for the current age and age of menarche of the sample. The final sample was comprised of 1218 female students at Stellenbosch University, ranging between ages 18 – 24 years. All cases have complete data for each of the variables. The average age of the sample was 20.41 years ($SD = 1.79$) and is

close to the median (20.00) and mode (20.00) values which indicated a relatively symmetrical distribution.

Table 4.1

Age and age of menarche statistics

		Age	Age of Menarche
N	Valid	1218	1218
	Missing	0	0
Mean		20.41	12.59
Median		20.00	13.00
Mode		20	13
Std. Deviation		1.79	1.46
Variance		3.19	2.14
Range		6	10
Minimum		18	8
Maximum		24	18

Age of menarche was recorded in this sample and reflects the age at which the participant experienced their first menstrual period. The average age of menarche for this sample was 12.59 years (SD = 1.46) and is also close the median (13.00) and mode (13.00) indicating a symmetrical distribution (Table 4.1). There is a wide age range (10.00) where some participants experienced their first menarche at early (minimum value of 8) or late ages (maximum value of 18).

Table 4.2 depicts the sociodemographic characteristics of the sample and includes the counts and percentages for faculty and year of study, whether participants live on or off-

campus, and for previous diagnoses of PMDD or any other psychiatric illnesses. Most participants were from the faculty of Arts and Social Sciences (28.1%), in their first year of study (34.4%), and lived off-campus (63%).

Table 4.2

Sociodemographic characteristics of participant sample

Characteristic	N	%
<i>Faculty of study</i>		
Agricultural Sciences	74	6.1%
Arts and Social Sciences	342	28.1%
Economic and Management Sciences	171	14.0%
Education	95	7.8%
Engineering	94	7.7%
Law	80	6.6%
Medicine and Health Science	180	14.8%
Science	171	14.0%
<i>Year of Study</i>		
1st year	419	34.4%
2nd year	257	21.1%
3rd year	277	22.7%
Postgraduate	265	21.8%
<i>Live on campus?</i>		
No	767	63.0%
Yes	451	37.0%
<i>Previous PMDD diagnosis?</i>		

No	1176	96.6%
Yes	42	3.4%
<hr/>		
<i>Previous psychiatric diagnosis?</i>		
No	698	57.3%
Yes	520	42.7%
<hr/>		

Participants were asked to disclose if they had been diagnosed with PMDD prior to completing the survey. Table 4.2 showed that most of the sample had no prior PMDD diagnosis, while around 3.4% of participants in this study indicated they had been diagnosed with PMDD. Similarly, participants were asked to disclose whether they had ever received any other psychiatric diagnosis, and a significant number of participants responded “Yes” (42.7%) as noted in Table 4.2. Participants were not asked to disclose information about their diagnosis.

4.3 Descriptive analysis

SPSS (Version 29.0; IBM Corp, 2022) was used to compute descriptive statistics for each of the data collection utilised. This included the Premenstrual Symptoms Screening Tool (PSST), short-form version of the Childhood Trauma Questionnaire (sf-CTQ), Interpersonal Needs Questionnaire (INQ), and the Acquired Capability for Suicide Scale (ACSS). The descriptive statistics are shown in Table 4.3.

The PSST measure shows participants' scores ranged from a minimum of 18 to a maximum of 72, with a mean score of 47.00 (SD = 10.74). Scores on the sf-CTQ ranged from 25 – 120, with a mean score of 48.42 (SD = 17.41). Thirdly, participants scored on the INQ between 15 and 101, with a mean score of 45.01 (SD = 18.35). Lastly, for the ACSS measure,

scores ranged between 23 and 97, with an average score of 58.25 (SD = 14.23). Further analyses will explore the relationships between these measures in 4.4.

Table 4.3

Descriptive statistics on total scores for battery of measures

	N	Min	Max	Mean	Std. Dev	Variance
PSST	1218	18	72	47.00	10.74	115.24
sf-CTQ	1218	25	120	48.42	17.41	302.99
INQ	1218	15	101	45.01	18.35	336.55
ACSS	1218	23	97	58.25	14.23	202.46

Table 4.4 depicts the prevalence rates for PMDD and child abuse in the present sample. Based on scoring guidelines stipulated in Steiner et al. (2003), 27.4% (334) screened positive for symptoms of PMDD. Using > 52 as the cut-off score for a prevalence of child abuse, approximately 37.3% (454) of participants self-reported experiencing child abuse. Of the 334 women who screened positive for PMDD, just over half also reported experiencing child abuse (51.20%). Therefore, roughly 14% of the women in the present sample screened positive for both PMDD and child abuse. Using the same minimum cut-off scores as recommended by Bernstein et al. (2003), the most common type of childhood trauma was EN (62.2%; Mean = 17.62). Followed by EA (37.4%; Mean = 11.49), SA (23.4%; Mean = 6.49), PA (16.7%; Mean = 7.40), and PN (5.7%; Mean = 5.42).

Table 4.4*Prevalence rates*

	N	%
PMDD	334	27.4%
Child Abuse	454	37.3%
Emotional Abuse	455	37.4%
Physical Abuse	204	16.7%
Sexual Abuse	285	23.4%
Emotional Neglect	757	62.2%
Physical Neglect	70	5.7%

4.4 Correlation analyses

The bivariate correlations between variables were examined. The r values, or Pearson correlation coefficients, are provided in Table 4.5.

The correlation between PMDD and suicidal cognitions, as measured by the INQ scale, was moderate and statistically significant ($r = .40, p < .001$). Correlation analyses were run to determine the individual relationships between PMDD and each of the subscales of the INQ. There was a significant moderate direct relationship between symptoms of PMDD and TB ($r = .35, p < .001$), and PB ($r = .38, p < .001$). In contrast, there was no significant correlation between PMDD and an ACS, the third component of the IPT ($r = .05, p > .05$).

Table 4.5*Bivariate Pearson correlation coefficients*

		PMDD	INQ	TB	PB	ACS	sf- CTQ	EA	PA	SA	EN	PN
PMDD	<i>r</i>	1	.40***	.35***	.38***	.05	.36***	.38***	.21***	.23***	.28***	.23***
INQ	<i>r</i>	.40***	1	.91***	.89***	.23***	.54***	.51***	.27***	.26***	.52***	.38***
TB	<i>r</i>	.35***	.91***	1	.69***	.15**	.48***	.43***	.23***	.21***	.50***	.35***
PB	<i>r</i>	.38***	.89***	.63***	1	.27***	.50***	.49***	.26***	.27***	.44***	.35***
ACS	<i>r</i>	.05	.23***	.15***	.27***	1	.27***	.22***	.21***	.17**	.21***	.19**
sf-CTQ	<i>r</i>	.36***	.54***	.48***	.50***	.27***	1	.87***	.68***	.58***	.87***	.68***
EA	<i>r</i>	.38***	.51***	.43***	.49***	.22***	.87***	1	.52***	.32***	.72***	.51***
PA	<i>r</i>	.21***	.27***	.23***	.26***	.21***	.68***	.52***	1	.33***	.42***	.40***
SA	<i>r</i>	.23***	.26***	.21***	.27***	.17**	.58***	.32***	.33***	1	.29***	.27***
EN	<i>r</i>	.28***	.52***	.50***	.44***	.21***	.87***	.72***	.42***	.29***	1	.58***
PN	<i>r</i>	.23**	.38***	.35***	.35***	.19**	.68***	.51***	.40***	.27***	.58***	1

** = $p < .01$; *** = $p < .001$

The correlation between scores on the PSST and the sf-CTQ were statistically significant ($r = .36$ $p < .001$). Thus, a significant positive moderate relationship exists between PMDD symptoms and a history of child abuse. Further correlational analyses were run to identify discrepancies amongst different types of child abuse and their respective relationships with PMDD. Of the five sub-scales of the sf-CTQ, EA ($r = .38$) had the strongest significant relationship with PMDD symptoms; followed by EN ($r = .28$), PN ($r = .23$), SA ($r =$

.231), and PA ($r = .21$) all showing significant albeit weak relationships with PMDD symptoms.

Correlation analyses were run to explore if any relationships were present between child abuse and suicidal cognitions. Scores on the sf-CTQ and INQ were strongly significantly correlated with each other ($r = .54, p < .001$). Child abuse was related to both TB ($r = .48, p < .001$) and PB ($r = .50, p < .001$). Therefore, a moderate relationship exists between child abuse and TB, as well as between child abuse and PB that is statistically significant. EA ($r = .51, p < .001$) and EN ($r = .52, p < .001$) had the strongest relationships with suicidal cognitions. Specifically, EA had the strongest association with PB ($r = .49, p < .001$), and EN had the strongest association with TB ($r = .50, p < .001$).

In terms of whether child abuse was associated with the development of an ACS, an indicator of risk for suicidal acts, correlational analyses indicated a statistically significant association between child abuse and an ACS, albeit a weak correlation ($r = .27, p < .001$). Further analyses revealed that EA had the strongest relationship with the development of ACS of all sub-types of child abuse ($r = .22, p < .001$). In summary, the bivariate correlations of key variables depicted in Table 4.5, excluding the non-significant correlation between PMDD and ACS, fell in the anticipated directions.

4.5 Reliability analysis

The reliability estimates for the variables included in the model were computed using the Cronbach's alpha technique. The nature of the study's constructs determines the validity and reliability criteria, and inter-item correlation coefficients determines the reliability between items (Field, 2018). No item deletions were made, as all inter-item correlations were $> .30$ and thus would not significantly improve reliability if deleted. The item statistics for the respective scales are detailed in Appendix 7. The reliability estimates and item

correlation coefficients for each of the data collection instruments, and their respective subscales, are depicted below in Table 4.6.

Table 4.6

Reliability statistics of the latent variables (N = 1218)

Variable	Cronbach's Alpha	Average inter-item correlation
PMDD	0.90	0.35
Thwarted belongingness	0.91	0.53
Perceived burdensomeness	0.96	0.79
Acquired capability for suicide	0.87	0.29
Child abuse	0.93	0.45
Emotional abuse	0.89	0.61
Physical abuse	0.82	0.55
Sexual abuse	0.95	0.83
Emotional neglect	0.93	0.65
Physical neglect	0.64	0.35

Table 4.6 indicates that the Cronbach's alpha coefficients were all acceptable for the model's variables ($\alpha \geq .80$), except for the PN subscale for child abuse ($\alpha = .64$). The average inter-item correlations of the scales fell in the acceptable range between .23 - .42.

4.6 CFA results

To determine measurement model fit, a CFA was run. A positive screening for PMDD symptoms was utilised in the model as a dichotomous variable. Therefore, the CFA was conducted to determine the variables' factor structure (CA, TB, PB and ACS).

The goodness-of-fit statistics displayed in Table 4.7 depict the chi-square statistic is 8742.86 ($p = .00$) and RMSEA = .06. An RMSEA = .06 is suggestive of good model fit, therefore the null hypothesis of exact model fit (RMSEA = 0) was rejected. The CFI (.84) and NFI (.84) values show acceptable model fit, but there could be room for improvement as the generally acceptable threshold is .90. The SRMR value of .09 is slightly above the threshold, suggesting a fit that is acceptable, but not ideal. The goodness-of-fit statistics in Table 4.7 were deemed acceptable according to the RMSEA, but the CFI, NFI and SRMR suggest there is room for model improvement. In conclusion, although the fit indices imply the model might not be optimal and could benefit from refinement, the chi-square statistic and p-value are indicative of statistical significance and the PLS-SEM analysis was conducted.

Table 4.7

Goodness-of-Fit Statistics

Degrees of freedom (N = 1218)	1500
Chi-square	8742.86
Relative Chi-square	5.83
RMSEA	0.06
90% C.I. for RMSEA	0.90
p-value	0.00
CFI	0.84
NFI	0.84
SRMR	0.09

4.7 PLS-SEM results

4.7.1 Evaluation of the measurement model.

The composite reliability and AVE were interpreted to ensure the integrity and robustness of the measurement model.

Composite reliability. The composite reliability value measures the internal consistency of a latent construct, it is similar to the Cronbach's alpha value but is considered more appropriate in the context of an SEM analysis as it considers the factor loadings of the indicators on their respective constructs. In my study, each latent variable had a composite reliability above .70 ($\geq .83$), indicating good internal consistency and were therefore deemed satisfactory, according to requirements stipulated by Hair et al. (2016). The composite reliability values are summarised in Table 4.8.

Table 4.8

Reliability statistics of the PLS-SEM model

<i>Scale</i>	<i>Composite Reliability</i>	<i>AVE</i>
Thwarted belongingness	0.92	0.58
Perceived burdensomeness	0.96	0.82
Child abuse	0.86	0.56
Acquired capability for suicide	0.78	0.47

Average variance extracted. The AVE value measures the amount of variance explained by a latent construct compared to the amount of variance due to measurement error (Hair et al., 2016). AVE ensures that the indicators of a construct are highly correlated and measure the same underlying concept. In my study, most of the AVE values were $> .50$ indicating good convergent validity among my constructs and their indicators are reliable

and effectively measure what they claim to measure (Field, 2018). However, for ACS the AVE was slightly below the minimum threshold (AVE = .47), suggesting that the indicators for ACS might not be as strongly correlated as desired. A summary of the AVE values is provided in Table 4.8.

Outer loadings. An examination of the outer loadings of the scales' items and their significance level concludes the evaluation of the measurement model. The factor loadings were statistically significant if zero fell outside the 95% confidence interval (C.I), also indicated by a p -value < .05.

Table 4.9 reports on the magnitude of the associations between the latent variables and their respective items. From this we can deduce that that the pathways between items and their relevant latent variables (TB, PB, ACS, and CA) were all statistically significant (p < .001). This confirms that the items included in the measurement scale are reliable and unproblematic.

Table 4.9

Summary of Outer Loadings

Latent variables	Manifest variable	Loading	95% C.I (L)	95% C.I (U)	p -value
Thwarted	BEL1 (R)	.78	.75	.81	< .001
belongingness	BEL2 (R)	.82	.80	.84	< .001
	BEL3	.64	.59	.69	< .001
	BEL4 (R)	.70	.65	.74	< .001
	BEL5	.74	.70	.77	< .001
	BEL6	.68	.63	.73	< .001

	BEL7 (R)	.81	.78	.84	< .001
	BEL8 (R)	.86	.84	.88	< .001
	BEL9 (R)	.77	.74	.80	< .001
Perceived	BUR1	.92	.91	.93	< .001
Burdensomeness	BUR2	.93	.91	.94	< .001
	BUR3	.90	.88	.91	< .001
	BUR4	.91	.90	.93	< .001
	BUR5	.88	.86	.90	< .001
	BUR6	.88	.86	.90	< .001
	Acquired Capability for Suicide	General fearlessness	.75	.69	.81
Insensitivity to sight of blood		.68	.58	.74	< .001
Fearlessness about death		.73	.66	.78	< .001
Enjoyment of observed violence		.55	.44	.65	< .001
Child Abuse	Emotional abuse	.86	.83	.88	< .001
	Physical abuse	.70	.65	.75	< .001
	Sexual abuse	.55	.48	.61	< .001
	Emotional neglect	.83	.80	.86	< .001
	Physical Neglect	.75	.70	.79	< .001

4.7.2 Evaluation of the structural model.

The inner structural model provided insight into the quality of the relationships among the study's variables (M. Kidd, personal communication, July 15, 2024). The PLS-SEM analysis determined the degree the latent variables were correlated to one another.

Multicollinearity. Amongst the several predictors included in the regression analysis, it is an important assumption that they are all uncorrelated (Thakkar, 2020). When predictors have high correlations it inflates standard errors and negatively affects the reliability of the estimates (Thakkar, 2020). Therefore, utilising the Variance Inflation Factor (VIF) value, a test for multicollinearity was performed.

VIF compares the amount of explained variance of the estimated regression coefficients to the amount of variance explained when the predictors are not linearly related (Hair et al., 2016). This is used to describe the amount of multicollinearity that exists in a regression analysis (Henseler et al., 2009). High multicollinearity between predictors is problematic as it causes unstable regressions, making them difficult to interpret (Henseler et al., 2009). Generally, issues with multicollinearity are indicated by VIF values that are above five, which corresponds with a tolerance recommendation of .50 (Field, 2018). As depicted in Table 4.10, all the VIF scores were below 5 and thus no indication of multicollinearity was identified in the present study.

Table 4.10*Multicollinearity statistics*

Scale	VIF
Thwarted belongingness	1.77
Perceived burdensomeness	1.81
Child abuse	1.42
Thwarted belongingness*Child abuse	1.13
Perceived burdensomeness*Child abuse	1.23

Endogenous variable: Acquired capability for suicide

Evaluation of the R-square. The R-square value was interpreted to determine the proportion of the explained variance in the endogenous variables by the exogenous variables. The R-square values ranged from 0.05 – 0.08 and are depicted in Table 4.11 below.

Table 4.11*R-square*

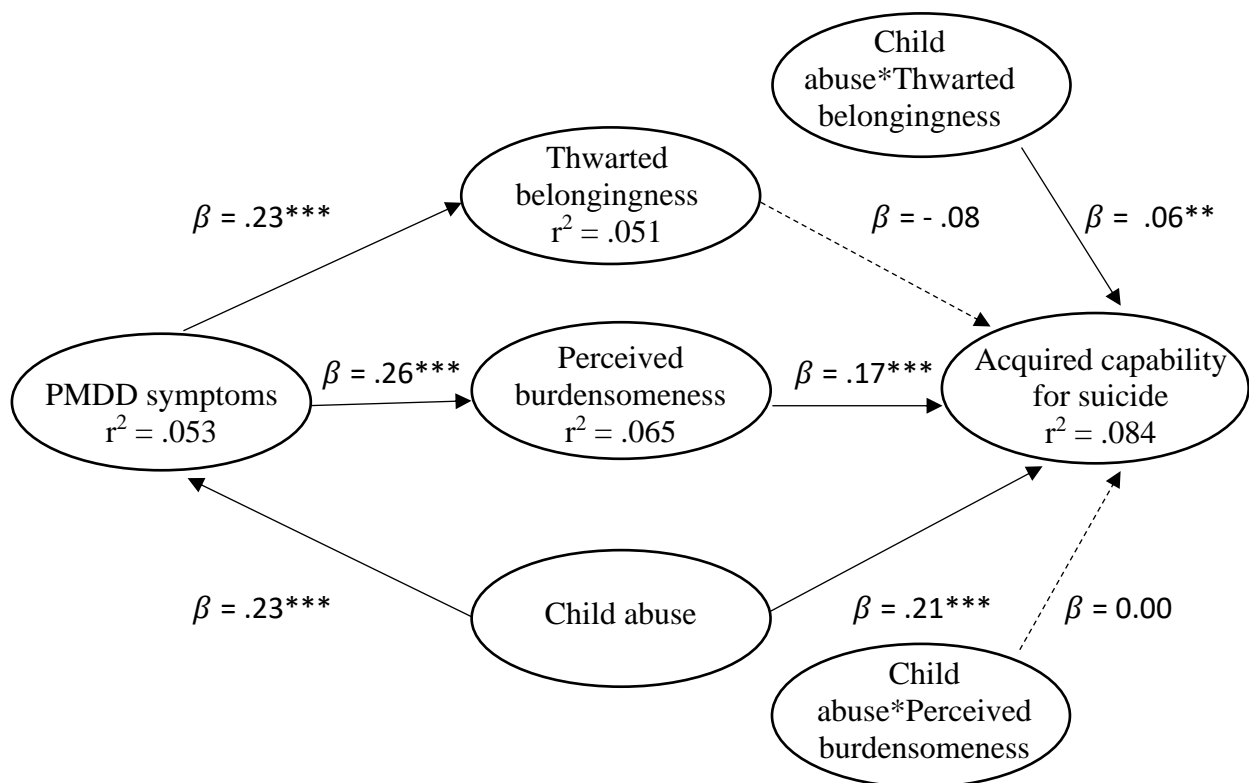
Variable	R ²	Adjusted R ²
PMDD symptoms	0.05	0.05
TB	0.05	0.05
PB	0.06	0.06
ACS	0.08	0.08

The model explained 5% of the variance in PMDD symptoms, 5% in TB, 6% in PB, and 8% in an ACS. This shows a somewhat larger, though still small, effect of child abuse on ACS

compared to the other constructs. Overall, child abuse exerts some influence on these variables, but a majority of the variance remains unexplained, indicating that other significant contributing factors exist outside of the present model. The final structural model is depicted below in Figure 4.1, and Table 4.12 indicates significant path coefficients details the standardised factor loadings, beta coefficients, and standard errors in the final model.

Figure 4.1

Final structural model



Evaluation of the main effects. I analysed the path coefficients to interpret the statistical significance and magnitude of the relationships hypothesised in the PLS-SEM. A statistically significant coefficient is indicated by a value of $p < .05$. This level of significance was used to decide whether to accept or reject a hypothesis. Table 4.12 details the direct path coefficients for hypotheses 1 – 6.

Table 4.12*Direct path coefficients between variables*

Path	Path Coefficient	95% C.I. (L)	95% C.I. (U)	p-value
H1: PMDD → TB	0.23	0.17	0.28	< .001
H2: PMDD → PB	0.25	0.2	0.31	< .001
H3: TB → ACS	-0.08	-0.16	0	.07
H4: PB → ACS	0.17	0.09	0.25	< .001
H5: CA → PMDD	0.23	0.18	0.29	< .001
H6: CA → ACS	0.21	0.15	0.28	< .001

Hypothesis 1: PMDD symptoms (Y_1) have a significant positive relationship with thwarted belongingness (Y_2).

The hypothesised relationship between symptoms of PMDD and TB was found to be statistically significant ($\beta = .23$; $p < .001$), with zero falling outside the 95% C.I.

Hypothesis 2: PMDD symptoms (Y_1) have a significant positive relationship with perceived burdensomeness (Y_3).

The positive direct relationship between PMDD symptoms and PB indicates that for women who screen positive for PMDD, they are highly likely to display feelings of being a burden to others ($\beta = .25$; $p < .001$).

Hypothesis 3: Thwarted belongingness (Y_2) has a significant positive relationship with an acquired capability for suicide (Y_4).

I hypothesised that TB would have a positive relationship with an ACS, but the results show that there is a weak and slightly negative relationship, albeit not statistically significant ($\beta = -.08$; $p > .05$).

Hypothesis 4: Perceived burdensomeness (Y_3) has a significant positive relationship with an acquired capability for suicide (Y_4).

The results depict that PB has a significant direct positive relationship with an ACS ($\beta = .17$; $p < .001$).

Hypothesis 5: Child abuse (X_1) has a significant positive relationship with PMDD symptoms (Y_1).

Child abuse was shown to have a direct positive effect on PMDD symptoms, and this effect was statistically significant ($\beta = .23$; $p < .001$).

Hypothesis 6: Child abuse (X_1) has a significant positive relationship with an acquired capability for suicide (Y_4).

Similarly, child abuse was also shown to have a significant positive relationship with an ACS in the present model ($\beta = .23$; $p < .001$).

Evaluation of proposed indirect effects. The path coefficients were used to determine the strength, direction and statistical significance of the proposed indirect effects for hypotheses 7 and 8 (Table 4.13). Using a C.I. of 95%, the significance of a hypothesized mediating path was evaluated by a p -value $< .05$.

Table 4.13

Mediating path coefficients between variables

Path	Path Coefficient	95% C.I. (L)	95% C.I. (U)	p-value
H7: PMDD \rightarrow TB \rightarrow ACS	-.02	-.04	0	.085
H8: PMDD \rightarrow PB \rightarrow ACS	.04	.02	.07	< .001

Hypothesis 7: Thwarted belongingness (Y_2) has significantly mediates the relationship between PMDD symptoms (Y_1) and an acquired capability for suicide (Y_4).

The results show that TB had no significant mediating effect on the relationship between PMDD symptoms and an ACS ($\beta = -.02$; $p > .05$).

Hypothesis 8: Perceived burdensomeness (Y_3) significantly mediates the relationship between PMDD symptoms (Y_1) and an acquired capability for suicide (Y_4).

The results from the SEM depict that PB significantly mediates the relationship between PMDD symptoms and an ACS ($\beta = .04$; $p < .001$).

Evaluation of proposed moderating effects. For hypotheses 9 and 10, I intended to test for the moderating effects of child abuse on the pathway for suicidality, or specifically from TB and PB to an ACS. The outputs of the proposed moderating effects are detailed in Table 4.14. The significance of the moderating effects was determined by analysing their path coefficients, a C.I. of 95%, and a p -value $< .05$.

Table 4.14

Moderating path coefficients between variables

Path	Effect Size	95% C.I. (L)	95% C.I. (U)	p-value
H9: CA*TB \rightarrow ACS	0.06	0.01	0.11	0.014
H10: CA*PB \rightarrow ACS	0.00	- 0.05	0.05	0.974

Hypothesis 9: Child abuse (X_1) significantly moderates the relationship between thwarted belongingness (Y_2) and an acquired capability for suicide (Y_4).

Based on results provided in Table 4.14, the relationship between thwarted belongingness and an acquired capability for suicide is significantly moderated by the presence of a history of child abuse ($\beta = .06$; $p < .05$).

Hypothesis 10: Child abuse (X_1) significantly moderates the relationship between perceived burdensomeness (Y_3) and an acquired capability for suicide (Y_4).

The interaction between child abuse and perceived burdensomeness has no effect on an ACS ($\beta = 0$; $p > .05$), therefore child abuse does not moderate the relationship between PB and ACS.

4.8 Interpretation of hypotheses

From the 10 hypotheses formulated for the study, 7 were rejected. 3 were accepted.

Hypotheses 1, 2, 4, 5, 6, 8 and 9 were all supported by Joiner's (2005) IPT model of suicide.

A summary of the hypotheses is provided in Table 4.15.

Table 4.15

Summary of hypotheses

Path	Path coefficient	Significance (p -value)	Decision	Joiner's IPT model
H1: PMDD \rightarrow TB	0.23	< .001	reject	supported
H2: PMDD \rightarrow PB	0.25	< .001	reject	supported
H3: TB \rightarrow ACS	-0.08	.077	fail to reject	unsupported
H4: PB \rightarrow ACS	0.17	< .001	reject	supported
H5: CA \rightarrow PMDD	0.23	< .001	reject	N/A
H6: CA \rightarrow ACS	0.21	< .001	reject	supported

H7: PMDD → TB → ACS	-0.02	.085	fail to reject	unsupported
H8: PMDD → PB → ACS	.04	< .001	reject	supported
H9: CA*TB → ACS	0.06	< .05	reject	supported
H10: CA*PB → ACS	0.00	0.974	fail to reject	disagree

4.9 Chapter summary and conclusion

This chapter detailed the findings of the data analysis of the present study. I outlined the demographic characteristics of the sample and presented the descriptive statistics of the battery of measures. All measures were shown to be reliable (Cronbach’s alpha > .65).and none of the items required deletion.

Initial correlation analyses showed significant relationships between all the variables, except for PMDD and ACS. CFA analysis showed satisfactory factor loadings, and good model fit to proceed with PLS-SEM. After evaluating both the measurement model and the structural model according to Hair et al. (2016) two-step process, PLS-SEM was conducted. Direct path coefficients tested for hypotheses 1 – 6, indirect path coefficients tested for hypothesis 7 and 8 and moderating path coefficients tested for hypothesis 9 and 10. Some additional significant path coefficients were outlined and hypotheses 1 – 10 were interpreted.

Chapter 5: Discussion

5.1 Introduction

This final chapter discusses the results presented in Chapter 4, and proposes potential reasons for how and why the results deviate or align with other studies. Incorporated into this discussion is an evaluation of the degree to which this study's findings agree with Joiner's (2005) IPT of suicide. The strengths and limitations of the study were also included. Before concluding the current study, an outline of the the implications of the results are provided and recommendations are made for young women, university campuses, and future research. The chapter concludes with a summary and final remarks.

5.2 Discussion

This study's main objective was to test a SEM based on Joiner's (2005) theory of suicidal behaviour using the hypothesised associations among the variables. Additionally, I aimed to determine the prevalence of positive PMDD screenings and child abuse in a sample of female students at SU. In doing so, the results and implications of the study's outcomes would guide interventions at SU that could reduce PMDD symptom severity and decrease suicide risk, with the goal of enhancing female students' quality of life.

5.2.1 Prevalence rates

5.2.1.1 PMDD Symptoms

The present study utilized the PSST to screen for PMDD symptoms among a sample of 1218 female university students at SU and found that 27.4% screened positive for PMDD. In 2020, Roomaney and Lourens (2020) also screened for PMDD symptoms using the PSST, among a sample of 1329 students at SU, and found a much lower prevalence of 11.2%. Considering the similarity of the sample characteristics and methods of measurement, the discrepancy between prevalence rates over these two time points can be attributed to several important

contextual factors. For example, the COVID-19 pandemic has been shown to have a profound impact on students' mental health (Bantjes et al., 2023), and the menstrual cycle (Mitra et al., 2023). A study conducted among female medical students in Italy found that the stress during the pandemic was associated with PMS, dysmenorrhea, sleep disturbances, and depressive symptoms (Polese et al., 2024). Coupled with academic stress, social isolation, and disruptions to daily life, these factors have the potential to exacerbate symptoms of mental illness, including PMDD (Polese et al., 2024). Additionally, increased mental health awareness and reduced stigma may have led to more students recognizing and reporting PMDD symptoms (Osborn et al., 2020).

Current research suggests that the prevalence of clinically significant symptoms of premenstrual dysphoria may be higher than global prevalence rates, with 13—18% of menstruating women having symptoms severe enough to result in distress and impairment (Rapkin & Winer, 2009). Evidently, the percentage of women who screened positive for PMDD symptoms in this study (27.4%) was significantly higher than what research has estimated, thus corroborating with previous research which has shown that PMDD symptoms are common and disproportionately affect university students compared to the general population (Eldeeb et al., 2021). Furthermore, this aligns with recent studies which have explored students' mental health in South Africa, where higher prevalence rates for mood disorders, such as depression and suicide, were observed among university students compared to community samples (Makhubela, 2021; Bantjes et al., 2023).

The current prevalence of positive screenings for PMDD symptoms in this sample is particularly concerning, as the survey questionnaire required students to disclose whether they had previously been diagnosed with PMDD, and only 4.4% of the sample having already received a diagnosis. Research has shown it can take women with PMDD up to 10

years to receive a diagnosis (Osborn et al., 2020). This delay in treatment and diagnosis further warrants the need for early detection and screening for PMDD symptoms, as early intervention can significantly improve life quality and reduce the impact and severity of symptoms (Thakrar et al., 2021). Given that a significant portion of the current sample was undiagnosed and experienced distress from severe symptoms, it is essential to enhance awareness, provide access to and introduce screening practices into routine health care for university students.

5.2.1.2 Child abuse

In this study, 37.3% of female university students reported a history of child abuse. The prevalence of child abuse among university samples varies widely based on the sample characteristics and different measurement tools (Karatekin, 2018). Among a sample of 1290 first year South African university students, 48.4% reported childhood maltreatment (Myers et al., 2021). The sample was overrepresented by females, and the most common sub-types of child abuse in this study was EN (62.2%), which aligns with another South African study conducted among a sample of 314 women (144 of which were HIV-positive) and found EN was the most endorsed sub-type (Spies et al., 2019). These results confirm that child abuse is highly prevalent among South African female university students, especially EN (Myers et al., 2021).

Among the young women who screened positive for PMDD in this study, just over half also reported a history of child abuse. Another study conducted among female students from the University of Jerusalem (n = 112) utilized the CTQ to measure child abuse found that 28.9% of women with PMDD reported exposure to child abuse (Azoulay et al., 2020). The variation in prevalence rates could be attributed to the significantly larger sample size utilized in this study. A similar study conducted in Australia also found a very high

prevalence of early life trauma (83%) among women diagnosed with PMDD (Kulkarni et al., 2022). This included PA, SA, EA, and EN (Kulkarni et al., 2022). Our study reached consensus with the findings of other studies investigating the effect of trauma and abuse on PMDD symptoms. For women with symptoms of PMDD, a history of abuse during childhood is a common co-occurring factor (Bertone-Johnson et al., 2014).

Furthermore, of all the subtypes of child abuse, EA showed the strongest association with PMDD symptoms. This finding was anticipated considering previous research having shown a strong relationship between PMDD symptoms and the experience of EA during childhood (Soydas et al., 2014). EA during childhood has been considered to result in more severe damage than other sub-types of child abuse as it is usually inflicted upon the child by an individual that child expects safety, love, and respect (Kulkarni et al., 2022). Furthermore, a child is more likely to develop a negative self-image when exposed to verbal forms of abuse than other abuse types as the perpetrator provides a direct source of negative cognitions for the child to internalise (Kulkarni et al., 2022). It is also possible that EN and EA had the strongest relationships with PMDD because those were the most common reported types of abuse in the sample. If there was an even percentage of people who had a history of each type of abuse, the results might differ. More research is needed to further understand the relationship between EA and the development of PMDD.

5.2.2 Interpretation of hypotheses

The research question asked: “How does a structural model based on Joiner’s (2005) Interpersonal-Psychological Theory (IPT) of suicide explain the pathway from PMDD symptoms to suicidal behaviour, and what role does child abuse play in influencing this pathway?”. From the 10 hypotheses for the study, 7 were found to be statistically significant and supported Joiner’s IPT model of suicide and previous research. However, there were 3

non-significant paths which could be explained by many reasons, the most likely being that there were other factors not included in the model which accounted for the variation in the variables of interest.

5.2.2.1 Direct path coefficients (Hypotheses 1 – 6)

Hypotheses 1 and 2 were supported by this study's findings and aligned with the IPT model of suicide. Hypothesis 1 involved the significant direct positive effect of PMDD symptoms on TB. This is in alignment with previous research showing that mood disorders are associated with feelings of increased TB (Silva et al., 2015). Likewise, Hypothesis 2 proposed that PMDD symptoms would also have a significant effect on PB. Once again, it was found that PMDD symptoms had a direct effect on PB in female university students. These findings align with that of a longitudinal Australian population-based study, where poor overall mental health was associated with greater PB and TB (Christensen et al., 2014).

Given the results, this study seems to agree with past research. For example, Amongst a sample of 150 female college students in the US, Wolford-Clevenger et al (2020) found that when these two interpersonal needs are unmet, they are associated with risk for suicidal cognitions. Therefore, based on the rejection of both hypothesis 1 and 2 and in agreement with Joiner's theory, PMDD increases risk for suicidal behaviour by affecting the first two components of the model: TB and PB (Smith et al., 2018).

For hypothesis 3, TB did not have a significant effect on the development of an ACS in the present study. Whereas hypothesis 4 was rejected as there was a significant effect of PB on an ACS. This result contrasts with what was expected based on Joiner's (2005) IPT model of suicide, which theorises that both TB and PB precipitate an ACS. Although Joiner (2007) explains that even if both TB and PB are present, the development of an ACS is primarily

determined by the presence of painful provocative life experiences and a level of fearlessness towards death (Van Orden et al., 2010).

While we expected that both TB and PB would have a direct effect on an ACS, a study which tested the validity of the IPT among a sample of Chinese university students also found support for the role of PB and ACS in risk for suicidal ideation, but not for TB (Zhang et al., 2013). There is consistent evidence in literature and the perception of being a burden to others has a strong relationship with suicidal behaviour (Bell et al., 2018). The results of the study indicate that PB and an ACS, variables which have been omitted from previous theories of suicide, are relevant for suicidal behaviour among female university students (Zhang et al., 2013).

The current study showed that child abuse had a positive direct effect on PMDD symptoms. For this reason, the null hypothesis was rejected, and this finding supports previous literature indicating child abuse may play a role in the onset and severity of PMDD symptoms (Eisenlohr-Moul et al., 2016). A study conducted among Lebanese university students utilised SEM and found that childhood maltreatment had a significant effect on the severity of PMDD symptoms, particularly psychological and sexual abuse (Younes et al., 2021). Furthermore, women with PMDD have scored higher overall on the CTQ, as well as reported higher scores on the different subscales for EA, PA, and SA in comparison to healthy controls (Bertone-Johnson et al., 2014).

For hypothesis 6, I anticipated that child abuse would also have a significant direct effect on an ACS, and the results confirm that there was a strong correlation between child abuse and ACS. As hypothesized, having a history previously painful and traumatic experiences during childhood enhances young women's vulnerability to develop an ACS (Van Orden et al., 2010). ACS is theorised to be related to habituation to physical pain

(Joiner et al., 2007; Orden et al., 2010). Similarly, a population-based longitudinal cohort study in Australia assessed 1167 participants to identify by risk factors for suicide utilizing the constructs of the IPT of suicide (Christensen et al., 2014). The study found that stressful events and lifetime traumas were associated with an ACS.

The results that child abuse has a direct effect on the development of an ACS is consistent with the recent research that supports the role of both physically and psychologically painful life events, including childhood trauma, in the development of an ACS (Smith et al., 2016). The results imply that trauma exposure increases a young woman's vulnerability to suicide over time by influencing her ACS (Van Orden et al., 2010).

5.2.2.2 Indirect path coefficients (Hypotheses 7 – 8)

Hypothesis 7 investigated the indirect effect of TB on the relationship between PMDD and an ACS. The results show that TB does not mediate the path from PMDD to ACS. Therefore, this was not in alignment with Joiner's theory. In contrast, Hypothesis 8 proposed an indirect effect of PB on the relationship between PMDD symptoms and an ACS and, it was found that a significant mediating effect existed.

This study's findings provide evidence of a clear pathway that PMDD influences the development of an ACS through PB, rather than TB. This aligns with Joiner's (2005 IPT model of suicide which purports that the presence of psychopathology, such as PMDD, will only result in the development of an ACS in the presence PB. This aligns with a study conducted among military veterans with depression histories, where PB was associated with depression symptom severity and suicide attempt history and the authors concluded that perceptions of being a burden may be a stronger determinant of risk for suicidal acts than a sense of belonging (Bell et al., 2018).

Similarly, Gunn et al (2012) analysed suicide notes for themes of TB and PB found that among the suicide notes of women (17%), PB more frequently found compared to men's suicide notes (8%). The current study's results, combined with recent literature suggest that PB may play an important role in predicting suicidal behaviour among women (Gunn et al., 2012).

5.2.2.3 Moderating path coefficients (Hypotheses 9 -10)

According to WHO data from World Mental Health Surveys, suicidal cognitions are very common among university students, with a prevalence rate of ideation ranging from 15 – 30% and intent ranging from 5 – 10% (Mortier et al., 2018). However, only a small percentage (1 – 6%) of young adults with suicidal thoughts will attempt suicide (Mortier et al., 2018). Thus, determining which factors facilitate the "ideation-to-action" progression poses one of the most difficult challenges to suicidology (Barzilay et al., 2015).

According to Joiner (2007), the progression to lethal self-injurious behaviour is catalysed by a tolerance for exposure to painful and stressful events which develops over time, and then a familiarity with suicidal behaviours, hence the term "acquired capability for suicide." Our findings partially support this. According to the structural equation model, TB will only lead to an ACS in the presence of a history of child abuse. Therefore, hypothesis 9 was rejected as child abuse was shown to significantly moderate the relationship between TB and ACS. This implies that as the size of the interaction between CA and TB increases, the ACS also increases and therefore so does the risk for suicidal acts according to Joiner's model (Joiner, 2007; Smith et al., 2016). However, the same was not observed for PB, which as shown in hypothesis 4, has a direct effect on ACS and was not significantly moderated by child abuse. Thus, for hypothesis 10 we failed to reject the null hypothesis as the presence of a history of child abuse had no effect on the relationship between PB and ACS.

5.3 Limitations

Several limitations exist in spite of the significant contributions made by this study. These limitations can serve as guidelines for researchers and their future models to improve upon.

5.3.1 Research design and methodology

The study's cross-sectional research design allowed for the variables to be measured at a single time-point and is limited in its ability to infer causality. Alternatively, a longitudinal study with multiple time waves would enhance the consistency and accuracy of the findings and allow more definitive conclusions to be drawn. Considering the present findings showing a higher prevalence rate of PMDD symptoms (27.4%) than the prevalence found by Roomaney & Lourens (2020) three years ago, a longitudinal study of PMDD would allow future researchers to identify recurring patterns among female university students and changes over time.

Given that this study focuses on students from a singular university and utilises convenience sampling, the findings cannot be applied to the larger population. For future research, a stratified random sample obtained from a several different South African universities would ensure representation and generalisability. To test this model on all women between 18 – 25 years old , and not solely among university students could be of further value to future studies.

The study also utilized self-report data, which is a weakness due to its association with social desirability bias. People who complete self-report questionnaires could manipulate their answers to portray themselves in a positive light, which could result in inaccurate measurement of the variables of interest and thus the reliability of the model. A mixed-methods study which collects qualitative data through semi-structured interviews, as well as collecting quantitative data through a survey questionnaire would also provide rich data and

results that can be compared for discrepancies. Furthermore, when collecting data on child abuse history, data that depends on the participant's accurate memory and recall of a previously traumatic event is not always reliable and could result in underreporting of abuse which affects data collection and analyses (Fluke et al., 2021).

In my study, I mitigated social desirability bias by ensuring all participants were kept anonymous and providing the opportunity to complete the survey online without a time limit. This facilitates participants' abilities to recall events more accurately, and the sf-CTQ includes three items to account for denial of abuse and underreporting (Bernstein et al., 2003). Furthermore, skewness and kurtosis values fell within the normal range, suggesting that social desirability bias is unlikely to be an issue in the present study.

5.3.2 Data collection instruments

The PSST was used to screen for PMDD symptoms and is limited in its ability to make a clinical diagnosis without a daily tracking of symptoms over at least two menstrual cycles (Steiner et al., 2003; APA, 2013). Furthermore, the item "feelings of being out-of-control or overwhelmed" was accidentally omitted from the survey questionnaire. This symptom is a significant component of PMDD, and its absence could mean that the severity of PMDD symptoms was underestimated in the sample.

Another limitation relates to the tool selected for measuring child abuse. There is some evidence that the sf-CTQ may not perform similarly across different cultural contexts (Spies et al., 2019). The sf-CTQ has been validated in several countries in Europe, South America, and North America (Saini et al., 2021). However, when its psychometric properties were examined among a female sample in South Africa, an alternative factor structure emerged compared to the original model, prompting a recommendation for revision of the instrument for use in this cultural context (Spies et al., 2019). Additionally, the Physical

Neglect (PN) subscale did not show stable factor loadings and was found to be heterogeneous. Previous research, such as Spies et al. (2019), also found that the PN subscale demonstrated varying reliability levels across countries, particularly in developing regions like South Africa. This may be attributed to cultural differences in how neglect is perceived and reported.

In this study, the PN subscale yielded a lower reliability estimate of .64, compared to the Physical Abuse (PA) subscale, which demonstrated a reliability of .82. Despite the lower reliability of the PN subscale, Spies et al. (2019) concluded that the sf-CTQ, including the PN subscale, remains useful for guiding prevention initiatives aimed at minimizing the adverse impacts of childhood abuse in South Africa. Given the overall robustness of the sf-CTQ, the PN subscale was retained in this study to ensure consistency with the standardized measure as a whole.

5.3.3 Structural equation model

5.3.3.1 Model Fit

The current study's structural equation modeling (SEM) analysis revealed limitations in the measurement model's fit indices, highlighting challenges in accurately capturing the latent constructs of interest.

While some goodness-of-fit indices showed partial acceptability, others did not meet conventional thresholds. For instance, the Comparative Fit Index (CFI = .84) and Normed Fit Index (NFI = .84) indicated poor model fit. The Standardized Root Mean Square Residual (SRMR = .09) approached the borderline of acceptability, and the Root Mean Square Error of Approximation (RMSEA) fell within an acceptable range, suggesting more nuance in the interpretation of the model fit. However, the relative chi-square value ($\chi^2/df = 5.83$)

exceeded the recommended threshold of 4:1, reflecting a less-than-optimal model fit (Kline, 2023).

The high chi-square value ($\chi^2 = 8742.86$) was a particular concern, driven in part by the model's complexity, including the use of numerous latent variables, many of which were measured by more than six indicators. While this approach was informed by the structure of the validated instruments used, it introduced substantial error variance and penalized goodness-of-fit indices. Item parcelling, as advocated by Little et al (2013), could have simplified the measurement model and improved fit indices. However, the approach remains contentious, as parcelling may obscure the underlying latent structure, undermining the primary aim of CFA (consultation with Professor Martin Kidd, November 15 2024). Furthermore, most latent variables in this study contained relatively few items, aligning to some extent with guidelines for parsimony in SEM.

Despite these challenges, the model provided limited support for the hypothesized latent structure, reflecting the validated nature of the instruments used and the complexity of the constructs being studied. The goodness-of-fit limitations underscore the need for cautious interpretation of the SEM results and suggest several areas for improvement in future research.

5.3.3.2 Proportion of explained variance

One of the outcomes of the study is the relatively low variance explained in the outcome variables (ranging from 5 – 8%). This limitation suggests that while the constructs measured in the study are significant, they represent only a small portion of the factors influencing the outcomes. Understanding this unexplained variance necessitates consideration of additional variables and contextual factors that were not captured within the scope of this research.

Biological factors. Biological processes, such as genetic predisposition, hormonal imbalances, and neurobiological mechanisms, are critical in influencing premenstrual dysphoric disorder (PMDD) and suicide-related behaviors (Owens & Eisenlohr-Moul, 2018). For example, variations in serotonin regulation, hypothalamic-pituitary-adrenal (HPA) axis functioning, and genetic markers associated with mood disorders may significantly contribute to the unexplained variance (Hantsoo & Epperson, 2015).

Psychological Factors. Psychological constructs such as resilience, emotional regulation, cognitive distortions, and personality traits also likely play a pivotal role in shaping the outcomes (Osborn et al., 2021; Petersen et al., 2016). These factors influence how individuals perceive and respond to stressors, potentially moderating the impact of child abuse and PMDD on suicidal ideation and behaviour (Azoulay et al., 2020; Beddig et al., 2019).

Environmental and Social Influences. Unmeasured environmental and social factors, such as socioeconomic status, family dynamics, peer relationships, and cultural norms, could contribute to the unexplained variance. Access to social support, exposure to community violence, or systemic inequities may interact with the measured constructs to influence outcomes.

Comorbid Conditions. Co-occurring mental health conditions, such as depression, anxiety, or post-traumatic stress disorder (PTSD), could also account for additional variance (Del Mar Fernandez et al., 2019; Kim & Freeman, 2010). These disorders may mediate or moderate the relationship between the primary constructs studied, influencing the severity of outcomes like PMDD and suicidal behavior. As evidenced by the 42.7% of female students in this study reporting a psychiatric diagnosis other than PMDD, controlling for the presence of other mental illnesses is crucial for future research.

Measurement and Methodological Limitations. Unmeasured variance may also stem from limitations in the instruments used to assess constructs. While validated measures were employed, they may not fully capture the complexity or multidimensionality of the constructs in this sample or context.

Cultural and Contextual Factors. Cultural factors, including stigma surrounding mental health, traditional gender roles, and access to healthcare services, may shape individual experiences and contribute to unexplained variance (Aguwa et al., 2023; Barker-Smith et al., 2020). For instance, women from different cultural backgrounds might exhibit varied coping mechanisms or report symptoms differently due to cultural norms (Bantjes et al., 2018; Mienck et al., 2015)

In light of these limitations, the study's results should be interpreted with caution. While they provide valuable insights into the pathways between PMDD symptoms, childhood abuse, and constructs of the IPT of suicidal behavior, future research should address these limitations to strengthen replicability and generalisability of the results.

5.4 Implications

The pathways between symptoms of PMDD, child abuse, and Joiner's (2005) constructs of suicidal behaviour are intricate. The IPT (2005) purports that people require both the desire and capability for suicide in order to enact a lethal or near-lethal suicide attempt (Van Orden et al., 2010). In light of this, Joiner's model provides a reason for the discrepancy between rates of suicidal cognitions and rates of death by suicide (Smith et al., 2017). The IPT was used as the theoretical underpinning of this study, for which it was proposed to explain how PMDD symptoms precipitate the development of TB and PB, and if a history of child abuse is present then it leads to the development of an ACS – and the risk for engaging

in a suicide attempt. Therefore, a focused effort should be made for developing interventions that will screen for PMDD and identify female students at risk for suicide.

To address the lack of explained variance in the current model, future studies should consider incorporating additional variables that account for these factors. A more comprehensive approach integrating biological, psychological, and environmental dimensions would offer a fuller understanding of the outcomes. For example, future research could explore other biopsychosocial factors, such as academic stress, hopelessness, a history of previous or current suicidal behavior, and the presence of other psychiatric diagnoses (Ibrahim et al., 2013). By expanding the scope of variables included in the study, the proportion of variance explained by the model could increase, enhancing the predictive power of the findings.

Moreover, longitudinal designs and larger sample sizes could help identify dynamic interactions between these factors over time. This would allow for a deeper exploration of how these factors interact with PMDD, child abuse, and suicide-related outcomes across different contexts. Incorporating additional variables into the IPT model of suicide risk could offer a more nuanced understanding of the factors influencing suicide risk among women who screen positive for PMDD, beyond child abuse as a singular environmental factor. By broadening the scope of the research model, future studies can provide a more comprehensive picture of the complex interplay between these variables.

The findings of this study show how symptoms of PMDD can be severe enough to result in an increased risk for suicidal behaviour, especially when combined with the presence of a history of childhood abuse. Therefore, it is recommended interventions are designed to screen for PMDD, reduce symptom severity, provide trauma counselling for

those who screen positive, and incorporate suicide prevention strategies for this at-risk group.

Suicidal behaviour among university students is a problem both in South Africa and worldwide (Bantjes et al., 2023; Stoltenborgh et al., 2014). Therefore, there is reason to find test the validity of the IPT of suicide in university students who display suicidal behaviour to determine the extent of the role Joiner's three constructs play in predicting these behaviours (Zhang et al., 2013).

These findings also suggest that among female university students experiencing PMDD symptoms, treatments that increase feelings of connectedness, hope, and contribution may mitigate risk for suicidal behaviour (Wolford-Clevenger et al., 2020). As the IPT of suicide focuses on perceptions of belonging and burdensomeness, CBT which focuses on addressing cognitive distortions may be useful. Furthermore, universities can seek to reduce suicide risk by creating campus initiatives that increase hope, belongingness, and self-worth. The study provides evidence that social support exerts influence on all three IPT constructs, and the potential of social support as a protective factor in mitigating future suicide risk (Christensen et al., 2014).

5.5 Recommendations

The findings from this study suggest several key recommendations for future research and university campuses in South Africa.

5.5.1 Enhanced screening and early intervention

Given the direct effect of child abuse on PMDD symptoms found in this study, early identification of at-risk women is crucial. Universities, such as SU, should introduce regular screening of female students who may be experiencing premenstrual distress and symptoms relating to trauma and abuse (Younes et al., 2021). Early detection can lead to

timely interventions, potentially reducing the severity of symptoms and improving students' QoL (Thakrar et al., 2021).

5.5.2 Integrated mental health services

Universities should establish integrated mental health services that address the complex interplay between severe premenstrual symptoms, psychological distress, history of trauma, and suicidal behaviour. These services should offer a holistic approach to mental health care, where students can access both psychological and medical support in one place.

Mental health services should include specialized interventions that focus on both PMDD and trauma symptoms, recognizing their interconnectedness and their joint influence on predicting risk for suicidal behaviour (Bantjes et al., 2023; Rousseau et al., 2021). Addressing these symptoms simultaneously can mitigate their combined impact on students' QoL and overall mental well-being and serve as a preventative measure for suicidal behaviour (Carlini et al., 2022).

5.5.3 Empowerment through education and support

Psychoeducation is integral to empowering female students to be aware of and to manage their PMDD symptoms effectively. Universities should provide education on PMDDs and female suicidal behaviour and the impact of trauma on the body through workshops, seminars, and informational campaigns. These initiatives can raise awareness, reduce stigma, and encourage students to seek help. Additionally, institutions can create support groups and workshops specifically for female students diagnosed with PMDD. These groups can provide a safe space for students to share experiences, access peer support, and learn coping strategies.

Empowerment is also about helping students utilize their inner resources. When students feel empowered within their environment, they are more likely to practice self-care and positive help-seeking behaviours (Aldalaykeh et al., 2019).

5.5.4 Specific interventions

To address the needs of students with PMDD symptoms, TB, PB, and a history of trauma, specific interventions should be implemented. Enhancing social support is critical, as research has shown that improvements in interpersonal relationships can result in improvements in all three constructs of Joiner's model of suicidal behaviour (Bell et al., 2018). This highlights the protective role of a supportive social environment against mental illness symptoms and suicide risk (Christensen et al., 2014).

Moreover, interventions that focus on enhancing mindfulness and emotional wellbeing, such as exercise, yoga, and support groups can help students manage their symptoms more effectively (Beddig et al., 2020; Ghaffarilaleh et al., 2019; Saglam & Orsal, 2020). Short CBT interventions have also been suggested as beneficial for reducing symptom severity and improving QoL (Sepede et al., 2016; Ussher & Perz, 2017). Universities should consider implementing these interventions within their mental health services to better support female students at risk.

5.5.5 Institutional policy and support

The relationships between PMDD, suicidal behaviour, and child abuse explored in this study should inform institutional policies. SU should develop and implement policies that promote mental health awareness, dismantle menstrual shame, provide adequate support services, and create a supportive environment for female students (Bobel et al., 2020; Mosalisa, 2023). By doing so, institutions can decrease the symptom severity of PMDD, mitigate

suicide risk, and ultimately optimize the health-related QoL for female students (Mosalisa, 2023).

5.5.6 Future research

Future research should explore the long-term outcomes of individuals with PMDD and histories of child abuse, particularly in relation to their well-being and academic performance (Eldeeb et al., 2021; Thakrar et al., 2021). Longitudinal studies could show the efficacy of early screening interventions and the changes in PMDD symptom severity over time (Roomaney & Lourens, 2020). Testing the efficacy of CBT and mindfulness-based interventions in these populations could be particularly beneficial (Ussher & Perz, 2017; Ghaffarilaleh et al., 2019).

Additionally, future research should aim to strengthen this study's model by exploring other genetic, hormonal, and psychosocial factors which could play a role in understanding the abuse-PMDD-suicidality pathway (Eisenlohr-Moul et al., 2016; Eisenlohr-Moul et al., 2022). The findings highlight the difficulty of modeling intricate constructs such as PMDD, child abuse, and suicidal behaviour, particularly within a single model. Researchers should consider alternative approaches to CFA and SEM, including the use of multiple SEM models to test subsets of latent variables before combining them into a structural model.

Practitioners relying on these findings should interpret them within the context of the model's fit limitations, avoiding overgeneralization. Future studies should carefully consider the trade-offs between model complexity and parsimony, particularly when using established instruments in diverse or novel populations.

Incorporating qualitative studies, including in-depth interviews or focus groups, would give more insightful data about the lived experiences of women with PMDD and a history of

child abuse, particularly in relation to their perceptions of suicidal thoughts and behaviours (Jurvanen, 2017; Osborn et al., 2020).

Future research should also explore the implications of these findings for mental health policy and education. Investigating how healthcare providers can be better trained to identify and address the risks associated with PMDD and childhood trauma could lead to more effective screening and prevention strategies.

5.6 Chapter summary

In summary, a discussion of the results adds to the knowledge base on the relationship between symptoms of PMDD, suicide risk and child abuse. The results depict significant direct and indirect pathways from child abuse and PMDD symptoms to key constructs of Joiner's (2005) IPT of suicidal behaviour, such as PB and TB, highlighting the integral role of these constructs in predicting suicide risk.

Moreover, child abuse directly affects PMDD symptoms and moderates the relationship between TB and the ACS. This emphasises the importance of using an integrated approach to assessment and intervention for women with PMDD that considers a history of childhood trauma as an important factor for identifying and preventing risk for future suicidal behaviour. These findings provide evidence for the need for early screening and interventions targeted at perceptions of being a burden to others, especially for young women suffering from PMDD symptoms, to reduce their risk for suicidal behaviour.

This research study has contributed to towards the narrow field of female suicidal behaviour and provided support for Joiner's IPT model of suicide by measuring all three constructs among a sample of young women in South Africa. This chapter discussed the findings of the current study and contrasted the results with other relevant studies

exploring the relationships between PMDD symptoms, child abuse, and suicidal behaviour among female university students.

The significant associations found between the variables underscore the need for targeted interventions to address both PMDD symptoms and the effects of trauma. The chapter also highlighted the importance of considering the psychological and environmental factors that influence mental health and suicide risk.

Recommendations were provided for enhanced screening, integrated mental health services, and specific interventions that can help mitigate the impact of PMDD and trauma on students' well-being. The need for institutional support and policy changes was emphasized to create a more supportive and empowering environment for female students.

5.7 Conclusion

The IPT model provides a valuable framework for conceptualizing suicide risk. The findings of this study contribute to a growing body of literature that emphasizes the complex interplay between PMDD, child abuse, and the three components of Joiner's IPT model of suicidal behaviour. The results provide partial support for Joiner's theory, emphasizing the role of child abuse and perceived burdensomeness on the development of an acquired capability for suicide.

The findings also highlight the need for specific interventions that consider psychological, environmental, and interpersonal factors influencing risk for suicidal behaviour amongst the female student population. Addressing these issues through comprehensive screening and integrated mental health services could alleviate symptom severity and the impact, thereby indirectly mitigating future suicide risk. Additionally, empowering students through education and support, and fostering a supportive institutional environment, are essential steps in improving the overall well-being of female

students. Future research on the relationships between child abuse, PMDD, and suicide risk is encouraged to inform effective prevention and intervention strategies for young women in the South African Context.

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APPENDICES

Appendix 1 – Recruitment Email

Dear Student,

You have been invited to take the survey: **Premenstrual distress, suicidal behaviour, and child abuse among young women.**

My name is Courtney and I am a student at Stellenbosch University completing my MA (Research by Dissertation) in Psychology under the supervision of Dr Rizwana Roomaney (xxxxxx@sun.ac.za).

This survey will explore the **relationship** between **symptoms of premenstrual distress** and **suicidal behaviour** among young women, and how **childhood abuse** plays a role in this relationship. The survey is written in **English**, and will take **approximately 10-15 minutes** to complete.

This is an **opportunity** for you to be a part of a study of an under-researched topic that could make advancements in women's health in South Africa. The only requirements needed for your participation are that you are a **registered student at SU**, and that you **identify as a female between 18 - 24 years of age who experiences a menstrual cycle.**

Your participation in this survey is entirely **voluntary** and you will not be required to give your name, as your identity will remain **anonymous** and the information you give will remain **confidential**. Upon completing the survey, you have the option to a part of a **lucky draw to win 1 of 3 spa vouchers each to the value of R1000!** If you wish to learn more about the study and take part in the survey, please **click the link below** to access the consent form and the survey itself.

[Click here to take the survey](#)

Disclaimer: The survey contains questions that relate to topics of a sensitive nature, **resources will be made available** in the consent form and in this email should you find you need support.

The study has received **institutional approval** from SU (reference #: IG-3834), as well as **ethical approval** from the Health and Research Ethics Committee (project ID #: 25635).

If you have any questions or concerns regarding the research, please **don't hesitate to contact me** via email xxxxxxxx@sun.ac.za or cellphone 076xxxxxxx.

Warm regards,

Courtney Coetzee

RESOURCES FOR SUPPORT and THERAPEUTIC INTERVENTION

- **SU Welgevallen Community Clinic**
 - Tel: 021 808 2696
 - Email: wpcp@sun.ac.za
 - Address: Welgevallen Community Psychology Clinic, Welgevallen House, Suidwal Street, Stellenbosch Central, 7600
- **SU Centre for Student Counselling and Development - Unit for Psychotherapeutic and Support Services (CSCD)**
 - Tel: 021 808 4994 (SU Campus); 021 938 9590 (Tygerberg Campus); or ER24 after hours service: 021 205 3032
 - Email: supportus@sun.ac.za
 - Address: 45 Victoria Street, Stellenbosch Central, 7600.

Appendix 2 – Ethical Approval Letter



Approved with Stipulations New Application

08/09/2022

Project ID: 25635

HREC Reference No: S22/08/148

Project Title: A Structural Equational Model of the Relationship between PMDD and Suicidal Behaviour, and the Effects of Childhood Abuse among South African University Students

Dear Ms C Coetzee

The **New Application** received on 08/08/2022 14:08 was reviewed by members of the **Health Research Ethics Committee** via Minimal Risk Review procedures on 08/09/2022 and was approved with stipulations.

Please note the following information about your approved research protocol:

Protocol Approval Period: **08-September-2022 – 07-September-2023.**

The stipulations of your ethics approval are as follows:

1. Investigator Declaration: Ms Coetzee to please correct – both boxes are selected in Section 2.
2. Protocol: Inclusion criteria include students who identify as a female between 18-24 years of age who experience a regular menstrual cycle. Why is irregular menses an exclusion? What is considered irregular? This needs to be further unpacked. Would someone experiencing a period every second month, for example, be excluded?
3. Informed consent form:
 - a. Remove the section in red: There should be an option for participants to download the information leaflet and consent form.
 - b. Remove the section in italics: If your study involves children
4. Survey:
 - a. Should participants be aware of reverse scoring of items? If not, kindly remove (R) from survey questions.
 - b. Will participants be provided with their results? If so, consider including a statement indicating that those who score high wrt suicidality are

strongly encouraged to make contact with the organisations providing support/ the researcher for referral.

Please remember to use your project ID 25635 and ethics reference number S22/08/148 on any documents or correspondence with the HREC/UREC concerning your research protocol.

Translation of the consent document(s) to the language(s) applicable to your study participants should now be submitted to the HREC.

Please note that this decision will be ratified at the next HREC full committee meeting. HREC reserves the right to suspend approval and to request changes or clarifications from applicants. The coordinator will notify the applicant (and if applicable, the supervisor) of the changes or suspension within 1 day of receiving the notice of suspension from HREC. HREC has the prerogative and authority to ask further questions, seek additional information, require further modifications, or monitor the conduct of your research and the consent process.

After Ethical Review:

Please note you can submit your progress report through the online ethics application process, available at: <https://apply.ethics.sun.ac.za> and the application should be submitted to the Committee before the year has expired. Please see [Forms and Instructions](#) on our HREC website for guidance on how to submit a progress report.

The Committee will then consider the continuation of the project for a further year (if necessary). Annually a number of projects may be selected randomly for an external audit.

Provincial and City of Cape Town Approval

Please note that for research at a primary or secondary healthcare facility, permission must still be obtained from the relevant authorities (Western Cape Department of Health and/or City Health) to conduct the research as stated in the protocol. Please consult the Western Cape Government website for access to the online Health Research Approval Process, see: <https://www.westerncape.gov.za/general-publication/health-research-approval-process>. Research that will be conducted at any tertiary academic institution requires approval from the relevant hospital manager. Ethics approval is required BEFORE approval can be obtained from these health authorities.

We wish you the best as you conduct your research.

For standard HREC forms and instructions, please visit: [Forms and Instructions](#) on

our HREC website (www.sun.ac.za/healthresearchethics) If you have any questions or need further assistance, please contact the HREC office at 021 938 9677.

Yours sincerely,
Ms Brightness Nxumalo HREC 2 Coordinator

National Health Research Ethics Council (NHREC) Registration Number: REC-130408-012 (HREC1)-REC-230208-010 (HREC2)

*Federal Wide Assurance Number: 00001372
Office of Human Research Protections (OHRP) Institutional Review Board (IRB) Number: IRB0005240 (HREC1)-IRB0005239 (HREC2)*

The Health Research Ethics Committee (HREC) complies with the SA National Health Act No. 61 of 2003 as it pertains to health research. The HREC abides by the ethical norms and principles for research, established by the World Medical Association (2013). Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects; the South African Department of Health (2006). Guidelines for Good Practice in the Conduct of Clinical Trials with Human Participants in South Africa (2nd edition); as well as the Department of Health (2015). Ethics in Health Research: Principles, Processes and Structures (2nd edition).

The Health Research Ethics Committee reviews research involving human subjects conducted or supported by the Department of Health and Human Services, or other federal departments or agencies that apply the Federal Policy for the Protection of Human Subjects to such research (United States Code of Federal Regulations Title 45 Part 46); and/or clinical investigations regulated by the Food and Drug Administration (FDA) of the Department of Health and Human Services.

Appendix 3 – Electronic Informed Consent Form

PARTICIPANT INFORMATION LEAFLET AND CONSENT FORM FOR ONLINE SURVEYS/QUESTIONNAIRES

TITLE OF RESEARCH PROJECT: Examining the Relationship Between PMDD And Suicidal Behaviour, and the Effects of Childhood Abuse Among South African University Students

We would like to invite you to take part in a research project which involves the completion of an online questionnaire. Your participation is **entirely voluntary** and you are free to decline to participate or to stop completing the questionnaire at any time, even if you have agreed to take part initially. However, once you have submitted your completed questionnaire online, you will no longer be able to withdraw your responses as there will be no way of linking your responses back to you.

[This study aims to... / What is the study about?](#)

The purpose of this study is to explain the relationship exists between Premenstrual Dysphoric Disorder (PMDD) and suicidal behaviour among young women in South Africa, and if this relationship is affected by a history of childhood abuse. The study aims to screen young women for PMDD and suicidal behaviour to determine if having symptoms of PMDD and a history of childhood abuse are risk factors for suicidal behaviour.

If you agree to take part in this study, you will be asked to complete an online consent form. Following your agreement to participate in the study, you will be redirected to take part in the online survey which will have 4 sections: (1) demographic information, (2) PMDD symptoms, (3) a history of childhood abuse, (4) suicidal behaviour. The survey will take between 20-25 minutes to complete and can be accessed on any device able to connect to the internet. I will attempt to recruit a minimum of 232 female students from Stellenbosch University. If the necessary data is obtained before the recruitment target is reached, recruitment will be halted.

[You are being asked to participate because.../ Why are you being asked to participate?](#)

You have been recruited via an email list of all the female students at Stellenbosch University in order to invite you to participate in this study because you identify as a young woman who experiences a menstrual period. Another reason for your participation is because you are a registered student between age 18-24 at Stellenbosch University in South Africa, which means you form part of a population of which very little is known about in terms of premenstrual dysphoric disorder and suicidal behaviour

[If you agree to participate you will be requested to.../ What will participating in the study entail?](#)

Your first responsibility as a participant is to read and complete the consent form, agreeing to participate in the study. Following this, you will be asked to complete several surveys. You will be asked a few questions about your demographic information (such as your age, faculty of study etc.), followed by questions relating to your menstrual cycle, any traumatic childhood experiences (neglect, physical or sexual abuse, emotional abuse etc.), and suicide risk. Your only responsibility is to respond to all the questions as honestly and as accurately as possible. The survey will take approximately 20-25 minutes to complete.

[The potential benefits of this research are... / Will you benefit from taking part in this research?](#)

There are no direct benefits associated with participating in this study. As a token of appreciation of your time, you stand a chance to win 1 of 3 spa vouchers each to the value of R1000 by completing the survey, however, this is optional.

The potential risks involved in participating in this research are.../ Are there any risks involved in your taking part in this research?

This study is classified as high risk due to the sensitive and highly personal nature of some of the survey questions. However, it is not expected that this research will cause you any significant harm. You may stop participating at any point by closing the survey window. All of your survey answers will be kept anonymously, and the data collected will be treated with strict confidentiality. If you provide any contact details for the lucky draw, these remain separate from your responses to the survey questions and cannot be traced back to you.

The potentially sensitive nature of some of the survey content could result in you experiencing psychological distress. If however, you do feel distress please contact the researcher who can refer you for counselling. Alternatively, there will be resources, such as SU's Welgevallen student support services, made available after completing the survey should you feel the need to discuss your experiences. You will be reassured that you do not have to answer any questions that you are not comfortable answering. You will also be reminded that they can stop the interview at any point.

Your choice to not participate will be respected, and you will not waive any legal claims, rights or remedies because of your participation in this research. If you begin the survey and then decide not to participate, there will be a 'Quit' button on each page of the survey which will allow you to exit and discard your data at any point.

Any information you share on the survey or at any point during this study and that could possibly identify you as a participant will be protected. To ensure anonymity and confidentiality, each survey will be assigned a unique code that will not be traceable to the personal identity of any one participant. No personal or identifying information will be collected from you, and the survey platform removes the IP address and location information from all respondents. All data gathered from participants will be accessible only to the primary researcher and her supervisor, Dr. Rizwana Roomaney. The data will be shared via SU's OneDrive and protected by a password. After study completion, participant data will be kept for a period of 5 years before being destroyed.

Permission to have all anonymous data shared with journals:

The information collected for the study will possibly be published in research journals and potentially used in other future studies on this topic. However, participants' survey information will only ever be shared in the anonymised format. Most journals require us to share your anonymous data with them before they publish the results. Therefore, we would like to obtain your permission to have your anonymous data shared with journals.

You can phone the Principal Investigator of this study, Courtney Coetzee at 076 513 0650 or 21610878@sun.ac.za if you have any questions about this study or encounter any problems.

This study has been approved by the **Health Research Ethics Committee at Stellenbosch University**. The study will be conducted according to the ethical guidelines and principles of the international Declaration of Helsinki, and the Department of Health Ethics in Health Research: Principles, Processes and Studies (2015).

You can phone the Health Research Ethics Committee at 021 938 9677/9819 if there still is something that concerns you about how this study is being conducted, or if you have a complaint.

You will receive a copy of this information and consent form for you to keep safe.

By clicking START SURVEY

you are confirming that you are:

- over 18 years old;
- have read and understood the above explanation about the study; and
- you agree to participate.

You also understand that your participation in this study is strictly voluntary.

Tick the Option you choose for anonymous data sharing with journals:

I agree to have my anonymous data shared with journals during publication of results of this study

Signature_____

OR

I do not agree to have my anonymous data shared with journals during publication of results of this study

Signature_____

Appendix 4 – Permission Letters from Welgevallen Community Psychology Clinic



WELGEVALLEN COMMUNITY PSYCHOLOGY CLINIC

Department of Psychology, Stellenbosch University
Tel: 021 808 2696 Email: wpc@sun.ac.za Web: www.sun.ac.za/wpc

29/09/2022

RE: **Free Psychological Services**

The Welgevallen Community Psychology Clinic (WCPC) is a clinic offering free psychological services.

The clinicians delivering the service at WCPC are student psychologists in training, all working under the supervision of registered independent practicing Clinical/Counselling Psychologists. WCPC is offering in person as well as online therapy sessions during the Covid-19 pandemic.

This letter serves as confirmation that the clinic services are available to provide support to any research participants who may experience psychological distress during or due to participation in the research being conducted by Courtney Coetzee.

The abovementioned student is conducting this research in fulfilment of her MA Research Psychology at Stellenbosch University under the supervision of Dr Rizwana Roomaney, Department of Psychology at Stellenbosch University.

Her research title is: A Model of the Relationship between PMDD and Suicidal Behaviour, and the Effects of Childhood Abuse among South African University Students.

The researcher agrees to provide the clinic details to all research participants to ensure they are aware of the support available and are thus able to access the necessary support should the need arise. The service at Welgevallen is offered by Clinical Psychologists in training, and clients are allocated to a clinician based on clinician availability. Therefore, it is not possible to provide the registration number and names of clinician prior to referral.

Please do contact me for further information
Megan Snow
Lecturer: Psychology Department
Clinical Psychologist
Clinic Manager: Welgevallen Community Psychology Clinic

Appendix 5 – Permission Letter from Centre for Student Counselling and Development



Student Affairs
iMicimbi yaBafundi
Studentesake

Dear Ms Courtney Coetzee (St nr 21610878)

We take note of your study titled **“Examining the Relationship between PMDD and Suicidal Behaviour, and the Effects of Childhood Abuse among South African University Students.”**

Should the participants - namely SU registered students - of the abovementioned study require therapeutic intervention, they can phone the Unit for Psychotherapeutic and Support Services at 021 808 4994 during office hours (Stellenbosch Campus) and 021 938 9590 during office hours (Tygerberg Campus) or email supportus@sun.ac.za. ER24 services can be contacted for emergencies after hours at 010 205 3032.

Please contact me should you have any other queries. Good luck with your studies!

Kind regards

Elmarie Kruger

Acting Head: Unit for Psychotherapeutic and Support Services (UPSS)

Centre for Student Counselling and Development (CSCD)

Department of Student Affairs (DSAF)

Appendix 6 – Survey Questionnaire

Section 1: Demographic information

1. What is your age?
 - Options to select between 18 to 24
2. What faculty of study are you registered for at Stellenbosch University?
 - Options include AgriSciences, Arts and Social Sciences, Economic and Management sciences, Education, Engineering, Law, Medicine and Health Science, Military Science, Theology and Science
3. What is your year of study?
 - Options include 1st year, 2nd year, 3rd year, postgraduate
4. Do you live on Campus?
 - Yes/No
5. At what age did you experience your first menstrual period (age of menarche)?
 - Block to fill in
6. Have you been previously diagnosed with PMDD
 - Yes/No
7. Have you been previously diagnosed with another mental illness?
 - Yes/No

Section 2: PMDD screening: PSST

Please read each of the questions carefully and indicate whether you have experienced these symptoms **in the week prior to** your period for **most** of your menstrual cycles **in the last year**.

Question 1: Do you experience some, or any, of the following premenstrual symptoms which **start before** your period and **stop within a few days** of bleeding? Select the option which is

most appropriate. (Options to select from 1 to 4; 1 = not at all, 2= mild, 3 = moderate, and 4 = severe).

1. Anger/ irritability
2. Anxiety/tension
3. Tearful/ increased sensitivity to rejection
4. Depressed mood/hopelessness
5. Decreased interest in academic activities
6. Decreased interest in home activities
7. Decreased interest in social activities
8. Difficulty concentrating
9. Fatigue/lack of energy
10. Overeating/ food cravings
11. Insomnia (inability to sleep)
12. Hypersomnia (needing more sleep)
13. Physical symptoms (Example: breast tenderness, headaches, joint/muscle pain, bloating, weight gain)

Question 2: Have any of the symptoms listed above interfered with: (Options to select from 1 to 4; 1 = not at all, 2= mild, 3 = moderate, and 4 = severe).

1. Your academic work efficiency or productivity
2. Your relationships with friends and romantic partner (s)
3. Your relationships with your family
4. Your social life activities
5. Your home responsibilities

Section 3: Childhood abuse history: CTQ-SF

These questions ask about some of your experiences growing up as a child and a teenager. For each question, circle (or select in any other way if completing online) the number that best describes how you feel. Although some of these questions are of a personal nature, please try to answer as honestly as you can. Your answers will be kept confidential. (options will be given ranging from “Never true” to “Very often True” will be assigned corresponding numbers ranging from 1 to 5, according to Bernstein et al., (2003)).

When I was growing up...

Emotional Abuse

1. People in my family called me things like “stupid”, “lazy”, or “ugly”.
2. I thought that my parents wished I had never been born.
3. Someone in my family hated me.
4. People in my family said hurtful or insulting things to me.
5. I believe that I was emotionally abused.

Physical abuse

1. I got hit so hard by someone in my family that I had to see a doctor or go to hospital.
2. People in my family hit me so hard that it left me with bruises or marks.
3. I was punished with a belt, a board, a cord (or some other hard object).
4. I got hit or beaten so badly that it was noticed by someone like a teacher, neighbour, or doctor.
5. I believe that I was physically abused.

Sexual abuse

1. Someone tried to make me do sexual things or watch sexual things.
2. Someone tried to touch me in a sexual way or tried to make me touch them.
3. Someone molested me (took advantage of me sexually).
4. I believe I was sexually abused.

Emotional Neglect

1. I felt loved.
2. There was someone in my family who helped me feel important or special.
3. People in my family looked out for each other.
4. People in my family felt close to each other.
5. There was nothing I wanted to change about my family.
6. I had the best family in the world.
7. I had the perfect childhood

Physical Neglect

1. I knew that there was someone to take care of me and protect me.
2. I didn't have enough to eat.
3. My parents were too drunk or high to take care of the family.
4. I had to wear dirty clothes.

Section 4: Suicide risk questionnaire:

Interpersonal Needs Questionnaire. This section will ask you questions about how connected you feel to other people in your life and your feelings of being a burden to important people in your life. Indicate the extent to which each statement is true to how you feel recently. (7-point Likert scale with options ranging from 1= "Not true at all for me" to 7 = "Completely true for me").

1. Others care about me
2. I feel like I belong
3. I rarely interact with others who care about me
4. I have many supportive friends
5. I feel disconnected from others
6. I feel like an outsider at gatherings

7. I feel as if I have people I can turn to
8. I feel close to others
9. I have daily satisfying interactions with others
10. People would be better off if I were gone
11. People would be happier without me
12. I feel like I am a burden on society
13. My death would be a relief to others
14. I think they wish they could be rid of me
15. I make things worse for others

Acquired capability for suicide scale. This next part to section four will ask you questions relating to your general level of fearlessness and willingness to tolerate physical pain. Please indicate the extent to which the following statements are true for you (Options listed based on a 5-point Likert scale; 1= “not at all like me” to 5 = “very much like me”).

1. Things that scare most people do not scare me
2. The sight of my own blood does not bother me
3. I can tolerate more pain than most people
4. People describe me as fearless
5. The fact that I am going to die does not affect me
6. Killing animals in a science course would not bother me
7. It does not make me nervous when people talk about death
8. I am not disturbed by death being the end of life as I know it
9. I am not at all afraid to die
10. I like watching the aggressive contact in sport games
11. The best parts of hockey games are the fights
12. When I see a fight, I stop to watch

13. The sight of blood bothers me a great deal
14. The pain involved in dying frightens me
15. I am very much afraid to die
16. The sight of a dead body is horrifying to me
17. The prospect of my own death arouses anxiety in me
18. I avoid certain situations (Example: certain sports) because of the possibility of injury
19. I prefer to shut my eyes during the violent parts of movies
20. I could kill myself if I wanted to (even if you have *never* wanted to kill yourself, please answer this question).

Appendix 7 – Item statistics

7.1 PSST

Table 7.1.1

PMDD symptoms

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.34				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.87(0.86, 0.88)	0.87		
PS1			0.46	0.86
PS2			0.58	0.86
PS3			0.46	0.86
PS4			0.65	0.85
PS5			0.68	0.85
PS6			0.66	0.85
PS7			0.61	0.86
PS8			0.63	0.85
PS9			0.62	0.86
PS10			0.35	0.87
PS11			0.4	0.87
PS12			0.51	0.86
PS13			0.43	0.87

Table 7.1.2

PMDD impairment

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.51				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.83(0.82, 0.85)	0.83		
PI1			0.56	0.82
PI2			0.66	0.79
PI3			0.62	0.8
PI4			0.68	0.79
PI5			0.65	0.8

7.2 sf-CTQ

Table 7.2.1

Child abuse

variable	data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.45			
	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.77(0.75, 0.79)	0.79		
emotional abuse			0.7	0.67
physical abuse			0.55	0.73
sexual abuse			0.37	0.8
Emotional neglect			0.67	0.68
physical neglect			0.58	0.74

Table 7.2.2

Emotional abuse

variable	data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.61			
	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.89(0.87, 0.90)	0.89		
EA1			0.71	0.86
EA2			0.66	0.88
EA3			0.7	0.87
EA4			0.8	0.84
EA5			0.75	0.85

Table 7.2.3

Physical Abuse

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.55				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
PA1			0.55	0.82
PA2			0.77	0.73
PA3			0.54	0.84
PA4			0.69	0.78
PA5			0.75	0.74

Table 7.2.4

Sexual Abuse

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.83				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
SA1			0.85	0.94
SA2			0.88	0.93
SA3			0.89	0.93
SA4			0.89	0.93

Table 7.2.5

Emotional Neglect

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.65				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
EN1(reversed)			0.75	0.92
EN2(reversed)			0.67	0.92
EN3(reversed)			0.8	0.91
EN4(reversed)			0.81	0.91
EN5(reversed)			0.79	0.91
EN6(reversed)			0.82	0.91
EN7(reversed)			0.74	0.92

Table 7.2.6

Physical Neglect

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.35				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.64(0.58, 0.70)	0.68		
PN1(reversed)			0.41	0.61
PN2			0.47	0.54
PN3			0.42	0.58
PN4			0.51	0.57

7.3 INQ

Table 7.3.1

Thwarted belongingness

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.53				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.91(0.90, 0.91)	0.91		
BEL1(reversed)			0.7	0.9
BEL2(reversed)			0.75	0.89
BEL3			0.53	0.91
BEL4(reversed)			0.63	0.9
BEL5			0.67	0.9
BEL6			0.61	0.9
BEL7(reversed)			0.74	0.89
BEL8(reversed)			0.82	0.88
BEL9(reversed)			0.7	0.89

Table 7.3.2

Perceived burdensomeness

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.79				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.95(0.95, 0.96)	0.96		
BUR1			0.89	0.94
BUR2			0.9	0.94
BUR3			0.85	0.95
BUR4			0.87	0.95
BUR5			0.83	0.95
BUR6			0.82	0.95

7.4 ACSS

Table 7.4.1

Acquired capability for suicide

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.29				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.62(0.58, 0.65)	0.62		
General Fearlessness			0.46	0.51
Insensitivity to Sight			0.48	0.49
Fearlessness about Death			0.44	0.52
Enjoyment of Observed Violence			0.24	0.66

Table 7.4.2

General fearlessness

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.47				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.73(0.69, 0.75)	0.73		
ACS1			0.57	0.6
ACS3			0.5	0.69
ACS4			0.57	0.61

Table 7.4.3

Insensitivity to the sight of blood

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.43				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.69(0.65, 0.72)	0.69		
ACS2			0.52	0.57
ACS13(reversed)			0.59	0.47
ACS16(reversed)			0.4	0.73

Table 7.4.5

Fearlessness about death

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.58				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.90(0.89, 0.91)	0.9		
ACS5			0.76	0.88
ACS7			0.65	0.89
ACS8			0.73	0.88
ACS9			0.83	0.87
ACS14(reversed)			0.43	0.91
ACS15(reversed)			0.82	0.87
ACS17(reversed)			0.75	0.88

Table 7.4.5

Enjoyment of observed violence

data file: SEM Data Prof Kidd*\Spreadsheet Valid N:1218 Average inter-item corr.:0.50				
variable	Cronbach's Alpha (95% confidence interval)	Standardized alpha	Itm-Totl Correl.	Alpha if deleted
	0.74(0.71, 0.77)	0.75		
ACS10			0.58	0.63
ACS11			0.66	0.56
ACS12			0.47	0.77

Appendix 8 – CFA Measurement Model

