THE BEHAVIOURAL FEATURES OF GENERALIZED ANXIETY DISORDER DURING
THE PERINATAL PERIOD

THE BEHAVIOURAL FEATURES OF GENERALIZED ANXIETY DISORDER DURING THE PERINATAL PERIOD: IDENTIFICATION, ASSESSMENT, AND DIAGNOSTIC IMPLICATIONS

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TITLE: The behavioural features of generalized anxiety disorder during the perinatal period: Identification, assessment, and diagnostic implications

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Lay Abstract

Generalized anxiety disorder (GAD), primarily characterized by worry that is excessive and difficult to control, is a common mental health condition, particularly during pregnancy and the postpartum (perinatal) period. However, little research has been devoted to understanding the behavioural features of GAD, which are key components of other anxiety and related disorders. This dissertation explores the behaviours that perinatal individuals with GAD engage in, adapts and validates a self-report tool to measure GAD behaviours during the perinatal period, and evaluates whether asking about behaviour during diagnostic assessments improves our understanding of GAD. Our research suggests that perinatal individuals with GAD engage in a range of avoidance and safety behaviours to manage their distress, and that checking behaviours are particularly relevant. Continued research on the role of checking behaviours in GAD may be important for improving the diagnosis and treatment of GAD.

Abstract

Generalized anxiety disorder (GAD) is a leading mental health condition, associated with significant distress and impairment, especially during pregnancy and the postpartum (perinatal) period. However, GAD is a poorly defined mental health disorder, and research devoted to understanding its clinical features is lacking. While excessive and difficult to control worry is the defining feature of GAD, there is growing interest in understanding the role of behaviour. Extant literature alludes to the diagnostic, clinical, and theoretical importance of behaviours in GAD, however, systematic evaluation of the behavioural features of GAD and their bearing on GAD pathology is lacking, particularly during the perinatal period. This dissertation explores the behaviours that perinatal individuals with GAD engage in, in response to their worries, adapts and validates a self-report measure to assess GAD behaviours during the perinatal period, and evaluates the contribution of specific behaviours to our diagnostic understanding of GAD. This program of research suggests that perinatal individuals with GAD engage in a range of avoidance and safety behaviours to manage their distress. We also provide clinicians and researchers with a measure of GAD behaviours for use during the perinatal period to support continued evaluation of this phenomenon. Finally, our research highlights the importance of checking behaviours in perinatal individuals with GAD, with potential implications for theory and practice.

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Chapter 2: Study One

List of Abbreviations

APA: American Psychiatric Association

CFA: Confirmatory Factor Analysis

CFI: Comparative Fit Index

COREQ: Consolidated Criteria for Reporting Qualitative Research

DSM: Diagnostic and Statistical Manual of Mental Disorders

DSM-III: Diagnostic and Statistical Manual of Mental Disorders, Third Edition

DSM-III-R: Diagnostic and Statistical Manual of Mental Disorders, Third Edition, Revised Version

DSM-IV: Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition

DSM-5: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

DSM-5-TR: Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision

EFA: Exploratory Factor Analysis

EPDS: Edinburgh Postnatal Depression Scale

GAD: Generalized Anxiety Disorder

GAD-Q-IV: Generalized Anxiety Disorder Questionnaire for the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition

GAD-7: Generalized Anxiety Disorder 7-Item Scale

IUM: Intolerance of Uncertainty Model

MAP: Minimum Average Partial Test

MCM: Metacognitive Model

MDD: Major Depressive Disorder

MINI-DSM-5: Mini International Neuropsychiatric Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition

OCD: Obsessive-compulsive disorder

Pram: Pregnancy-related Anxiety

PSWQ: Penn State Worry Questionnaire

RA: Research Assistant

Redcap: Research Electronic Data Capture

RMSEA: Root Mean Square Error of Approximation

SJHH: St. Joseph's Healthcare Hamilton

STICSA: State-Trait Inventory for Cognitive and Somatic Anxiety

TLI: Tucker-Lewis Index

WBI: Worry Behaviors Inventory

WBI-A: Worry Behaviors Inventory, Avoidance Subscale

WBI-PR: Worry Behaviors Inventory–Perinatal Revised

WBI-SB: Worry Behaviors Inventory, Safety Behaviours Subscale

Y-BOCS: Yale-Brown Obsessive-Compulsive Scale

Declaration of Academic Achievement

This dissertation comprises three studies, each of which were led by the student (B. Inness). The student assisted in the conceptualization and design of study 1, including development of a qualitative interview guide. The student was also responsible for data collection, audio transcription, data analysis, and manuscript preparation of study 1. Co-author and principal investigator, Dr. Sheryl Green provided supervision throughout all stages of the project. Co-authors, Dr. Sheryl Green and Dr. Randi McCabe assisted with conceptualization, study design, and manuscript review. Study 1 is ***published*** in the journal **Psychology and Psychotherapy: Theory, Research and Practice.**

The student was primarily responsible for the conceptualization, study design, data analyses, and manuscript preparation for study 2. Co-author and principal investigator, Dr. Sheryl Green provided supervision throughout all stages of the project. Co-authors Dr. Sheryl Green, Dr. Randi McCabe, and Dr. David Streiner contributed to the conceptualization and study design of the project, in addition to manuscript review. Dr. David Streiner additionally aided in data analysis interpretation. Co-author, Emily Barrett assisted with data collection and manuscript review. Study 2 is ***published*** in the journal **Assessment.**

The student was responsible for conceptualization, study design, data analyses, and manuscript preparation for study 3. Co-author and principal investigator, Dr. Sheryl Green provided supervision throughout all stages of the project. Co-authors, Dr. Sheryl Green, Dr. Randi McCabe, and Dr. David Streiner contributed to conceptualization and manuscript review. Co-authors, Melissa Furtado, Bethany Easterbrook, and Alyssa Georgescu assisted with data collection and manuscript review. Study 3 is ***under review*** in the **Journal of Psychopathology and Behavioral Assessment.**

Chapter 1: General Introduction

Understanding the Role of Behaviour in Generalized Anxiety Disorder (GAD)

1.1   Overview

This chapter explores literature on behaviours associated with generalized anxiety disorder (GAD) both during and outside of the perinatal period. It highlights that despite potential phenomenological, theoretical, and diagnostic importance of behaviours in GAD, there has been little systematic investigation of such behaviours, particularly during the perinatal period.

1.2   Generalized Anxiety Disorder (GAD)

According to the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR), GAD is defined by excessive and difficult to control anxiety and worry (i.e., apprehensive expectation) about multiple topics, that occurs more days than not for at least six months [American Psychiatric Association (APA), 2022]. Individuals must also endorse three or more of six physical symptoms (feeling restless, keyed up, or on edge; fatigue; difficulty concentrating or mind going blank; irritability; muscle tension; and sleep disturbance). Finally, anxiety, worry or physical symptoms must be associated with significant distress or impairment, not be attributable to the physiological effects of a substance, and not be better explained by another mental disorder.

1.2.1   Prevalence and implications of GAD

Lifetime prevalence of GAD is approximately 4%, with a 12-month prevalence rate of about 2% (Kessler et al., 2012; Ruscio et al., 2017). The 12-month prevalence rate of GAD in Canada is comparable, at 2.5% (Pelletier et al., 2017). GAD is twice as common in females than males (Vesga-López et al., 2008), and is considered a disorder of adult onset. The average age of onset is 21 years (Bruce et al., 2005), with about 30% of cases beginning before the age of 20, 50% between the ages of 20-50 years, and 20% after age 50 (Kessler et al., 2012). GAD is a

chronic condition with high likelihood of recurrence. Longitudinal data suggest that over the course of 12-years, those with GAD spend approximately 74% of the time ill (Bruce et al., 2005). Further, the probability of recovery from GAD is 58%, with 45% of individuals later relapsing. Poorer prognosis has been linked to impaired family relationships, co-occurrence of other anxiety, mood, substance, and personality disorders, and being female (Weisberg, 2009). GAD has also been linked to occupational impairment, health, psychological distress, life satisfaction, and suicidal ideation comparable to that of major depressive disorder (Pelletier et al., 2017; Weisberg, 2009).

1.2.2   *The perinatal period*

The perinatal period is broadly defined as the period before and after childbirth; however, varying definitions of the perinatal period exist depending on the nature and setting of the research being conducted. The World Health Organization suggests that the perinatal period begins at 22 weeks' gestation and lasts until seven days postpartum (World Health Organization, n.d.). Further, the peripartum onset specifier within the DSM-5-TR highlights that a mood disorder must begin any time during pregnancy or within the first four weeks postpartum (APA, 2022). Other perinatal mental health researchers have defined the perinatal period as occurring during pregnancy and up to three (O'Hara & Wisner, 2014), six (Dennis et al., 2017), or 12 months postpartum (O'Hara et al., 2014). For the current dissertation, the perinatal period is defined as any time during pregnancy and up to six months postpartum, as six months postpartum has been used to define the end of the postpartum period in prevalence studies of perinatal individuals with GAD (Dennis et al., 2017).

1.2.3   *Prevalence and implications of GAD during the perinatal period*

The perinatal period represents a time of increased vulnerability to the onset and exacerbation of mental health difficulties (Munk-Olsen & Agerbo, 2015). Until recently, much of the scientific literature has focused on perinatal depression; however, anxiety disorders are now known to be at least as common as perinatal depression, with up to 20% of individuals meeting diagnostic criteria for one or more anxiety disorders during the perinatal period (Dennis et al., 2017; Fawcett et al., 2019). GAD is the most frequently diagnosed anxiety disorder during the perinatal period, affecting up to 4.1% of pregnant and 5.7% of postpartum individuals (Dennis et al., 2017). Outside of the perinatal period, the 12-month prevalence rate of GAD in females is 2.7% (Vesga-Lopez et al., 2008), suggesting that the perinatal period is associated with increased risk of GAD.

GAD occurring during the perinatal period has been linked to additional consequences for mothers and their offspring, including increased distress about the roles and responsibilities of parenthood, significant distress and interference in functioning (Ali, 2018), sexual fear and avoidance, and body dissatisfaction (Wenzel et al., 2005). Further, GAD during the perinatal period has been linked to reduced maternal responsivity during infant interactions, impaired ability to accurately identify infant emotional expression, infant withdrawal during social interaction, and reduced brain derived neurotrophic factor in utero (Goodman et al., 2016; Misri et al., 2015). More broadly, maternal anxiety has been linked to social and emotional deficits in children, leading to more difficult temperaments, increased behavioural reactivity, negative affectivity, reduced inhibitory control, and lower developmental age at two years (Misri et al., 2015).

1.3   The Clinical Features of GAD

1.3.1   Worry

GAD is primarily characterized by its cardinal feature, worry (APA, 2022). Worry is a cognitive process that typically occurs in the context of anxiety (Hazlett-Stevens et al., 2008). Worry has been described as a *"chain of thoughts and images, negatively affect-laden and relatively uncontrollable. The worry process represents an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes"* (Borkovec et al., 1983, p. 10). Here, worry is concerned with future events, associated with feelings of apprehension and tension, and used in an attempt to solve problems. More broadly, worry has been defined as a verbal-linguistic process, composed both of thought activity and mental images that occurs in response to problems that are perceived as threatening or uncertain. While worry is considered a normal and adaptive process at low levels (Davey et al., 1992), those with GAD spend a significant amount of time worrying, which can lead to distress and the perception that worry is uncontrollable (Hazlett-Stevens et al., 2008; Holaway et al., 2006). Further, those with GAD tend to report a greater breadth of worry topics than non-anxious controls, including greater worry about minor matters (e.g., being late for appointments) and the future (Hazlett-Stevens et al., 2008). Worry can also shift according to life context, as children have been shown to worry about peer rejection, and older adults report more worry about diminishing social networks, declining health, and end of life (Diefenbach et al., 2001; Silverman et al., 1995; Wisocki, 1988). Individuals with GAD have also been found to hold positive beliefs about the usefulness of worry (e.g., worry helps one cope; worry prevents bad things from happening; Freeston et al., 1994). Further, worry among individuals with GAD may be characterized by underlying fears of failure, inadequacy, and incompetence (Hazlett-Stevens et al., 2008).

1.3.1.1 Worry during the perinatal period

Few studies have explored the phenomenology of worry during the perinatal period. However, initial evidence suggests that worry content also tends to shift during this time. For example, Goldfinger and colleagues (2019) found that perinatal individuals with GAD reported more maternally focused worries than their non-perinatal, age-matched counterparts with GAD. Most commonly, perinatal individuals with GAD report worrying about their parenting ability, the health and wellbeing of their pregnancy and infant, coping with the stresses of parenthood, in addition to the health of themselves and their partners (Ali, 2018; Goldfinger et al., 2019; Green et al., 2021; Misri et al., 2015).

1.3.2   *Behaviours associated with GAD*

Research devoted to understanding the role of behaviour in GAD has largely been neglected. This may be attributed to the fact that worry itself has been conceptualized as a negatively reinforcing avoidance strategy aimed at reducing physiological and emotional arousal (Borkovec, 1994; Borkovec et al., 2004) and is, therefore, functionally equivalent to the behavioural responses observed in other anxiety and related disorders. However, in addition to cognitive processes, those with GAD also engage in behavioural strategies to manage their distress. For example, early research on GAD phenomenology described GAD as an "unsuccessful search for safety" associated with various risk avoidance, reassurance seeking, checking, cautious, and overprotective behaviours to gain or maintain a sense of safety, although often providing unsuccessful or short-lived reductions in distress (Woody & Rachman, 1994, p. 743). Several case studies have also highlighted the role of behaviours in GAD. Robichaud (2013) describes an individual who engages in reassurance seeking and information gathering in response to worries about making the correct decision; refuses to delegate tasks to ensure that tasks are completed correctly; repeatedly checks work emails; and sticks to strict routines and

schedules to avoid change. Further, Orsillo and colleagues (2003) highlight avoidance of anxiety-evoking activities related to relationship and financial worries and frequent medical testing in response to worries about health, in individuals with GAD. As such, it appears that behaviour has long been relevant to the phenomenology and clinical presentation of GAD.

Over the years, these behaviours have also been captured empirically. Townsend and colleagues (1999) administered the Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) to a sample of 78 individuals ($n = 27$ with GAD) and found that although those with GAD reported fewer types of behaviours than those with obsessive-compulsive disorder (OCD), those with GAD and OCD engaged in behaviours at a comparable rate. Those with GAD were also most likely to report engaging in checking behaviours. Further, Schut and colleagues (2001) examined rates of obsessions and compulsions in 107 participants with a principal diagnosis of GAD using the Anxiety Disorder Interview Schedule – Revised (DiNardo et al., 1994) and found that 25% of the sample reported engaging in compulsions, most commonly checking. Building on this research, Coleman and colleagues (2011) attempted to identify differences in checking behaviours between those with symptoms of GAD and OCD. They found that individuals with GAD were more likely to report interpersonal checking (i.e., reassurance seeking), as opposed to object checking (Coleman et al., 2011).

Evidence for engagement in behaviours other than checking has also been documented. Beesdo-Baum and colleagues (2012) examined the role of behaviours in 56 patients with GAD participating in a randomized controlled trial and 33 healthy controls. Participants were given a list of behaviours and asked to rate how often they engaged in each behaviour to control worry over the past week. GAD participants were found to engage in situational avoidance, reassurance seeking, and acting carefully more frequently than those without GAD. Further, Mahoney and

colleagues (2016), in their development of the Worry Behaviors Inventory (WBI)–a self-report measure of GAD behaviours–found that individuals with GAD reported engaging in controlling behaviours, overpreparation, planning, hypervigilance, behavioural avoidance, information seeking, repeated checking, and delayed decision making in response to worries. Further, item-level analyses of the WBI revealed that those with GAD typically engaged in four to five behaviours to manage worry, and hypervigilance (i.e., *I keep a close watch for anything bad that could happen*), checking (i.e., *I check to make sure nothing bad has happened or that everything is OK*), and situational avoidance (i.e., *I avoid saying or doing things that worry me*) were most common (Mahoney et al., 2018). Emerging evidence also suggests that greater GAD symptom severity is associated with greater engagement in negative urgency (Malivoire et al., 2019; Pawluk & Koerner, 2016), the tendency to respond impulsively and rashly in response to emotional distress (Whiteside & Lynam, 2001).

1.3.2.1 Behaviours associated with GAD during the perinatal period

Few studies have explored behaviours associated with GAD during the perinatal period; however, preliminary research suggests that perinatal individuals with GAD engage in comparable behaviours to those with GAD in the general population. In a secondary analysis of data from a randomized controlled trial, Green and colleagues (2021b) evaluated behaviours associated with GAD during the perinatal period. They found that perinatal individuals with GAD engaged in avoidance and safety behaviours, as measured by the WBI (Mahoney et al., 2016), and that behaviour severity was positively related to worry symptom severity, such that higher levels of worry were associated with higher levels of behaviour endorsement (Green et al., 2021b). This suggests that behaviour and worry are likely functionally related. A few qualitative studies have explored the experience of perinatal anxiety and depression, more broadly. These

studies document engagement in various behaviours during the perinatal period such as repeated checking of infant breathing, avoidance and withdrawal from social interactions and outings, and overprotective behaviours (Highet et al., 2014; Oh et al., 2020).

1.4   Behaviour in Contemporary Models of GAD

Historically, GAD has been described as the most poorly defined anxiety disorder (Olantunji et al., 2010). While there has been an uptick in GAD-related publications since this initial declaration (Asmundson & Asmundson, 2018), challenges with the integration and synthesis of GAD theory remain, as several theoretical models of GAD exist, with overlapping and distinct components (Behar et al., 2009; Koerner et al., 2020). The Avoidance Model of Worry (Borkovec et al., 1998; Borkovec et al., 2004) was one of the first theoretical models of GAD and stemmed from research suggesting that GAD-type worry consisted mainly of thoughts over images (Borkovec & Inz, 1990); this became the central tenet of the model. More specifically, Borkovec and colleagues (1998; 2004) suggested that individuals with GAD attempt to avoid and suppress anxious arousal by worrying, which activates thoughts and images that are vague and abstract, but inadvertently precludes emotional processing (Borkovec et al., 1998; Borkovec et al., 2004). In this model, the worry process is hypothesized to be reinforced through reductions in emotional and physiological arousal. While some studies have shown that worry appears to reduce arousal (Hoehn-Saric & McLeod, 1998; Lyonfields et al., 1995; Thayer et al., 1996), worry has also been shown to intensify and prolong negative emotionality (Brosschot et al., 2005; 2006; 2007; Pieper & Brosschot, 2005; Llera & Newman, 2017), which contradicts the central component this model. Nonetheless, the Avoidance Model was the catalyst for the development of several other theoretical models of GAD (Koerner et al., 2020), likely dissuading

research on GAD's overt behavioural features, as worry itself is conceptualized to function as a behaviour in this model.

While overt behaviours are acknowledged in other theoretical models of GAD, behaviour is not a central component, nor is it theorized to be as important as in other anxiety and related disorders. The Metacognitive Model (Wells, 1995; 1999; 2004; 2005) suggests that anxiety-evoking situations trigger positive beliefs about worry (e.g., 'worry helps me cope'). With continued worrying, however, negative beliefs about worry are activated (e.g., worry is uncontrollable). These negative beliefs lead to ineffective cognitive (e.g., worry suppression) and behavioural strategies (e.g., avoidance, checking, reassurance seeking) aimed at controlling worry and reducing distress that inadvertently reinforce beliefs about the dangerousness and uncontrollability of worry (Wells, 1999).

The Intolerance of Uncertainty Model (IUM) posits that some individuals find novel or ambiguous situations distressing, leading to worry (Dugas et al., 1995; 1998; 2004; Freeston et al., 1994). Here, individuals hold positive beliefs about the usefulness of worry (e.g., worry leads to more effective coping; worry can prevent negative events from occurring). Worry is also associated with negative problem orientation (i.e., thoughts and emotions about one's ability to effectively solve problems) and cognitive avoidance (e.g., attempts to suppress and distract from upsetting thoughts), which serve to further reinforce worry through avoidance of arousal (Dugas & Koerner, 2005). While overt behaviours are not cited as a central component in the IUM, it is acknowledged that people respond to uncertainty with a set of "cognitive, emotional, and behavioural reactions" (Dugas et al., 1998, p. 216). In an updated IUM (Hebert et al., 2019), behavioural features are more explicitly recognized, as novel, ambiguous and unpredictable situations are thought to trigger catastrophic misinterpretations of uncertainty, leading to

cognitive, emotional, and behavioural (e.g., avoidance, reassurance seeking, researching) attempts to cope with distress.

Developers of the Acceptance-Based Model of GAD (Roemer & Orsillo, 2002; 2005) recognized that avoidace of distressing internal experiences was common across each of the aforementioned models. As such, the Acceptance-Based Model posits that external threats lead to internal experiences that are intolerable for those with GAD, resulting in experiential and behavioural avoidance (Roemer & Orsillo, 2002). Finally, the Emotion Regulation Model (Mennin et al., 2004) conceptualizes GAD as a disorder of emotion dysregulation. Here, individuals experience emotional hyperarousal, poor understanding of emotions, and negative attitudes about emotions, leading to ineffective attempts to cope with emotions, including cognitive and behavioural avoidance. In summary, while avoidance of distressing internal experiences is a key component that unifies the five main theoretical models of GAD, it is often theorized that overt behaviours, may be used to avoid and reduce uncomfortable internal experiences. However, because behaviours have been sidelined in many theoretical models of GAD, their specific process, function, and centrality remains unclear.

1.4.1 *Evidence for the relation between behaviour and cognitive processes in GAD*

It is clear from the research presented above that individuals with GAD not only engage in avoidance and safety behaviours, but that many theorists recognize the role of behaviour in GAD pathology. However, few studies have examined the relations between cognitive and behavioural processes in GAD. This is likely due to the lack of measures that assess GAD behaviours, as the first comprehensive self-report measure of GAD behaviours was not developed until 2016 (Mahoney et al., 2016). Nonetheless, there is some empirical support for the role of behaviour in the maintenance of GAD, with several studies highlighting relations

between cognitive processes and behavioural responses. For example, intolerance of uncertainty has been linked to information seeking behaviours (Rosen & Knäuper, 2009) and negative urgency has been linked to negative problem orientation, cognitive inflexibility, and poor attentional control (Malivoire et al., 2019). Further, significant positive relations have been found between behaviour (as measured by the WBI; Mahoney et al., 2016) and cognitive avoidance, worry, and fear of emotion (Marcotte-Beaumier et al., 2021). Mahoney and colleagues (2018) also demonstrated that behaviour (as measured by the WBI; Mahoney et al., 2016) mediated the relation between various cognitive processes (i.e., intolerance of uncertainty, meta-worry, cognitive avoidance) and GAD symptoms. A bidirectional relation between worry and behaviour (as measured by the WBI; Mahoney et al., 2016) has also been demonstrated in perinatal samples with GAD (Green et al., 2021b). Finally, Beesdo-Baum and colleagues (2012) demonstrated that greater engagement in avoidance and safety behaviours at post-treatment was associated with worse long-term outcomes for individuals with GAD, suggesting that behaviour may maintain GAD symptoms and be an important diagnostic marker.

1.5   Classification of GAD in the Diagnostic and Statistical Manual of Mental Disorders (DSM)

1.5.1   *Limitations of the diagnostic category of GAD in the DSM*

GAD has been a contentious diagnostic category since its inception, and the autonomy of GAD as a standalone disorder has been widely debated due to high comorbidity with other anxiety and mood disorders and its non-specific features. While the phenomenology of what is now considered GAD has been described by physicians since the late 18th century (Crocq, 2017), it was not until the publication of the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM-III) in 1980 that the diagnostic category of GAD was born (APA, 1980). At

the time, GAD was considered a residual diagnosis and was only used when criteria for other anxiety disorders were not met (Hazlett-Stevens et al., 2008). In DSM-III, diagnosis of GAD required endorsement of generalized, persistent worry occurring for one or more months, in addition to an unspecified number of symptoms from three of four domains (motor tension; autonomic hyperactivity; apprehensive expectation; vigilance and scanning; APA 1980).

In 1987, with the publication of the revised version of the Diagnostic and Statistical Manual of Mental Disorders, Third Edition (DSM-III-R; APA, 1987), the diagnostic criteria of GAD were largely amended, partly due to challenges differentiating GAD from other anxiety and mood disorders, leading to low diagnostic reliability (e.g., Di Nardo et al., 1983). In DSM-III-R, GAD became an independent diagnosis rather than a residual category (Hazlett-Stevens et al., 2008). Endorsement of 'generalized persistent worry' was changed to "unrealistic excessive anxiety and worry about two or more life circumstances" (Crocq, 2017). The duration of the disorder changed from one month to six months, as this led to reduced co-occurrence with mood disorders, and endorsement of six or more of 18 somatic symptoms were needed (Crocq, 2017). However, low diagnostic reliability remained (Di Nardo et al., 1983; Mannuzza et al., 1989; Williams et al., 1992).

During the transition from DSM-III-R to the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV), additional changes to the criteria of GAD were introduced in the hopes of improving its diagnostic reliability. First, greater emphasis was placed on the "uncontrollability" of worry, with the requirement that individuals must find anxiety and worry 'difficult to control' (APA, 1994). This was based on emerging research showing that the 'uncontrollability' of worry is what distinguished those with GAD from their non-anxious counterparts (Crocq, 2017; Hazlett-Stevens, 2008). Second, revisions were made to the list of

somatic symptoms, as those with GAD infrequently endorsed symptoms associated with autonomic hyperactivity (Hazlett-Stevens, 2008) and thus, endorsement of three or more of six symptoms was required. These changes led improved diagnostic reliability of GAD but remained among the lowest of the anxiety disorders (Brown et al., 2001).

While GAD reflects other psychiatric disorders with respect to changing definitions and queries of reliability and validity, several problems specific to the diagnostic category of GAD remain. First, none of the diagnostic features of GAD are specific to the disorder. For example, worry and anxiety are transdiagnostic processes observed across mood and anxiety disorders (APA, 2022; Ehring & Watkins, 2008; Kertz et al., 2012; Olantunji et al., 2010) and many accompanying symptoms of GAD (e.g., sleep disturbance, concentration difficulties) are symptoms of mood disorders (APA, 2022). This symptom overlap has led to challenges discriminating GAD from other disorders, particularly mood disorders (Brown et al., 2001; Lawrence & Brown, 2008). Further, GAD is the only anxiety and related disorder that does not include behaviour in its diagnostic criteria (APA, 2022). The absence of behavioural markers in the diagnostic criteria of GAD may contribute to issues with diagnostic reliability, as interrater agreement of anxiety disorders tends to be highest when clear behavioural markers are included in the diagnostic definition (Brown et al., 2001).

To increase detection and recognition of GAD, several proposed changes were recommended for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5), one of which was the inclusion of a behavioural criterion. Here, endorsement of one or more behaviours (i.e., avoidance, overpreparation, reassurance seeking, procrastination) would be required to receive a diagnosis of GAD. However, questions were raised about the specificity of these behaviours to GAD and the lack of available measures to assess these behaviours. As

such, the behavioural criterion was not implemented, and notwithstanding minor wording changes, the present DSM-5-TR criteria of GAD remains unchanged from DSM-IV (APA, 1994; APA 2022).

1.5.2   Behaviours in the classification of GAD

Few studies have evaluated the role of behaviour in the classification and diagnosis of GAD, resulting in mixed evidence. Brown and Tung (2018) evaluated the contribution of the proposed DSM-5 behaviour criterion (i.e., endorsement of one or more avoidance, overpreparation, reassurance seeking, procrastination behaviours) to the diagnostic category of GAD. In a large sample of 800 outpatients with emotional disorders ($n = 366$ with GAD), 95% of patients with GAD endorsed one or more behavioural symptoms, and at a rate significantly higher than the other patient groups (Brown & Tung, 2018). Endorsement of one or more behavioural symptoms was also associated with increased severity of GAD symptoms, and each of the proposed behaviours significantly predicted GAD diagnostic status beyond existing features of the disorder, albeit marginally. However, the proposed behavioural criterion did not improve the diagnostic reliability of GAD (Brown & Tung, 2018). Marcotte-Beaumier and colleagues (2021) similarly evaluated the contribution of behaviours to GAD symptoms in a sample of 113 community participants with high worry. They found that behaviours, as measured by the WBI (Mahoney et al., 2016), did not significantly predict GAD symptoms after controlling for cognitive avoidance. Differences in outcomes between these two studies may be attributed to the samples (i.e., outpatient versus community settings) and measures used (i.e., diagnostic assessment versus self-report questionnaire to assess behaviours and GAD). Other evidence suggests that hypervigilance, checking, and avoidance behaviours may be particularly

relevant to GAD (Mahoney et al., 2018). However, the contribution of these behaviours to the classification of GAD has not yet been established.

1.6   Conclusions and Aims of Current Research Program

It is evident from this chapter that individuals with GAD engage in various behaviours to manage their distress. However, little is known about the specific behaviours that individuals with GAD engage in, particularly during the perinatal period, when GAD is twice as common. This is likely due to a lack of available measures that assess GAD behaviours, which has precluded evaluation of the role of behaviours in GAD pathology and their contribution to the diagnosis. As such, the current program of research aims to fill these gaps by: 1) identifying the behaviours that perinatal individuals with GAD engage in, in response to worry using qualitative methodology; 2) adapting and validating a clinically meaningful self-report measure to assess behaviours associated with GAD during the perinatal period; and 3) evaluating if the inclusion of specific behaviours in the diagnostic criteria of GAD leads to improved understanding, detection, and diagnostic reliability of GAD during the perinatal period.

Chapter 2: Study One

Problematic behaviours associated with generalized anxiety disorder during pregnancy and the

postpartum period: A thematic analysis

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2.1   Abstract

Generalized anxiety disorder (GAD) is the most common anxiety disorder in pregnancy and the postpartum (perinatal) period. Perinatal women with GAD engage in problematic behaviours, yet the focus and function of these behaviours remain unknown. *Objective:* Given that worry during the perinatal period is largely maternally focused, the objective of this study was to explore the accompanying behavioural features of GAD during pregnancy and the postpartum period. *Design:* A qualitative study was conducted. *Methods:* Twenty-five pregnant ($n = 10$) and postpartum ($n = 15$) women were recruited through clinical referrals and the Hamilton community. Following the completion of a semi-structured diagnostic interview and symptom measures, participants participated in one of seven focus groups to learn about behaviours utilized in response to their worries. A thematic analysis was conducted to identify behaviour themes and subthemes in pregnant and postpartum women. *Results:* Five behaviour themes and 12 subthemes were identified. Specifically, participants endorsed engaging in excessive reassurance seeking, checking and repeating, overcontrol, overpreparation, and avoidance behaviours. *Conclusions:* Our results confirm that perinatal women with GAD engage in comparable problematic behaviours to those with GAD in the general population, yet the presentation, frequency, and focus of those behaviours differ. These findings have implications for theoretical formulations of GAD, as well as the clinical management of this disorder during the perinatal period.

Keywords: Pregnant, Postpartum, Behaviour, Worry, Generalized Anxiety Disorder

2.2   Background

Generalized anxiety disorder (GAD)–characterized by excessive worry–is one of the most frequently diagnosed anxiety disorders during pregnancy and the postpartum (perinatal)

period, affecting 4.1%– 5.7% (Dennis et al., 2017) of women. When left untreated, perinatal GAD is associated with adverse outcomes for mothers and their infants including significant distress and impairment in women (Ali, 2018), impaired mother–infant interactions (Stein et al., 2012) and reduced emotional reactivity and neurodevelopment in offspring (Uguz et al., 2013).

Given that worry is a defining feature of GAD (APA, 2013), various worry domains have been established to capture common worries reported in GAD (Di Nardo et al., 1994). While these worry domains appear consistent across the lifespan, the content of worry within these domains often reflects the current context of one's life (Constans et al., 2002; Correa & Brown, 2018; Diefenbach et al., 2001). For instance, although children and elderly adults both worry about social relationships and their health, children tend to worry about peer rejection and receiving medical care (Silverman et al., 1995), whereas elderly adults tend to worry about diminishing social networks and declining health (Wisocki, 1988). The perinatal period is no exception, as worry content tends to be maternally focused (Goldfinger et al., 2020; Phillips et al., 2009), with these women reporting significantly more baby- and parenting-related worries than age-matched non-perinatal controls (Goldfinger et al., 2020). While recent efforts have been made to characterize the worry content of perinatal women, the behavioural features of GAD have been largely overlooked.

Unlike other anxiety disorders, behaviour is not recognized as a diagnostic feature of GAD (APA, 2013). Consequently, leading theoretical models of GAD do not effectively outline the role of behaviour in the maintenance of this disorder (Behar et al., 2009). For instance, the Intolerance of Uncertainty Model (IUM; Dugas et al., 1998) suggests that those with GAD worry about uncertain situations and hold positive beliefs about the usefulness of worry, leading to poor problem orientation (i.e., negative beliefs about problems and one's ability to solve them) and

cognitive avoidance (i.e., avoidance of distressing thoughts and feelings), both of which maintain GAD symptoms. While components of the IUM have received empirical support (Behar et al., 2009), this model largely fails to acknowledge the role of behaviour in GAD. Other models of GAD, such as the Metacognitive Model (MCM; Wells, 1999), suggest that problematic behaviours are used in an attempt to avoid worrying about worrying (i.e., meta-worry). However, this conceptualization is inconsistent with emerging evidence, as those with GAD appear to engage in problematic avoidance (e.g., situational avoidance, procrastination, partial commitment) and safety behaviours (e.g., excessive checking, reassurance seeking, preparation, control; Beesdo- Baum et al., 2012; Coleman et al., 2011; Mahoney et al., 2016), in an attempt to prevent and control the feared outcomes of their worries, more generally (e.g., calling a loved one repeatedly to ensure their safety), rather than preventing and controlling their meta-worries, more specifically. These problematic behaviours have, in turn, been found to contribute to the maintenance and severity of GAD symptoms (Mahoney, Hobbs, Newby, Williams, Sunderland, & Andrews, 2018b; Mahoney, Hobbs, Williams, Andrews, & Newby, 2018a).

Regarding perinatal samples, research on problematic behaviours is limited. A recent study by our group demonstrated that perinatal women with GAD also engage in problematic avoidance and safety behaviours that contribute to the maintenance of GAD symptoms (Green et al., 2021). However, the focus and function of these behaviours remain unknown. Given that worry is often temporally unique and little research has been devoted to understanding the role of behaviour in GAD, resulting in absent and inaccurate theoretical conceptualizations of its behavioural features, this study sought to identify and characterize the problematic behaviours that accompany maternally focused worry in pregnant and postpartum women with GAD. A

better understanding of the focus and function of problematic behaviours will support the refinement of theoretical formulations of GAD and the clinical management of this disorder.

2.3   Method

2.3.1   Design

We conducted a qualitative study to obtain an in-depth understanding of the problematic behaviours reported by perinatal women with GAD. The consolidated criteria for reporting qualitative research were followed (COREQ; Tong et al., 2007).

2.3.2   Participants and Procedures

A purposeful sample of 25 pregnant ($n = 10$) and postpartum ($n = 15$) women were recruited through clinical referrals (68%) at the Women's Health Concerns Clinic, St. Joseph's Healthcare Hamilton and advertisements (32%) in the Hamilton community. Participants were recruited until saturation was reached (i.e., until no new content emerged during participant interviews; Streiner et al., 2015). All study procedures were approved by the Hamilton Integrated Research Ethics Board. Interested participants were contacted by telephone and pre-screened to determine that they were: (1) pregnant or within 6 months postpartum, (2) 18 years of age or older and (3) experiencing GAD symptoms. Eligible and consenting participants were scheduled for an audio-video zoom visit, in which the Mini International Neuropsychiatric Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (MINI-DSM-5; version 7.0.2; Sheehan et al., 1998) was administered to confirm a primary diagnosis of GAD, with or without comorbid mood and anxiety disorders. Assessments were conducted by the first author (BI), a female PhD psychology student, and diagnoses were confirmed by a licensed psychologist. Participants also completed demographic and symptom measures and were scheduled to participate in a 60-to-90-minute focus group.

2.3.3   Focus Groups

Seven focus groups, consisting of 3-4 participants were conducted via Zoom by the first author (BI), who has extensive experience conducting semi-structured and contextual interviews. Interviews were conducted between September 2020 and July 2021. A trained research assistant (RA) was present during focus groups and took field notes. Researchers had no prior working relationships with participants. Participants were informed that the interviewer was a PhD student in psychology. Six open-ended questions were developed to learn more about the behaviours that perinatal women engage in, in response to their worries, as well as the frequency and severity of endorsed behaviours. During each focus group, participants were asked: (1) *What has been your experience with pregnancy/motherhood so far?* (2) *What have you worried about since becoming pregnant/a mother?* (3) *When you worry about [endorsed maternally focused worry], do you do or say anything in response to that worry?* (4) *How often do you engage in that [endorsed behaviour]?* (5) *What impact do these [endorsed behaviours] have on your life?* (6) *How does engaging in these behaviours make you feel?* Probes were used as needed to elicit further information. Focus groups were audio-recorded, transcribed verbatim by RAs and reviewed by the first author (BI).

2.3.4   Measures

Demographic and health review form. The demographic and health review form included questions related to age, ethnicity, marital status, education, parity, medication and treatment history.

Worry Behaviors Inventory (WBI). The WBI is a 10-item self-report measure that assesses the frequency of problematic behaviours associated with worry (Mahoney et al., 2016). Each item is scored on a 5-point scale ranging from 0 ('none of the time') to 4 ('all of the time').

The WBI consists of two subscales: the avoidance subscale (WBI- A), which assesses behavioural avoidance; and the safety behaviours subscale (WBI- SB), which assesses behaviours such as repeated checking, reassurance seeking, overpreparation and control. A cut-off score of 17, 7 and 11 or higher has been suggested for detection of a probable GAD diagnosis in the full scale, WBI-A and WBI-SB, respectively (Mahoney et al., 2016). The WBI has demonstrated good reliability and discriminative validity, and is sensitive to treatment effects (Mahoney, Hobbs, Newby, Williams, Sunderland, & Andrews, 2018b). The internal consistency of the WBI in this sample for the full scale, WBI-A and WBI-SB was $\alpha = .70$, $\alpha = .40$ and $\alpha = .69$, respectively.

State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). The STICSA is a 21-item self-report scale assessing cognitive and somatic anxiety (Grös et al., 2007). Items are scored on a 4-point scale ranging from 1 ('not at all') to 4 ('very much so'). The STICSA has demonstrated excellent validity and reliability (Grös et al., 2007). A cut-off score of 43 or higher on the STICSA has been determined for the detection of an anxiety disorder (Van Dam et al., 2013). The STICSA has been validated for use in clinical samples of adults with anxiety disorders (Grös et al., 2007), although not explicitly in perinatal samples. The internal consistency of the STICSA in this sample was $\alpha = .90$.

Penn State Worry Questionnaire (PSWQ). The PSWQ is a 16-item self-report measure that assesses the tendency to worry (Meyer et al., 1990). Items are scored on a 5-point scale ranging from 1 ('not typical at all') to 5 ('very typical'), with higher scores reflecting greater pathological worry. A cut-off score of 62 or higher has been suggested for determining a probable GAD diagnosis (Behar et al., 2003). The PSWQ has demonstrated excellent internal

consistency and validity across various populations (Brown et al., 1992; Voegtline et al., 2021). The internal consistency of the PSWQ in the current sample was $\alpha = .85$.

Edinburgh Postnatal Depression Scale (EPDS). The EPDS is a 10-item self-report measure that assesses depression in perinatal women (Murray & Cox, 1990). Items are scored on a 4-point scale ranging from 0 to 3, with higher scores reflecting greater depressive symptoms (Cox et al., 1987). The EPDS has demonstrated good sensitivity and specificity for a diagnosis of Major Depressive Disorder (MDD). Cut-off scores of 15 and 13 or higher have been proposed for determining a probable MDD diagnosis during pregnancy and the postpartum period, respectively (Matthey et al., 2006). The internal consistency of the EPDS in this sample was $\alpha = .76$.

2.3.5   Data Analysis

2.3.5.1 Statistical Analysis

Means and percentages (for continuous variables) and means and standard deviations (for discrete variables) are reported for relevant demographic, psychological and symptom scores for both pregnant and postpartum participants, to better characterize the sample. Descriptive statistics were performed using IBM SPSS Statistics 27 software (IBM Corp., 2020).

2.3.5.2 Qualitative Analysis

A thematic analysis, as outlined by Braun and Clarke (2006), was conducted to identify problematic behaviour themes and subthemes. In accordance with phase one of thematic analysis (i.e., data familiarization), the first author (BI), RA1 and RA2 familiarized themselves with the data and then independently reviewed the transcribed focus groups. Phrases and sentences related to problematic behaviours were identified by the first author (BI), RA1 and RA2, and each independently generated a list of initial codes. In phase two (i.e., preliminary code

generation), initial codes were identified, compared and then combined to create themes and subthemes (i.e., phase three: identifying themes). In phase four (i.e., reviewing themes), themes and subthemes were refined, cross-checked by the remaining authors and discussed until consensus was reached, allowing for discussion of similar and dissimilar interpretations of the data. Following consensus and during phase five (i.e., defining and naming themes), a codebook was generated, which included defined themes, subthemes and supportive quotes. The first author (BI) and RA1 coded the remainder of the focus groups, which were periodically reviewed by the remaining authors to resolve discrepancies in the interpretation of findings.

2.4   Results

2.4.1   Participant Characteristics

Participant demographics and characteristics for pregnant and postpartum participants are reported in Table 1. Scores on relevant symptom measures for pregnant and postpartum participants are reported in Table 2. Both groups scored above the recommended clinical cut-offs on each measure (except for the WBI-A for pregnant and postpartum participants, and the EPDS for pregnant participants).

Table 1

Demographics and Characteristics of Pregnant (n=10) and Postpartum (n=15) Participants.

	Pregnant	Postpartum
Age, **M(SD)**[†]	33.11 (4.19)	29.47 (3.72)
Weeks pregnant / postpartum, **M(SD)**	23.60 (7.91)	15.60 (7.07)
	n (%)	**n (%)**
First child		

Yes	5 (50.00)	10 (66.67)
No	5 (50.00)	5 (33.33)
Recruitment Source		
Clinical Referral	3 (30.00)	14 (93.33)
Community	7 (70.00)	1 (6.67)
Ethnicity		
Caucasian	7 (70.00)	13 (86.67)
African American	1 (10.00)	0 (0.00)
Asian/Pacific Islander	1 (10.00)	0 (0.00)
Hispanic	0 (0.00)	1 (6.67)
Other	1 (10.00)	1 (6.67)
Marital status		
Single	0 (0.00)	1 (6.67)
Married/Common-Law	10 (100.00)	13 (86.67)
Separated	0 (0.00)	1 (6.67)
Highest education		
High school	1 (10.00)	0 (0.00)
Some college / university	1 (10.00)	1 (6.67)
College	1 (10.00)	7 (46.47)
Bachelor's Degree	2 (20.00)	6 (40.00)
Master's Degree	3 (30.00)	0 (0.00)
Professional Degree	0 (0.00)	1 (6.67)
Other	2 (20.00)	0 (0.00)

Comorbid diagnoses[‡]	2 (20.00)	7 (46.67)
Mood Disorders[§]	2 (20.00)	5 (33.33)
Anxiety and Related Disorders[¶]	2 (20.00)	4 (26.67)
Psychotropic medication use	2 (20.00)	6 (40.00)

[†]One pregnant participant did not disclose their age (*n*=9); [‡]One pregnant and three postpartum participants had more than one comorbid diagnosis; [§]Mood disorders = Major Depressive Disorder (*n*=6), Persistent Depressive Disorder (*n*=1), Bipolar I Disorder, Current Episode Depressed (*n*=1); [¶]Anxiety and Related Disorders = Agoraphobia (*n*=2), Panic Disorder (*n*=1), Specific Phobia (*n*=1), Social Anxiety Disorder (*n*=1), Obsessive-Compulsive Disorder (*n*=1).

2.4.2   *Thematic Analysis*

Our thematic analysis revealed a range of problematic behaviours identified by pregnant and postpartum women with GAD. Five themes [(1) *reassurance seeking*, (2) *checking and repeating*, (3) *overcontrol*, (4) *overpreparation and* (5) *avoidance*] and 12 subthemes were identified (see Figure 1 for thematic map). Themes and subthemes are defined, explained and presented below, using participant quotes. Thematic comparisons were made between pregnant and postpartum women with regard to endorsed problematic behaviours, given that the focus of worry and associated behaviours may shift throughout the perinatal period

Table 2

Clinical symptom severity scores in pregnant and postpartum women.

	Pregnant (n=10)	Postpartum (n=14)[†]	Clinical Cut-offs
WBI-total	20.20 (5.57)	26.43 (3.11)	17
WBI-A	4.90 (2.37)	6.85 (1.29)	7

WBI-SB	15.30 (4.67)	19.57 (2.76)	11
STICSA	43.4 (14.02)	52.78 (9.27)	43
PSWQ	62.30 (8.26)	71.21 (6.24)	62
EPDS	13.20 (5.57)	14.50 (4.05)	15[‡] and 13[§]

WBI-total = Worry Behaviours Inventory; WBI-A = Worry Behaviours Inventory Avoidance Subscale; WBI-SB = Worry Behaviours Inventory Safety Behaviours Subscale; STICSA = State-Trait Inventory of Cognitive and Somatic Anxiety–Trait Version; PSWQ = Penn State Worry Questionnaire; EPDS = Edinburgh Postnatal Depression Scale. [†]*One postpartum participant did not complete WBI, STICSA, PSWQ, or EPDS.* [‡]*Recommended clinical cut-off during pregnancy.* [§]*Recommended clinical cut-off during the postpartum.*

2.4.2.1 Theme 1: Reassurance Seeking

Behaviours in this category involve continually and excessively looking for confirmation that the baby (i.e., fetus and newborn) is healthy and developing properly, and confirmation of parenting and care decisions. Participants endorsed seeking reassurance both verbally and through sources of information.

Subtheme 1a: Seeking reassurance from others. Pregnant women reported asking their partners, family, medical professionals and friends for confirmation of the viability and health of the pregnancy, and that they were taking proper care of themselves (e.g., consuming appropriate foods). A few pregnant women also asked others about what to expect from childbirth and how they managed with multiple children.

I've been using the midwives as the sounding board [...] and I said, "you'd swear this is my first baby" because I was just offloading everything onto them. Again, mostly around, like, the anxieties with the delivery. [...] We really want an epidural,

and I'm [asking my midwives], "what do we need to do to get there [early enough to

receive an epidural]" and "do you guys know when this baby is going to come?"

And they don't, and I know that, but you're looking for that kind of certainty.
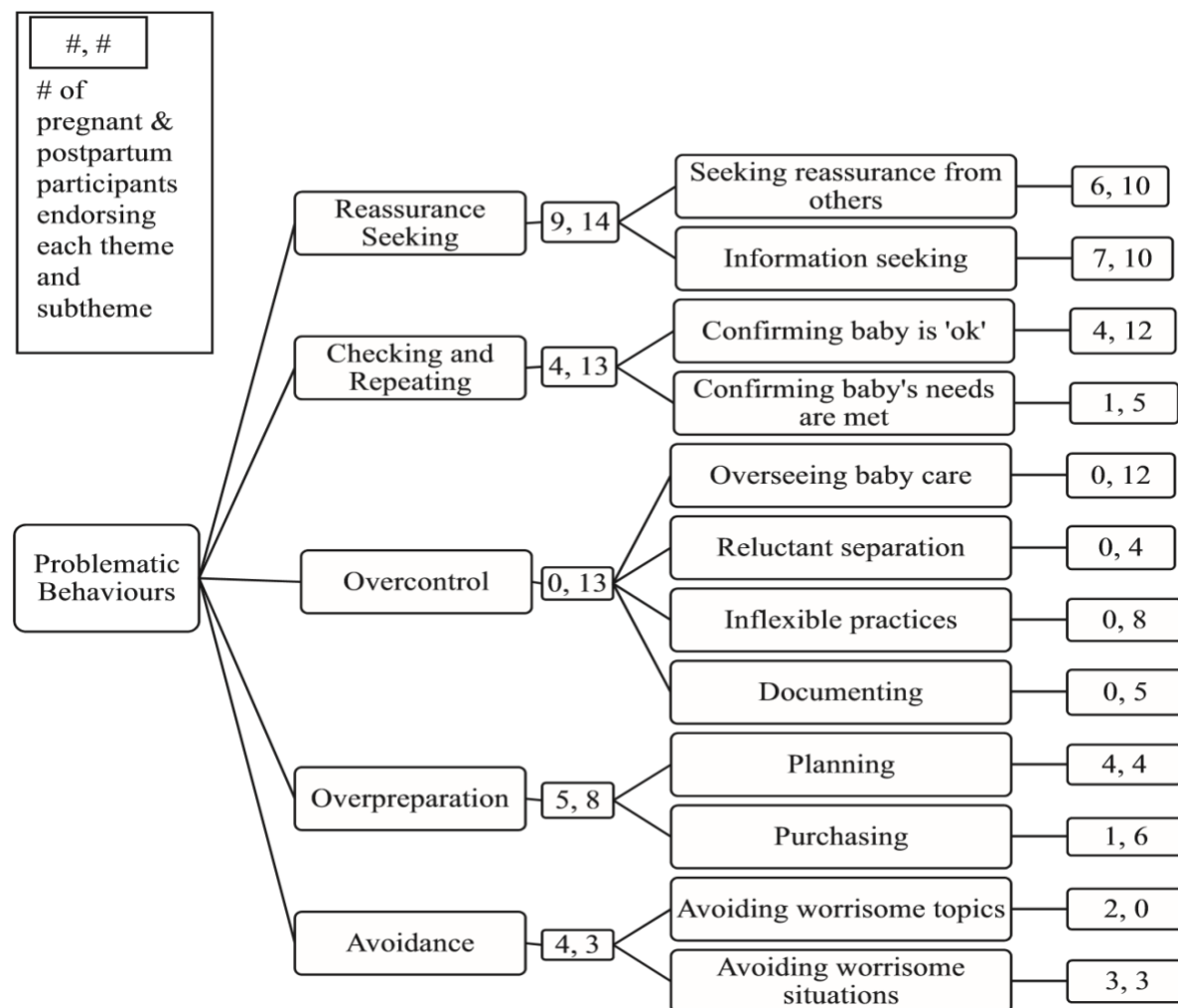
Pregnant #2.

Figure 1. Problematic behaviours' thematic map in pregnant ($n = 10$) and postpartum ($n = 15$)

participants

Most commonly, postpartum women reported excessively asking their partners to verify

that their baby was healthy and developing properly, and that they were making appropriate

parenting decisions. Postpartum women also asked medical professionals, family members and others to verify these same thoughts and decisions, but to a lesser extent than their partners.

> *With my husband, I'm constantly asking his opinion. "Do you think the babies are growing? They look healthy, right?" I would say at least six times a day, I bounce ideas off of him. "Do you think their upper body strength is good enough for their age? Do you think that [child] looks too skinny?" "No, no, she looks great." "Oh, okay." And then I'll ask him the same thing later in the evening.* Postpartum #3.

Subtheme 1b: Information seeking. Pregnant women reported 'googling' information to confirm the well-being of the baby, pain management strategies, and to determine which foods were 'safe' to eat during pregnancy. A few pregnant women sought out additional scans and medical tests to reconfirm the viability of the pregnancy, and others reported comparing their bodies to other pregnant women and to past pregnancies.

> *[My obstetrician] let me have some extra scans, early on, and then I did the panorama testing, and all the genetic testing that you can do to try and help myself get around the fact that just because I had one miscarriage doesn't mean I'm going to keep having miscarriages.* Pregnant #5.
>
> *I have a lot of friends who are pregnant right now. So, I'm looking at them. […] I sometimes even compare to my first pregnancy. […] I compare, and then I worry, "should I be eating more?"* Pregnant #10.

Similarly, and most commonly, postpartum women reported excessively 'googling' information to confirm their baby's health and development, and their parenting decisions. A few postpartum women also reported comparing their parenting decisions and baby's development to others online.

[I was] checking on information multiple times an hour. Am I doing enough? Is she getting enough? What if she slept for four hours and she missed that feeding? Is she gonna get sick now? Am I a neglectful mom? Looking up what milestones she should be hitting at different points of her year and how much she should be drinking at this time. Just all kinds of things. Postpartum #1.

[I] compare myself to other mothers on social media and where their babies are [developmentally]. Postpartum #15.

2.4.2.2 Theme 2: Checking and Repeating

Behaviours in this category involve repeating tasks and actions over and over again to confirm the health, well-being and safety of the baby, and that the baby's needs are met.

Subtheme 2a: Confirming baby is 'ok'. Pregnant women reported repeatedly checking their weight, fetal movement, and urine for traces of blood, to confirm the health of the baby and pregnancy.

Even though I can feel them kicking for the most part, even if there's that five- minute time where I'm like, oh my gosh I don't feel the kicking, I get the [at home] Doppler and [I] listen to his heartbeat again. Pregnant #5.

Yeah, we actually had a miscarriage with our first pregnancy. The way we found out the first time was I actually found some blood after I peed. […] And so, I, to this day, three o'clock in the morning and I'm peeing […], I turn on the lights and check the toilet. Pregnant #7.

Most commonly, postpartum women reported checking their babies while they were sleeping to confirm that they were 'ok' and were breathing. Postpartum women also reported

checking their baby's weight, temperature and body either physically or technologically (e.g., monitor, thermometer), to confirm the health and well-being of their newborn.

> *I have this thing where I compulsively check on him. I will get up every half hour or so and make sure he's breathing. And he's always fine, but it's still always on my mind.* Postpartum #12.

> *I got to a point where I was checking her temperature upwards of 8 times a day, with an actual thermometer.* Postpartum #7.

Subtheme 2b: Confirming baby's needs are met. One pregnant woman reported repeatedly checking the ingredients of food products to ensure that the food she was consuming was 'safe' for pregnancy.

> *Early on I was looking at everything I was consuming. Looking at every single food. […] What can I eat? What can't I eat?* Pregnant #5.

Postpartum women commonly reported checking their baby's physical environment, such as the temperature of the house and outdoors, sleep setting and their baby's diaper bags prior to outings, to confirm that their baby's needs were met. In addition, postpartum women commonly reported checking their baby's intake, output and duration of naps and feedings.

> *[I was] constantly checking wet diapers, how long that they fed on each breast, and how much topped up milk they had. Making sure they were eating enough and growing enough, but then also checking the app one to two times an hour. Reviewing the content on there, looking at the history of the feeds, everything like that.* Postpartum #3.

2.4.2.3 Theme 3: Overcontrol

Behaviours in this category involve attempts to reduce uncertainty and to ensure that tasks are completed 'just right.' Postpartum women made attempts to increase control over

situations by overseeing baby care, staying close to their infants, engaging in inflexible and rigid parenting practices and documenting their baby's intake and output. Pregnant women did not endorse overcontrol behaviours.

Subtheme 3a: Overseeing baby care. Postpartum women reported difficulty allowing others to care for their babies and often refused to delegate baby care tasks. In addition, postpartum women hovered, watched others closely and told others how to care for the baby. Alternatively, some women allowed others to care for their baby but would then inspect and correct what others had done or would check-in frequently to ensure that everything was 'ok.'

> *I still feel like I have to be the one to give him the bottle. Because [others] don't know how he drinks. A couple of times I've tried to get my husband to do it, because I'm like, "Oh, you should bond with the baby." But then he's like, "Oh, he didn't want it." And I'm like, "Well that's cause you didn't do it the way I would do it." And I have to do it again.* Postpartum #6.

> *The biggest thing is making sure that my husband is doing it right. I think that's where it becomes an issue, is that I don't trust [my husband] to do it. I like to go into the room after he's put them down and check and make sure that it's done properly. If I asked him, I would still go and check, just to make sure.* Postpartum #8.

Subtheme 3b: Reluctant separation. A few postpartum women reported difficulty separating from their infants, even for short periods, and some postpartum women watched their infants closely to ensure that they were 'ok.'

> *The first four weeks of her life, I slept on the couch with her in one of those little bassinets. I wanted to basically be able to open my eyes and see into that bassinet and make sure everything was okay.* Postpartum #4.

Subtheme 3c: Inflexible practices. Some postpartum women reported being inflexible in their parenting practices and developed strict routines and schedules.

I didn't do a lot because I always had a baby sleeping on me. I need him to sleep for a certain length of time […] so, I was just very restricted in what I could do. We would stay home a lot. We had a friend's house I would go to, and some days we wouldn't go cause I'm just like, I'm going to have him sleep on me. I don't know if he'll sleep there. I need to just stay home. Postpartum #6.

Subtheme 3d: Documenting. Several postpartum women endorsed excessively recording and logging their baby's intake and output, both on paper and in mobile apps, to ensure that no information was missed.

I would log how many ounces she drank. Or, when I was breastfeeding, how long she was on each side for. And then I would tally it up and then, if it wasn't where it was supposed to be, I would try and squeeze another feeding in. Like, I would log like every 3 hours. Postpartum #13.

2.4.2.4 Theme 4: Overpreparation

Behaviours in this category involve attempts to prepare for all possible outcomes and scenarios. Both pregnant and postpartum women endorsed excessive planning and purchasing behaviours to ensure the well-being of their babies.

Subtheme 4a: Planning. A few pregnant women reported attempting to prepare for their deliveries by thinking through possible scenarios or trying to plan for specific outcomes. Similarly, one pregnant woman also reported repeatedly talking through how she and her partner would manage additional children.

I feel more in control when I think about different scenarios. […] So, worst-case-scenario, how I hope for things to go and, realistically, how things might go. And I have those thoughts as well about, like, NICU, child-care, things like that. […] Feeling like I have somewhat of a plan. But also, being open to that plan changing. But considering all of the different bases. Pregnant #1.

A few postpartum women reported planning for outings with their baby by packing well in advance or bringing various baby items on outings to ensure that they could accommodate changing needs and situations. Two postpartum women also reported planning their feeding schedules to ensure that they had enough breastmilk for their babies.

I tried to get things ready a few days in advance [before taking the baby to their grandparents]. Knowing that will give me a few days to make sure I didn't miss anything. That if things change, I can make sure I have them. Packing for 50-degree weather and minus 50, packing for everything in between. Postpartum #1.

I need to stay ahead, […], so I have extra, so if she decides to cluster-feed, or increases her appetite, I already have that supply. Postpartum #4.

Subtheme 4b: Purchasing. One pregnant woman reported purchasing several different brands of prenatal vitamins.

I know that women should have multivitamins. I didn't know if I should buy the Jamieson, the Materna, the Pregvit. […] I ended up buying a lot and my partner said, "are you sure that this is good for you? Don't you think this is too much?" And my mom said the same. Pregnant #6.

Similarly, several postpartum women reported buying numerous different baby products or the highest quality items for their babies.

I [saw] the owlet foot monitor, I bought the owlet. There's this bassinet that holds the baby on their back, the "snoo," it's a couple thousand dollars. I bought that. Muzzling sheets, silk sheets for the play pen. […] I bought a really expensive new mattress because she could breathe through it. I'm just so paranoid that I'm buying all these things that I see that can potentially help prevent my baby from passing away at night, or SIDS, or any kind of ill effects for her. Postpartum #14.

2.4.2.5 Theme 5: Avoidance

Behaviours in this category involve behavioural avoidance. Perinatal women reported avoiding speaking about worrisome topics and engaging in worrisome situations, in an attempt to prevent 'bad things' from happening to their babies.

Subtheme 5a: Avoiding talking about worrisome topics. Two pregnant women avoided disclosing and talking about their pregnancy. Postpartum women did not avoid speaking about worrisome topics.

I avoided talking about [the pregnancy]. […] Because talking about it made me even more anxious. You often get such an excited reaction, and I would watch people's excitement, but I wasn't feeling excited, I was just feeling anxious and scared. Pregnant #3.

Subtheme 5b: Avoiding worrisome situations and things. Three pregnant women avoided doing things that worried them, including taking anti-nausea medication and weighing themselves. One pregnant woman avoided spending time with friends for fear that her weight and body would be judged.

I stopped stepping on the scale completely. I don't even look at it anymore. I don't do

that to myself [...] because with my first pregnancy I gained a lot of weight and it

really affected me. Pregnant #9.

Three postpartum women reported avoiding various situations that worried them, including

going out, driving and being outdoors with the baby alone.

When I had to go somewhere, I would wait until my husband was home. Even going

for a walk, I was like, what if something happens and I'm not home with all of our

stuff? [...] Little things like that really worried me to the point where I was like, well,

it's just not worth it. Postpartum #7.

2.5   Discussion

GAD remains one of the most poorly defined and least successfully treated of all the

anxiety disorders (Olatunji et al., 2010), potentially because leading theoretical models of GAD,

such as the IUM (Dugas et al., 1998) and MCM (Wells, 1999) do not effectively outline the role

of behaviour and its relation to worry, despite growing empirical evidence. This qualitative study

sought to provide an in-depth understanding of the focus and function of behaviours that

accompany maternally focused worry in perinatal women with GAD. Both pregnant and

postpartum participants' worry, anxiety and problematic behaviour scores were above

recommended clinical thresholds, except for avoidance behaviours; implications of this finding

are presented below. Both pregnant and postpartum women reported engaging in several

problematic behaviours that were summarized into five themes: (1) reassurance seeking, (2)

checking and repeating, (3) overcontrol, (4) overpreparation and (5) avoidance.

Reassurance seeking can be defined as repeated attempts to confirm that things are 'ok',

despite having already received this information (Beesdo-Baum et al., 2012) and was the most

common behaviour endorsed by pregnant and postpartum women in our sample. Pregnant and postpartum women reported seeking reassurance from other people (e.g., partners, medical professionals) and through sources of information (e.g., Google, medical tests) to verify the health and well-being of the baby (i.e., fetus and newborn), and pregnancy- and parenting-related decisions. Concern about infant well-being and one's performance as a mother have been cited as some of the most common worries, perinatally (Goldfinger et al., 2020; Phillips et al., 2009). As such, it appears that temporally unique worries are met with worry-specific behaviours in perinatal women with GAD. This finding is consistent with research demonstrating a bidirectional relation between worry and behaviour in those with GAD in the general population (Mahoney, Hobbs, Williams, Andrews, & Newby, 2018a) and during the perinatal period (Green et al., 2021). Interestingly, in the general population, information seeking has been found to poorly discriminate between those with and without GAD (Beesdo-Baum et al., 2012; Mahoney et al., 2016). In our sample, two-thirds of pregnant and postpartum women endorsed information seeking behaviours. While the occurrence of behaviour does not necessarily signify its importance, it is interesting to note that reassurance seeking behaviours in perinatal samples are not only context-specific but may present differently than in non-perinatal populations, which has implications for the clinical management of perinatal GAD.

Checking and repeating behaviours can be conceptualized as preventative behaviours associated with thoughts of doubt and are aimed at reducing the likelihood of negative events occurring (Rachman, 2002), and are commonly overserved in many anxiety and related disorders, including GAD (Coleman et al., 2011; Scarella et al., 2019; Schut et al., 2001; Townsend et al., 1999). In our sample, some pregnant women reported frequently checking their weight, fetal movement, urine and the viability of the pregnancy, arguably in an attempt to

eliminate doubts about the well-being of the unborn baby. Similarly, most postpartum women reported repeatedly checking their sleeping babies for signs of health and well-being. While confirming the health of the baby is a normal and adaptive behaviour, excessive checking and other problematic behaviours, have been shown to maintain GAD symptoms (Green et al., 2021; Mahoney, Hobbs, Williams, Andrews, & Newby, 2018a), as the non-occurrence of a catastrophic outcome is attributed to the behavioural response (i.e., checking prevented harm to baby), which increases the likelihood of engaging in that behaviour again. Interestingly, postpartum women were more likely than pregnant women to endorse checking behaviours. While further research is necessary, it is possible that the presence of an infant allows for more overt checking behaviours, resulting in increased checking postnatally. Alternatively, the extent of checking behaviours in pregnant women may not have been captured in our sample. Some perinatal women also endorsed checking behaviours aimed at ensuring that the baby's needs were met but to a lesser extent than checking that directly confirmed the well-being of the baby. This is consistent with research showing that, in the general population, people with GAD do not engage in object checking as frequently as is seen in other anxiety and related disorders, such as obsessive-compulsive disorder (Coleman et al., 2011).

Given that a defining feature of GAD includes uncontrollable worry (APA, 2013), the need for control seems logical. Controlling behaviours are often motivated by a fear of uncertainty and attempts are made to reduce uncertainty and enhance perceptions of control by regulating one's environment (Boswell et al., 2013). In the present sample, postpartum women reported refusing to delegate baby care tasks, and also watched, told and corrected how others cared for the infant. Postpartum women also noted difficulty separating from and closely watching their infants. In item response analyses of the WBI, the item 'keeping a close watch'

was most strongly associated with a diagnosis of GAD (Mahoney, Hobbs, Newby, Williams, & Andrews, 2018c). Anxious mothers outside of the perinatal period also exhibit difficulty separating from and closely watching their children (Bogels & Melick, 2004; Kalomiris & Kiel, 2016), which has been linked to the development of behavioural inhibition in offspring (Hudson et al., 2011). As such, it appears that behaviours aimed at maintaining proximity and watching others are not only problematic for those who engage in them but also for those that they are directed towards.

Many postpartum women endorsed rigid parenting practices and inflexible routines (e.g., strict feeding and sleep schedules). Rigidity and inflexibility have been cited as transdiagnostic factors maintaining psychopathology (Morris & Mansell, 2018), and linked to perfectionistic traits (Burns, 1980). Although unknown, postpartum women in our sample may have exhibited high degrees of perfectionism, given that perfectionism is associated with the development of perinatal mood and anxiety disorders (Oddo-Sommerfeld et al., 2016). Some postpartum women also excessively logged their baby's intake, output and sleep, which may be akin to excessive list-making behaviours observed in those with GAD in the general population (Robichaud et al., 2019). Notably, pregnant women in our sample did not endorse control behaviours. While further research is necessary, it is possible that control behaviours are less prevalent during pregnancy because women can regulate their own bodies and, by extension, the baby's environment. In the postpartum period, however, external factors threaten one's ability to control all aspects of the infant's environment, leading to more salient and observable control behaviours.

Attempts to prepare for all possible outcomes and scenarios (i.e., overpreparation) have been documented in those with GAD (Mahoney et al., 2016; Robichaud et al., 2019), as a means of reducing the ambiguity of daily life. Both pregnant and postpartum women endorsed planning

behaviours. Pregnant women deliberated about their deliveries and life with multiple children, and postpartum women spent significant amounts of time preparing for outings with their babies. One pregnant woman and some postpartum women also endorsed purchasing behaviours. While purchasing behaviours, to our knowledge, have not been documented in GAD, purchasing multiple items or items of the highest quality may, again, reflect attempts to reduce the ambiguity of daily life by ensuring that one is prepared for every possibility or can withstand the worst of possibilities. Relatedly, on computer-generated learning tasks, those with GAD make more commission errors (i.e., incorrectly responding to costly stimuli) than healthy controls (Teng et al., 2016). It is plausible that some perinatal women with GAD would, similarly, rather purchase needless and costly products than fail to purchase a product that is potentially useful.

Avoidance is arguably the most well-documented behaviour associated with anxiety and is a key diagnostic criterion of all anxiety and related disorders, except for GAD (APA, 2013). In the general population, people with GAD have been found to engage in various avoidance behaviours (Beesdo-Baum et al., 2012; Mahoney et al., 2016; Robichaud et al., 2019). Avoidance behaviours, such as not disclosing pregnancies (Ockhuijsen et al., 2013) and avoiding certain situations and places with infants (Fallon et al., 2016) have also been cited in perinatal women with anxiety. Interestingly, however, while a few perinatal women endorsed avoidance of worrisome topics and situations, avoidance was the least prevalent behaviour reported by our sample. Given that both pregnant and postpartum women in our sample scored below the clinical threshold on the WBI-A and the internal consistency of the WBI-A was low ($\alpha = .40$), this may suggest that avoidance behaviours are not as relevant in perinatal GAD samples. While replication of this finding is necessary, this result could have significant implications for the

treatment of anxiety disorders, which tend to prioritize reduction of avoidance behaviours (Olatunji et al., 2010).

Taken together, these qualitative findings have several important implications. First, these results advance our theoretical understanding of GAD, as they further establish the importance of behaviour in GAD and highlight potential mechanisms through which maintenance of GAD symptoms may occur (i.e., behaviour aimed at managing worry). As such, theoretical models of GAD, which centralize the maintaining role of worry, should be refined to incorporate worry's accompanying behavioural features. Additionally, the discovery that behaviours, like worry, are context-specific has implications for the clinical management of GAD, as adaptations to existing perinatal GAD treatment protocols may be necessary to support the unique focus of behaviours during the perinatal period.

2.5.1 Limitations and Future Directions

The present study is not without limitations. This study lacked a comparison condition of perinatal women without GAD and, therefore, the extent to which healthy controls engage in these same behaviours is unknown. Certainly, to some extent, checking on and spending time with one's baby is crucial to their well-being. Future studies should compare behaviours endorsed by perinatal women with and without GAD to better elucidate what constitutes normal versus excessive behaviour. Further, there has been growing attention to the clinical construct of pregnancy-related anxiety (PrA; worry that is exclusive to pregnancy), which shares both unique and distinct correlates with GAD (Robertson Blackmore et al., 2016). While we did not formally assess PrA in our study, by definition, endorsement of worry in several domains, and not just in relation to pregnancy, was required to meet the criteria for a diagnosis of GAD. However, further studies may wish to explore the overlapping and distinct behavioural features of both constructs.

It should additionally be noted that the behaviours reported by our sample may not be *unique* to GAD, as behaviours such as avoidance, checking and reassurance seeking have been cited in, and are often central to the conceptualization of other anxiety and related disorders (Coleman et al., 2011; McManus et al., 2008; Salkovskis et al., 1999; Scarella et al., 2019). Further, as most of our sample consisted of highly educated, Caucasian women, research evaluating the behavioural features of perinatal GAD across diverse sociodemographic samples is necessary. Finally, although worry during the perinatal period tends to be maternally focused (Goldfinger et al., 2020) and thus, our objective was to characterize its corresponding behavioural features, future studies may wish to determine to what extent perinatal women engage in non-maternally focused behaviours.

2.5.2   *Conclusions*

This was the first study to explore the focus and function of behaviours in perinatal women with GAD. Our results confirmed that perinatal women with GAD, like individuals with GAD in the general population, engage in reassurance seeking, checking and repeating, overcontrol, overpreparation and avoidance behaviours. However, the specific presentation, frequency and focus of those behaviours differ. Namely, behaviours such as information seeking and purchasing, conceptualized as forms of reassurance seeking and overpreparation, are not as common in the general population, and avoidance behaviours were not as relevant in our sample. Finally, and in line with our primary objective, we established that the attention of behaviours during pregnancy and the postpartum period are maternally focused, reflecting the current context of perinatal women's lives. These findings have implications for theoretical formulations of GAD and the clinical management of this disorder.

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Chapter 3: Study Two

The Worry Behaviors Inventory–Perinatal Revised: Adaptation and initial validation for use in

perinatal samples

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Inness, B. E., McCabe, R. E., Streiner, D., Barrett, E., & Green, S. M. (2023). The Worry
        Behaviors Inventory – Perinatal Revised: Adaptation and initial validation for use in
        perinatal samples. *Assessment, 31,* 350–362, https://doi.org/10.1177/10731911231165071

3.1   Abstract

Generalized anxiety disorder (GAD) is a leading mental health concern during pregnancy and the postpartum (perinatal) period. People with GAD engage in problematic behaviors to manage their distress. However, the extent of GAD behaviors during the perinatal period may not be adequately captured by the Worry Behaviors Inventory (WBI), the most comprehensive measure of GAD behaviors to date. We evaluated the structure of the initial WBI item-pool and then evaluated the internal consistency, construct validity, and predictive utility of the Perinatal Revised WBI (WBI-PR) in a sample of 214 perinatal women with and without GAD. A two-factor, 10-item scale was supported, and some of the retained items differed from the original WBI. Internal consistency of the WBI-PR was acceptable, and evidence of construct validity was demonstrated. The WBI-PR predicted GAD diagnostic status both alone and beyond existing generalized anxiety and depression symptoms. Implications of these findings are discussed.

Keywords: generalized anxiety disorder, behavior, measurement, pregnant, postpartum

3.2   Background

Generalized anxiety disorder (GAD)–characterized by excessive and difficult to control worry about a number of events or activities (American Psychiatric Association [APA], 2013)–is a common mental health concern, with lifetime prevalence of 4.3% (Kessler et al., 2012). GAD is a chronic condition with high likelihood of recurrence and is associated with occupational impairment, health difficulties, life satisfaction, and suicidal tendencies comparable to that of major depressive disorder (MDD; Pelletier et al., 2017; Weisberg, 2009). However, GAD remains one of the most poorly defined and least successfully treated anxiety disorders (Olatunji et al., 2010), as research devoted to understanding its clinical features pales in comparison to other anxiety disorders (Dugas et al., 2010).

Much of the scientific literature on the clinical features of GAD has focused on its cardinal symptom, worry. Prevailing theoretical models emphasize the role of covert processes and avoidance of internal experiences (i.e., thoughts and emotions) as central to the maintenance of GAD (Behar et al., 2009). Worry itself has been conceptualized as a negatively reinforcing avoidance strategy aimed at reducing physiological and emotional arousal (Borkovec, 1994; Borkovec et al., 2004) and is therefore functionally equivalent to the overt behavioral responses observed in other anxiety and related disorders. However, in addition to cognitive avoidance strategies, those with GAD are also thought to engage in overt behaviors to manage their distress. The 'Metacognitive Model' (Wells, 1999) suggests that those with GAD engage in meta worry (i.e., worrying about worrying), which leads to the use of ineffective strategies–including overt behaviors (e.g., situational avoidance, checking, reassurance seeking)–aimed at controlling thoughts and emotions (Behar et al., 2009; Wells, 1999). Furthermore, the 'Intolerance of Uncertainty Model' suggests that individuals with GAD use various maladaptive behaviors to manage uncertainty (e.g., situational avoidance, excessive information seeking; Hebert & Dugas, 2019). The use of these behaviors is thought to reinforce negative beliefs about uncertainty, as the non-occurrence of catastrophic outcomes is attributed to the behavioral response. Indeed, those with GAD have been found to engage in problematic avoidance (e.g., avoiding feared situations, procrastination, delayed decision-making) and safety behaviors (e.g., checking, reassurance-seeking, overpreparation, control) in response to their worries (Beesdo-Baum et al., 2012; Coleman et al., 2009; Robichaud, 2013; Robichaud et al., 2019; Schut et al., 2001). Furthermore, greater use of these overt behaviors appears to contribute to poorer long-term prognosis of GAD (Beesdo-Baum et al., 2012). Based on this initial evidence, the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; DSM-5; APA, 2013) Anxiety Disorders

Workgroup proposed that overt behaviors be added to the diagnostic criteria of GAD (Andrews et al., 2010). Here, endorsement of at least one of four behaviors (i.e., avoidance, procrastination, overpreparation, and reassurance seeking) would be required to receive a diagnosis of GAD. Ultimately, however, behavioral criteria were not implemented due to a lack of evidence to support these changes and an absence of available tools to assess GAD behaviors at that time (Brown & Tung, 2018; Mahoney et al., 2016).

In response to these shortcomings and to facilitate research on the contribution of overt behaviors to GAD pathology, Mahoney and colleagues (2016) developed the first comprehensive self-report measure of GAD behaviors. The Worry Behaviors Inventory (WBI) assesses the tendency to engage in behaviors aimed at preventing, controlling, and avoiding worrying. WBI items were generated based on a review of GAD literature and led to the identification of 26 unique behaviors that were reviewed by six experts and piloted in a sample of treatment seeking patients (Mahoney et al., 2016). Six items were deemed redundant resulting in 20 items, with content covering a range of avoidance (e.g., item 9: "I avoid situations or people that worry me"), reassurance seeking [e.g., item 1: "I seek reassurance from other people (e.g., family, friends, doctors, experts, authorities)"], checking (e.g., item 20: "I repeatedly check that things have been done properly"), controlling [e.g., item 15: "I take control of every aspect of a situation (e.g., try to do everything myself, avoid delegating tasks, control money/ finances, keep a close eye on what is happening)"], hypervigilance (e.g., item 8: "I keep a close watch for anything bad that could happen"), and overpreparation behaviors [e.g., item 19: "I over-plan activities (e.g., prepare for all possible bad outcomes, have a plan B, plan every step of an activity)"; see Table 1]. The 20-item pool was administered to 1201 patients seeking treatment for anxiety and depression, and factor analyses led to a two-factor, 10-item scale, which was

easily interpretable (assessing avoidance and safety behaviors) and demonstrated good model fit based on the Comparative Fit Index (CFI = .95) and Tucker–Lewis Index (TLI = .97), and mediocre model fit based on Root Mean Square Error of Approximation (RMSEA = .10). The WBI and subscales have since demonstrated acceptable to excellent internal consistency (α's ranging from .70 to .90), convergence with measures assessing similar constructs (e.g., GAD symptoms and worry), and evidence of discriminant validity (Mahoney et al., 2016; Mahoney, Hobbs, Newby, Williams, & Andrews, 2018; Mahoney, Hobbs, Newby, Williams, Sunderland, & Andrews, 2018; Mahoney, Hobbs, Williams, Andrews, & Newby, 2018). The WBI is also sensitive to change across treatment and has been found to mediate the relation between various cognitive factors (e.g., cognitive avoidance) and GAD symptoms (Mahoney, Hobbs, Newby, Williams, Sunderland, & Andrews, 2018; Mahoney, Hobbs, Williams, Andrews, & Newby, 2018). However, the WBI has not been validated for use during pregnancy and the postpartum (perinatal) period.

Table 1. Initial Worry Behaviors Inventory Item-Pool

Item Number	Item
1	I seek reassurance from other people (e.g., family, friends, doctors, experts, authorities)
2	I try to avoid making any mistakes and try to do things perfectly
3	I reassure myself (e.g., tell myself things will be OK)
4	I distract myself or do things to take my mind off worrying (e.g., keep busy, exercise, tidy things, do pleasant activities)

5	I try to control what other people do or think (e.g., stop others doing things, tell others to be careful, give advice, over-protect others, do things for others)
6	I make lists to prepare for situations
7	I make plans 'just in case'
8	I keep a close watch for anything bad that could happen
9	I avoid situations or people that worry me
10	I get others to do things for me (e.g., contact me so I know they are OK, keep me company, run errands)
11	I seek reassurance from sources of information (e.g., personal records, Internet, reviews, books)
12	I procrastinate or delay doing things
13	I do nothing
14	I act very carefully (e.g., arrive early, avoid rushing, leave more time than is needed, really think before I act)
15	I take control of every aspect of a situation (e.g., try to do everything myself, avoid delegating tasks, control money/finances, keep a close eye on what is happening)
16	I check to make sure nothing bad has happened or that everything is OK
17	I delay making decisions about things or get other people to make decisions for me
18	I avoid saying or doing things that worry me
19	I over-plan activities (e.g., prepare for all possible bad outcomes, have a plan B, plan every step of an activity)

| 20 | I repeatedly check that things have been done properly |

Note. Items are taken from the Worry Behaviors Inventory initial item pool proposed by Mahoney and colleagues (2016).

It is now known that the perinatal period represents a time of increased vulnerability to the onset and exacerbation of psychopathology (Munk-Olsen, & Agerbo, 2015), with up to 13% of perinatal women meeting criteria for depression (O'Hara & Swain, 2009; Shorey et al., 2018; Woody et al., 2017) and 20.7% meeting criteria for one or more anxiety disorders (Fawcett et al., 2019). GAD, in particular, is a leading mental health concern during the perinatal period, affecting 4.1% to 5.7% of women (Dennis et al., 2017) and is associated with significant distress and impairment in mothers (Ali, 2018) and impaired social, emotional, and neurological development in offspring (Stein et al., 2012; Uguz et al., 2013). GAD is also highly comorbid with other mental health disorders such as depression (Grigoriadis et al., 2011; Misri et al., 2015), which often results in lower rates of remission, reduced quality of life (Misri & Swift, 2015), and decreased emotional availability in mothers and infants (Aran et al., 2021). While recent efforts have been made to characterize the nature of worry during the perinatal period (Goldfinger et al., 2020), the corresponding behavioral features of GAD have been largely overlooked. In response, Inness and colleagues (2022) conducted a qualitative study to gain insight into the behaviors reported by perinatal women with GAD. They found that perinatal women, like individuals with GAD in the general population, engage in various reassurance seeking, checking, controlling, overpreparation, and avoidance behaviors. However, the extent of these behaviors may not be adequately captured by the 10 retained items of the WBI. For example, items that reflect reassurance-seeking [i.e., item 1: "I seek reassurance from other people (e.g., family, friends, doctors, experts, authorities")], controlling [i.e., item 15: "I take

control of every aspect of a situation (e.g., try to do everything myself, avoid delegating tasks, control money/ finances, keep a close eye on what is happening")], and inflexible behaviors [i.e., item 14: "I act very carefully (e.g., arrive early, avoid rushing, leave more time than is needed, really think before I act")] were omitted from the WBI (Mahoney et al., 2016). While these items were not representative of GAD behaviors in the general population (Mahoney et al., 2016), reassurance seeking (e.g., confirming baby-related decisions with partner, family, and medical professionals), controlling (e.g., reluctance to delegate baby care tasks), and inflexible behaviors (e.g., rigid parenting practices and routines) are prevalent and may be more relevant during the perinatal period (Inness et al., 2022).

As such, the primary objective of this study was to evaluate the initial 20-item pool proposed by Mahoney and colleagues (2016) to determine whether a divergent factor structure would emerge within a perinatal sample. We hypothesized that the factor structure and items retained within each factor would differ, given previous research to suggest that certain GAD behaviors (i.e., reassurance seeking, controlling, and inflexible behaviors) may be more relevant during the perinatal period (Inness et al., 2022). Given our prediction that the factor structure would differ, our secondary objective was to assess the internal consistency and construct validity of the Perinatal Revised WBI (i.e., WBI-PR), hypothesizing that the WBI-PR would demonstrate good internal consistency, converge with measures assessing similar constructs, and successfully discriminate between those with and without a GAD diagnosis. Finally, given that the implementation of behavioral criteria was suggested for DSM-5 (APA, 2013), our final objective was to evaluate the contribution of GAD behaviors to the prediction of GAD diagnoses, hypothesizing that the WBI-PR would significantly predict GAD diagnostic status

both alone, and when controlling for existing GAD and depressive symptoms, which have been shown to explain significant variance in GAD diagnoses.

3.3   Methods

3.3.1   Participants

Two-hundred fourteen participants were recruited for this cross-sectional study. Sample size estimates were determined a-priori based on COSMIN guidelines for conducting exploratory factor analyses (EFAs; Mokkink et al., 2010). Participants were included if they were 18 years of age or older, fluent in English, and pregnant ($n = 84$) or between 0 and 6 months postpartum ($n = 130$). Participant's ages ranged from 19 to 44 years ($M = 31.95$, $SD = 4.23$). The sample was predominantly married/common-law (94.4%), Caucasian (85.8%), and highly educated (89.2% with a college degree or higher), and roughly half were primiparous (51.8%). One-hundred forty-one participants (65.9%) met criteria for a principal diagnosis of GAD. The remaining participants ($n = 73$) had principal mood disorders (6.1%), other anxiety and related disorders (6.5%), or no current psychopathology (21.5%). See Table 2 for a breakdown of participant demographics and characteristics between those with and without a principal diagnosis of GAD.

Table 2. Participant Demographics and Characteristics

	GAD ($n = 141$)	Other ($n = 73$)
	n (%)	*n* (%)
Age	$M = 31.67$, $SD = 4.58$	$M = 32.49$, $SD = 3.41$
Number of Children	$M = 1.14$, $SD = 0.85$	$M = 2.04$, $SD = 5.39$
Perinatal Status		
Pregnant	54 (38.3)	30 (41.1)
Postpartum	87 (61.7)	43 (58.9)

Ethnicity[a]

Caucasian	122 (86.5)	60 (82.2)
African American	1 (0.7)	0 (0.0)
Asian/Pacific Islander	4 (2.8)	5 (6.8)
Hispanic	3 (2.1)	1 (1.4)
Native American	0 (0.0)	1 (1.4)
Other	10 (7.1)	5 (6.8)

Marital status[b]

Married/Common-Law	132 (93.6)	69 (94.5)
Single	6 (4.3)	2 (2.7)
Separated/Divorced	2 (1.4)	2 (2.7)

Education[c]

≤ High school	11 (8.0)	7 (9.6)
College/University	107 (77)	50 (68.4)
Postgraduate (e.g., MSc, JD, MD, PhD)	19 (13.7)	15 (20.5)
Other	2 (1.4)	1 (1.4)

Comorbid diagnoses

Mood Disorders	68 (48.2)	3 (4.1)
Anxiety and Related Disorders	49 (34.7)	13 (17.8)
Other Disorders	3 (2.0)	1 (1.4)

Psychotropic medication use[d]	56 (39.7)	19 (28.4)

Symptom Measures

GAD-7[e]	$M = 12.21, SD = 4.49$	$M = 7.53, SD = 5.36$
PSWQ	$M = 67.51, SD = 7.49$	$M = 55.61, SD = 13.88$
STICSA	$M = 50.22, SD = 9.18$	$M = 41.16, SD = 12.29$
EPDS	$M = 14.25, SD = 4.14$	$M = 9.41, SD = 5.87$

Note. GAD-7 = Generalized Anxiety Disorder 7-Item Scale; PSWQ = Penn State Worry Questionnaire; STICSA = State-Trait Inventory for Cognitive and Somatic Anxiety; EPDS = Edinburgh Postnatal Depression scale; Some participants had more than one comorbid diagnosis. Mood Disorders = Major Depressive Disorder ($n = 62$), Persistent Depressive Disorder ($n = 3$) Bipolar Disorder ($n = 6$); Anxiety and Related Disorders = Agoraphobia ($n = 6$), Generalized Anxiety Disorder ($n = 8$), Obsessive-Compulsive Disorder ($n = 2$), Panic Disorder ($n = 8$), Posttraumatic Stress Disorder ($n = 6$), Social Anxiety Disorder ($n = 25$), Specific Phobia ($n = 4$), Illness Anxiety Disorder ($n = 3$); Other Disorders = Substance Use Disorders ($n = 3$), Bulimia ($n = 1$); [a]Two participants did not report their ethnicity; [b]One participant did not report their marital status; [c]Two participants did not report their education level; [d]11 participants did not report psychotropic medication use; [e]One participant did not complete the GAD-7.

3.3.2 Procedures

A convenience sample of participants were recruited between June 2021 and January 2022 from the Women's Health Concerns Clinic, St. Joseph's Healthcare Hamilton (SJHH), an outpatient mental health facility (Caropreso et al., 2020), and through online (e.g., Kijiji, Facebook, SJHH research page) and community (e.g., midwifery clinics) advertisements in the Hamilton and surrounding areas. Eligible and consenting participants were scheduled for a virtual research visit in which the Mini International Neuropsychiatric Interview for the DSM-5 version 7.0.2 (MINI-DSM-5; Sheehan et al., 1998) was administered to assess participants'

current diagnostic status. Diagnostic interviews were administered by PhD-level clinical

psychology students, and diagnoses were confirmed by a licensed clinical psychologist.

Participants then completed a brief battery of self-report measures (see "Measures" section), via

Research Electronic Data Capture (REDCap), a web-based data management and storage system.

All study procedures were approved by the Hamilton Integrated Research Ethics Board.

3.3.3   *Measures*

MINI-DSM-5. The MINI-DSM-5 is a brief, semi-structured diagnostic interview used to

assess a variety of psychiatric disorders in research and clinical settings, according to DSM-5

(APA, 2013) diagnostic criteria (version 7.0.2.; Sheehan et al., 1998). Participants in this study

were assessed using the mood disorders, anxiety and related disorders, substance and alcohol use

disorders, eating disorders, psychosis, and suicidality modules of the MINI-DSM-5. The MINI-

DSM-5 is a reliable and valid assessment tool (Lecrubier et al., 1997; Sheehan et al., 1997) and

has demonstrated good concordance with other diagnostic interviews, such as the Structured

Clinical Interview for DSM-5 (APA, 2013; Spitzer et al., 1990).

WBI Item Pool. The initial WBI item pool consists of 20 unique items assessing

avoidance and safety behaviors aimed at preventing, controlling, and avoiding worrying; see

Table 1; Mahoney et al., 2016). Respondents are provided with the following instructions:

"People can worry about everyday things, like their family, finances, work, health, the future, or

minor things like being on time. This questionnaire concerns the sorts of things people do to

prevent, control, or avoid worrying. Please select the number that best describes what you do

generally." Items are scored on a 5-point Likert-type scale ranging from 0 ("none of the time")

to 4 ("all of the time"), with higher scores reflecting greater engagement in reported behaviors.

Penn State Worry Questionnaire (PSWQ). The PSWQ is a 16-item self-report measure that assesses the tendency to worry (Meyer et al., 1990). Items are scored on a 5-point scale ranging from 1 ("not at all typical of me") to 5 ("very typical of me"), with higher scores reflecting greater pathological worry. A cut-off score of 62 or higher has been suggested for determining a probable GAD diagnosis (Behar et al., 2003). The PSWQ has demonstrated excellent internal consistency and validity across various populations (Brown et al., 1992) and has been validated for use in perinatal samples (Voegtline et al., 2021). The internal consistency of the PSWQ in the current sample was $\alpha = 0.91$.

Generalized Anxiety Disorder 7-Item Scale (GAD-7). The GAD-7 is a 7-item self-report measure that assesses GAD symptom severity over the previous two weeks (Spitzer et al., 2006). Items are measured on a 4-point scale ranging from 0 ("not at all") to 3 ("nearly every day"). A cut-off score of 10 or higher with sensitivity of 89% and specificity of 82% has been suggested for detecting a probable diagnosis of GAD (Spitzer et al., 2006). The GAD-7 has also been validated for use in perinatal samples (Simpson et al., 2014). The internal consistency of the GAD-7 in the current sample was $\alpha = 0.88$.

State-Trait Inventory for Cognitive and Somatic Anxiety (STICSA). The STICSA is a 21-item self-report scale that assesses cognitive and somatic components of anxiety (Ree et al., 2008). The STICSA is comprised of a state scale that measures individuals' current anxiety symptoms, and a trait scale that assesses one's general proneness to anxiety. In this study, only the trait scale of the STICSA was used. Items are scored on a 4-point scale ranging from 1 ("not at all") to 4 ("very much so"). The STICSA has demonstrated excellent validity and reliability (Grös et al., 2007). A cut-off score of 43 or higher on the STICSA has been suggested for detecting a probable anxiety disorder (Van Dam et al., 2013). The STICSA has been validated for

use in clinical samples of adults with anxiety disorders (Grös et al., 2007), although not explicitly in perinatal samples. The internal consistency of the STICSA in this sample was $\alpha = 0.89$.

Edinburgh Postnatal Depression Scale (EPDS). The EPDS is a 10-item self-report measure that assesses symptoms of depression during the perinatal period (Murray & Cox, 1990). Items are scored on a 4-point scale ranging from 0 to 3, with higher scores reflecting greater depressive symptomatology. The EPDS has demonstrated good sensitivity and specificity for a diagnosis of MDD. Cut-off scores of 15 and 13 or higher have been suggested for detecting a probable diagnosis of MDD during pregnancy and the postpartum period, respectively (Matthey et al., 2006). The internal consistency of the EPDS in this sample was $\alpha = 0.87$.

3.3.4   Statistical Analyses

Structure. EFAs were used to assess the structure of the initial WBI item pool (Mahoney et al., 2016). Prior to EFA, data were examined for normality and bivariate correlation matrices inspected. Bartlett's test of sphericity and the Kaiser-Meyer-Olkin measure of sampling adequacy were performed to determine that the data were appropriate for factor analysis. Items with communalities < 0.4 were removed prior to factor analysis, as low communalities indicate that the item has little in common with other items and can distort outcomes (Fabrigar et al., 1999). EFAs were then conducted using principal axis factoring with oblique (promax) rotation (Watkins, 2018). Scree plots (Cattell, 1966), Eigenvalue >1 (Braeken & van Assen, 2016; Kaiser, 1974) and Revised Velicer's Minimum Average Partial (MAP) test (Velicer et al., 2000) were used to determine the number of factors to retain. Items with loadings > 0.4 were retained and factorially complex items (i.e., items that loaded onto multiple factors) were omitted (Watkins, 2018).

Internal Consistency. Cronbach's alpha was used to assess the internal consistency of the WBI-PR.

Construct Validity. Correlations between the WBI-PR and PSWQ (worry), GAD-7 (GAD symptoms), STICSA (anxiety), and EPDS (depression) were calculated. The PSWQ and GAD-7 were used as indicators of convergent validity as they are commonly used to assess GAD symptoms (Behar et al., 2003; Fresco et al., 2003; Spitzer et al., 2006). The STICSA and EPDS were used as indicators of discriminant validity, as they measure similar yet distinct constructs. Although cognitive and somatic components of anxiety exist in GAD, worry is generally considered distinct from other cognitive aspects of anxiety (Holaway et al., 2006) and the STICSA is not a measure of GAD per se. The STICSA was chosen as a measure of discriminant validity to assess how specific the WBI-PR is to GAD, as opposed to anxiety symptoms more broadly. Steiger's *z* test was used to assess convergent validity by examining whether the WBI-PR was more strongly associated with measures of worry and GAD symptoms than anxiety and depression. To assess discriminant validity, *t*-tests were performed to determine whether cases of GAD scored significantly higher on the WBI-PR and subscales than non-cases.

Criterion Validity. To assess the contribution of GAD behaviors to the prediction of GAD diagnoses, a logistic regression was performed to evaluate how well the WBI-PR, alone, predicted GAD diagnostic status. A hierarchical logistic regression was then conducted to evaluate how well the WBI-PR predicted GAD diagnostic status, after controlling for existing GAD (as measured by the GAD-7) and depression (as measured by the EPDS) symptoms.

3.4   Results

3.4.1   Structure

Factorability of the 20 items was examined prior to EFAs. Skew values were between 0.69 to -0.89 and kurtosis values were between 0.22 and -0.90, suggesting that the data were normally distributed. Examination of the bivariate correlation matrix suggested that 15 of 20 items were correlated at 0.3 or greater with at least one other item, indicating reasonable factorability (Watkins, 2018). The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.78, which is greater than the recommended value of 0.7 (Watkins, 2018). Bartlett's test of sphericity was significant, $\chi^2 (190) = 940.97$, $p < .001$. Nine of 20 items had communalities < 0.4 and were removed. Factorability of the remaining 11 items was reassessed. Ten of 11 items were correlated at 0.3 or greater with at least one other item. The Kaiser-Meyer-Olkin measure of sampling adequacy was 0.81, and Bartlett's test of sphericity was significant, $\chi^2 (55) = 598.17$, $p < .001$, suggesting that the remaining 11 items were appropriate for factor analysis.

Rotated factor loadings from the pattern matrix are shown in Table 3. A two-factor structure was preferred based on MAP, Eigenvalue > 1, and Scree plot criteria (Eigenvalues: 3.65 and 1.64). The two-factor structure revealed that one item (item 9) did not load onto either factor (item loadings: 0.32 and 0.39). The two-factor solution explained 48.1% of the variance. Factor 1 (Safety Behaviors) included seven items and explained 33.2% of the variance and Factor 2 (Avoidance) included three items and explained 14.9% of the variance. The correlation between the two factors was small and positive, 0.20. Although the factor structure of the scale and number of items indexed by each factor was consistent with the original WBI (Mahoney et al., 2016), some of the retained items within each factor differed and thus, remaining analyses were performed on the WBI-PR.

Table 3. Exploratory Factor Analysis: Factor Loadings from the Rotated Pattern Matrix Solution

Item Number	Item	Factor 1: Safety Behaviors	Factor 2: Avoidance
7	I make plans 'just in case'	**.774**	-0.74
8	I keep a close watch for anything bad that could happen	**.662**	.181
12	I procrastinate or delay doing things	-.270	**.769**
14	I act very carefully (e.g., arrive early, avoid rushing, leave more time than is needed, really think before I act)	**.553**	.019
15	I take control of every aspect of a situation (e.g., try to do everything myself, avoid delegating tasks, control money/finances, keep a close eye on what is happening)	**.634**	-.249
16	I check to make sure nothing bad has happened or that everything is OK	**.693**	.090
17	I delay making decisions about things or get other people to make decisions for me	-0.36	**.654**
18	I avoid saying or doing things that worry me	.207	**.704**
19	I over-plan activities (e.g., prepare for all possible bad outcomes, have a plan B, plan every step of an activity)	**.816**	-.005
20	I repeatedly check that things have been done properly	**.629**	-.015

Note. Dominant factor loadings are bolded.

5.4.2 Internal Consistency

Internal consistency of the WBI-PR was α = 0.81 for full scale, and α = 0.86 and α = 0.73 for the Safety Behaviors and Avoidance subscales, respectively, suggesting acceptable internal consistency (Tavakol & Dennick, 2011).

3.4.3 Construct Validity

Participants who completed all convergent and discriminant measures were included in this analysis (n = 213). All correlations were positive and statistically significant (all p values ≤ .013); see Table 4 for correlations between WBI-PR total and subscale scores and measures of convergent and discriminant validity. As hypothesized, the WBI-PR was more strongly associated with measures of GAD symptoms (GAD-7; z = 3.06, p = .001) and worry (PSWQ; z = 3.26, p < .001) than depression (EPDS). However, contrary to hypotheses, the WBI-PR was not more strongly associated with measures of GAD symptoms (z = 21.37, p = .914) and worry (z = 20.04, p = .517) than anxiety (STICSA). The same pattern of results was observed for the Safety Behaviors subscale (GAD-7 vs EPDS z = 3.09, p = .001; PSWQ vs EPDS z = 3.45, p < .001; GAD-7 vs STICSA z = 20.39, p = .654; PSWQ vs STICSA z = 1.06, p = .144). Surprisingly, and in contrast to our hypotheses, the Avoidance subscale was not more strongly associated with measures of GAD symptoms or worry than depression (GAD-7 vs EPDS, z = 0.77, p = .219; PSWQ vs EPDS z = 0.35, p = .363) or anxiety (GAD-7 vs STICSA, z = 22.46, p = .993; PSWQ vs STICSA, z = 22.48, p = .993).

Levene's tests suggested that the equality of variances assumption between those with and without a diagnosis of GAD was met for the WBI-PR and subscales (F-values = 0.11 to 0.77, all p-values > .38). Independent samples t-tests indicated that participants with a principal GAD diagnosis scored significantly higher on the WBI-PR (M = 24.43, SD = 6.37) than participants without a principal GAD diagnosis (M = 19.68, SD = 6.67, t (212) = 5.09, p < .001, g

= 0.73). Similarly, participants with principal GAD scored significantly higher on the Safety Behaviors ($M = 18.15$, $SD = 5.55$ vs $M = 14.64$, $SD = 5.86$, $t(212) = 24.29$, $p < .001$, $g = 0.62$) and Avoidance ($M = 6.29$, $SD = 2.58$ vs $M = 5.04$, $SD = 2.58$, $t(212) = 23.36$, $p < .001$, $g = 0.48$) subscales than participants without a principal GAD diagnosis.

Table 4. Correlation Matrix between WBI-PR and Subscales and Measures of Convergent and Discriminant Validity

	WBI-PR	SB Subscale	Avoidance Subscale	GAD-7	PSWQ	EPDS	STICSA
WBI-PR	-						
SB Subscale	.925**	-					
Avoidance Subscale	.532**	.170*	-				
GAD-7	.463**	.374**	.368**	-			
PSWQ	.522**	.448**	.355**	.640**	-		
EPDS	.328**	.232**	.333**	.751**	.513**	-	
STICSA	.524**	.393**	.483**	.710**	.645**	.704**	-

Note. WBI-PR = Worry Behaviors Inventory–Perinatal Revised Scale; SB Subscale = Safety Behaviors Subscale; GAD-7 = Generalized Anxiety Disorder 7-Item Scale; PSWQ = Penn State Worry Questionnaire; EPDS = Edinburgh Postnatal Depression Scale; STICSA = State Trait Inventory for Cognitive and Somatic Anxiety; *$p<.05$; **$p<.01$

3.4.4   Criterion Validity

Prior to logistic regressions, normality of the data was inspected. Skew and kurtosis values of the WBI-PR, GAD-7, and EPDS were between ±1, which is considered normal. There were no multivariate outliers according to Mahalanobis distance (all p-values $> .001$). The

logistic regression model, with GAD behaviors (i.e., WBI-PR total scores) predicting GAD diagnostic status, was statistically significant χ^2 (1) = 23.95, p < .001. The model explained 14.6% (Nagelkerke R^2) of the variance in GAD diagnoses and correctly classified 71% of cases, where greater endorsement of GAD behaviors was associated with increased likelihood of a principal GAD diagnosis. Regarding the hierarchical regression, with GAD behaviors (i.e., WBI-PR total scores) predicting GAD diagnostic status after controlling for GAD (i.e., GAD-7 total scores) and depression (i.e., EPDS total scores) symptoms, Model 1 was statistically significant χ^2 (2) = 48.66, p < .001. The model explained 28.3% (Nagelkerke R^2) of the variance in GAD diagnoses and correctly classified 78.9% of cases, where greater GAD and depression symptomatology was associated with greater likelihood of a principal GAD diagnosis. When GAD behaviors (i.e., WBI-PR total scores) were added in block two, both the overall regression model (χ^2 (3) = 54.38, p < .001) and block (χ^2 (1) = 5.72, p = .017) were statistically significant. Model 2 explained 31.2% (Nagelkerke R^2) of the variance in GAD diagnoses, correctly classifying 76.5% of cases. This suggests that GAD behaviors (as measured by the WBI-PR) significantly predict primary GAD diagnostic status over and above existing GAD and depression symptoms; however, the contribution is relatively small, accounting for an additional 2.9% of the variance in GAD diagnoses.

3.5   Discussion

Perinatal women with GAD engage in comparable problematic behaviors to those with GAD in the general population (Inness et al., 2022). However, the extent of these behaviors may not be adequately captured by existing GAD behavior measures. This study examined the initial WBI item pool proposed by Mahoney and colleagues (2016) and the psychometric properties of the resulting WBI-PR in a perinatal sample.

EFAs led to the emergence of a two-factor solution, indexed by seven Safety Behavior and three Avoidance items. Ten items were omitted from the WBI-PR (items: 1, 2, 3, 4, 5, 6, 9, 10, 11, and 13; see Table 1). Some of the omitted items, such as item 3 ("I reassure myself"), 4 ("I distract myself"), and 13 ("I do nothing"), may reflect more useful attempts to cope with worry, as those with GAD have been found to use less distraction and reappraisal strategies than non-anxious controls (Coles & Heimberg, 2005). Furthermore, behaviors such as distraction, self-reassurance, and doing nothing in response to worries have not been cited in perinatal women with GAD (Inness et al., 2022). Conversely, items that reflect situational avoidance (item 9: "I avoid situations or people that worry me") and excessive reassurance and information seeking (item 1: "I seek reassurance from other people"; item 11: "I seek reassurance from sources of information") have been documented in perinatal women with GAD (Inness et al., 2022) but were, nonetheless, omitted from the WBI-PR. It is possible that these omitted items may not be specific to GAD, as we might expect all mothers to seek confirmation of parenting and baby-related decisions, to some extent.

Interestingly, while the factor structure and number of items indexed by each factor was consistent with the WBI, some of the retained items differed between the WBI and WBI-PR. Namely, items 5 ("I try to control what other people do or think"), 9 ("I avoid situations or people that worry me"), and 11 ("I seek reassurance from sources of information") were replaced by items 15 ("I take control of every aspect of a situation"), 14 ("I act very carefully"), and 12 ("I procrastinate or delay doing things"). While controlling what others do (item 5), researching (item 11), and avoiding anxiety-evoking situations (item 9) have been documented in perinatal women with GAD, so too have behaviors that reflect attempts to "control situations" (item 15; e.g., overseeing and difficulty delegating baby care tasks) and

"act carefully" (item 14; e.g., inflexible parenting practices; Inness et al., 2022). Notably, controlling behaviors may be more relevant in maternal populations, as overprotective behaviors have been documented in mothers with GAD outside of the perinatal period as well (Bogels & Melick, 2004; Kalomiris & Kiel, 2016). Procrastination and delayed decision-making have also been cited in GAD (Andrews et al., 2010; Robichaud, 2013; Robichaud et al., 2019). Other retained items such as repeated checking (item 16: "I check to make sure nothing bad has happened or that everything is OK"; item 20: "I repeatedly check that things have been done properly"), over-preparation (item 19: "I over-plan activities"; item 7: "I make plans just in case") and hypervigilance behaviors (item 8: "I keep a close watch for anything bad that could happen") have been observed in those with GAD both in the general population (Mahoney et al., 2016) and in perinatal samples (Inness et al., 2022). Perinatal women with GAD in particular, have been found to excessively check their sleeping babies and regularly oversee baby-care to ensure that tasks are completed correctly (Inness et al., 2022). They also report preparing for outings with their babies well in advance, as well as thinking through various worrisome scenarios. Similarly, many perinatal women with GAD report closely watching their infants. As such, the retained items of the WBI-PR were easily interpretable and were consistent with qualitative studies of GAD behaviors during the perinatal period.

The WBI-PR and Safety Behaviors and Avoidance subscales demonstrated acceptable internal consistency (Tavakol & Dennick, 2011) and was comparable to that observed by Mahoney and colleagues (2016) in their initial validation of the WBI.

The WBI-PR was significantly and positively correlated with measures of GAD symptoms, worry, anxiety and depression, supporting convergent validity of the scale. In support

of our hypotheses, the WBI-PR was more strongly associated with measures of GAD symptoms and worry than depression. Contrary to our hypotheses, the WBI-PR was not more strongly associated with measures of GAD symptoms and worry than anxiety. However, this finding is perhaps unsurprising when considering that various avoidance (e.g., avoiding feared situations) and safety behaviors (e.g., checking and reassurance seeking) are central to the conceptualization of many anxiety and related disorders (Barlow, 2002; McManus et al., 2008; Salkovskis et al., 1999; Scarella et al., 2019). The same pattern of results was observed for the Safety Behaviors subscale but not for the Avoidance subscale. While the Avoidance subscale was significantly and positively correlated with measures of GAD symptoms and worry, it was more strongly associated with measures of anxiety and depression. Although further research is necessary, it may be that avoidance behaviors are not specific to GAD but common across psychiatric disorders, as avoidance is a core diagnostic criterion of all anxiety and related disorders (APA, 2013) and has been conceptualized as central to the maintenance of depression (Trew, 2011). This finding is also consistent with Mahoney and colleagues (2016) initial validation of the WBI, in which they found that the Avoidance subscale of the WBI was as strongly correlated with symptoms of depression and anxiety (i.e., social anxiety and panic disorder) as it was with measures of GAD. Furthermore, our findings showed that participants with a principal GAD diagnosis scored significantly higher on the WBI-PR and Safety Behaviors and Avoidance subscales than participants without a principal GAD diagnosis, providing preliminary evidence of discriminant validity.

Consistent with our hypotheses, logistic regression analyses suggested that GAD behaviors significantly predicted GAD diagnostic status both alone and over and above GAD and depression symptoms. However, the relative contribution of GAD behaviors to the prediction of

GAD diagnostic status when controlling for GAD and depression symptoms was relatively small, accounting for an additional 2.9% of the variance in principal GAD diagnoses. These findings are consistent with research on GAD behaviors in both perinatal samples and in the general population, showing that GAD behaviors are significantly positively correlated with cognitive processes of GAD (e.g., excessive worry, cognitive avoidance; Mahoney, Hobbs, Williams, Andrews, & Newby, 2018; Marcotte-Beaumier et al., 2022) and depressive symptoms (Green et al., 2021; Mahoney et al., 2016) and, while small, contribute unique variance to GAD diagnoses (Brown & Tung, 2018; Marcotte-Beaumier et al., 2022). Item-level analyses of the WBI-PR may lead to the identification of particularly robust items that could be converted into and improve specificity of GAD diagnostic criteria.

3.5.1   Limitations and Future Directions

There are several limitations of this study. First, while our sample size was appropriate for all analyses conducted, our study was not appropriately powered to conduct a confirmatory factor analysis (CFA). While EFA is the preferred method of analysis when relations among the variables are unknown, as is the case in this study, EFA provides weaker evidence of structural validity than CFA (Merenda, 1997; Streiner et al., 2015). As such, no causal inferences can be made about the observed variables and the underlying latent constructs of the WBI-PR until CFAs are conducted. Furthermore, while the WBI-PR demonstrated acceptable internal consistency, relying solely on internal consistency to assess reliability can be problematic, as single administrations of a scale fail to acknowledge other sources of variance that can influence reliability (Streiner et al., 2015). As such, without examining the stability of the WBI-PR between administrations, it is possible that the scores on the WBI-PR are not representative of participant's true GAD behaviors but due to other testing artifacts (e.g., the environment in

which they completed the measure). Thus, future studies should evaluate the test–retest reliability of the WBI-PR. Furthermore, while the STICSA has been validated in clinical samples of adults with anxiety disorders (Grös et al., 2007) and used in perinatal samples (Furtado et al., 2021; Green et al., 2020, 2021), it has not been validated for use in perinatal samples, which may affect the interpretation of results. For example, certain items on the STICSA (e.g., "I have trouble remembering things"; "I feel dizzy"; "My muscles are tense") may be over-endorsed, as various cognitive and physiological changes occur during the perinatal period (Henry & Sherwin, 2012; Soma-Pillay et al., 2016) that may not be related to anxiety per se. Our study sample also consisted predominantly of highly educated, Caucasian women. As such, our results may not generalize to perinatal women from diverse sociodemographic backgrounds. Finally, while beyond the scope of this study, future research should evaluate the WBI-PR's responsivity to change throughout treatment, which is crucial to establishing the clinical utility of a measure.

3.5.2   Conclusion

This study evaluated the initial WBI item pool (Mahoney et al., 2016), which led to the emergence of the WBI-PR, a two-factor (Safety Behaviors and Avoidance), 10-item scale. We found initial evidence of reliability, construct validity, and predictive utility of the WBI-PR. Continued use of the WBI-PR by perinatal clinicians and researchers is important for determining the contribution of GAD behaviors to GAD pathology, as well as the significance of GAD behaviors in treatment planning and outcomes. Item-level analyses of the WBI-PR may provide insight into behaviors that are most representative and predictive of GAD diagnoses.

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Chapter 4: Study Three

The role of hypervigilance, checking, and avoidance behaviours in the diagnosis of generalized

anxiety disorder during the perinatal period

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4.1   Abstract

Generalized anxiety disorder (GAD) is common during the perinatal period. Since its inception, substantial efforts have been put forth to improve the specificity and interrater reliability of GAD. More recently, increased attention has been given to the behavioral features of GAD, with evidence to suggest that hypervigilance, checking, and avoidance may be particularly relevant. It is unknown however if these behaviors lead to improved classification and understanding of GAD. The present study examines: 1) the proportion of perinatal individuals with and without GAD who endorse hypervigilance, checking and avoidance; 2) the interrater reliability of GAD during the perinatal period; 3) whether inclusion of hypervigilance, checking, and avoidance in GAD diagnostic criteria leads to improved interrater reliability; and 4) if hypervigilance, checking and avoidance significantly predict GAD diagnostic status beyond current features of the disorder. Thirty-eight perinatal women, who were predominantly white and highly educated were randomized to one of two assessors to complete a semi-structured diagnostic assessment. Interviewers queried about the presence of current mental health disorders and engagement in behaviors of interest. Each assessment was independently rated by three assessors. More participants with GAD reported engaging in hypervigilance, checking, and avoidance than those without GAD. Interrater agreement of GAD diagnoses was excellent ($\kappa =$ 0.91). Inter-rater agreement of GAD diagnoses was comparable ($\kappa = 0.92$) when checking was included in the diagnostic criteria of GAD. Checking also significantly predicted GAD diagnostic status beyond existing features of the disorder. These results support continued evaluation of the role of checking in GAD.

Keywords: generalized anxiety disorder, perinatal, behavior, checking, diagnosis

4.2   Introduction

Generalized anxiety disorder (GAD) is a leading mental health concern during pregnancy and the postpartum (perinatal) period, affecting up to 4.1% of perinatal individuals (Dennis et al., 2017). Presently, diagnosis of GAD requires endorsement of excessive and difficult to control anxiety and worry about several events or activities, occurring more days than not for at least six months, in addition to three or more of six physical symptoms [feeling restless, keyed up, or on edge; fatigue; difficulty concentrating or mind going blank; irritability; muscle tension; sleep disturbance; American Psychiatric Association (APA), 2022]. GAD is a chronic condition with high likelihood of recurrence (Weisberg, 2009), and is associated with significant distress, high healthcare costs (Pelletier et al., 2017; Wittchen, 2002), impaired family interactions, and high co-occurrence with other mental health disorders (Weisberg, 2009). During the perinatal period, GAD is associated with additional consequences to mothers and infants, including maternal distress and impaired psychosocial functioning (Ali, 2018), compromised mother–infant interactions (Stein et al., 2012), and risk of anxiety and depression in offspring (Wichstrøm et al., 2018). However, GAD remains a poorly defined diagnostic category (Starcevic et al., 2012; Starcevic & Portman, 2013), and better understanding of its clinical features is critically needed.

Since its inception, GAD has been a contentious diagnostic category due to its non-specific clinical features and high comorbidity with other mental health disorders (Starcevic et al., 2012; Starcevic & Portman, 2013). For example, worry–the core feature of GAD–is considered a transdiagnostic process, present across anxiety and mood disorders (Ehring & Watkins, 2008; Kertz et al., 2012; Olantunji et al., 2010). Further, physiological symptoms of GAD such as sleep disturbance, fatigue and concentration difficulties are also symptoms of mood disorders (APA, 2022). This symptom overlap has led to challenges discriminating GAD from other disorders, as GAD rarely presents in isolation and most of the diagnostic

disagreements involving GAD are with other diagnoses, particularly mood disorders (Brown et al., 2001; Lawrence & Brown, 2008). Further, while there is certainly evidence to support the role of worry in GAD (Borkovec & Newman, 1998; Newman et al., 2013), the distinction between normal and pathological worry, and between pathological worry observed in those with and without GAD is not always immediately apparent. At low levels, worry is considered a normal and adaptive process that can facilitate problem solving (Davey et al., 1992), and many people worry at high levels but do not necessarily meet diagnostic criteria for GAD (Ruscio, 2002). Further, while those with GAD typically spend more time worrying and have less perceived control over worry (Hazlett-Stevens et al., 2008; Holaway et al., 2006; Olantunji et al., 2010), determining "excessive" and "difficult to control" worry has proven more challenging in practice, with intraclass correlation coefficients ranging from 0.43 to 0.81 (Gordon & Heimberg, 2011; Rutter & Brown, 2015), suggesting variable clinician agreement.

One potential solution for improving the diagnostic category of GAD is to include a behavioral criterion, as interrater agreement of anxiety disorders tends to be highest when clear behavioral markers (e.g., situational avoidance in social anxiety disorder; compulsions in obsessive-compulsive disorder) are included in the diagnostic definition (Brown et al., 2001; Chorpita et al., 1998). In fact, the DSM-5 Anxiety Disorders Workgroup proposed that a behavioral criterion be added to GAD, in which individuals would be required to endorse one or more of four behaviors (i.e., avoidance of negative events and activities; time and effort preparing for possible negative outcomes of events and activities; procrastination in behavior or decision making; repeatedly seeking reassurance; Andrews et al., 2010) to receive a diagnosis of GAD. Ultimately, however, a behavioral criterion was not implemented due to a lack of evidence to support these changes and questions surrounding the specificity of these behaviors to GAD

(Starcevic et al., 2012). Post-hoc evaluations suggested that inclusion of these proposed behaviors did not improve the diagnostic reliability of GAD and only weakly predicted GAD diagnostic beyond current criteria (Brown & Tung, 2018).

Nevertheless, there remains interest in understanding the role of behavior in GAD, as those with GAD engage in various avoidance and safety behaviors (e.g., situational avoidance; procrastination; delayed decision-making, repeated checking, reassurance-seeking, over preparation, control) to manage their distress (Beesdo-Baum et al., 2012; Coleman et al., 2011; Green et al., 2021; Inness et al., 2022; Mahoney et al., 2016; Robichaud, 2013; Robichaud et al., 2019; Schut et al., 2001). Greater engagement in avoidance and safety behaviors has also been shown to maintain GAD symptoms (Mahoney et al., 2018a) and predict worse long-term outcomes in GAD (Beesdo-Baum et al., 2012), suggesting potential diagnostic importance. Hypervigilance, checking and avoidance behaviors may be particularly relevant to GAD. In a sample of 537 treatment-seeking patients, 61% with probable GAD, it was found that behaviors such as 'I keep a close watch for anything bad that could happen' (i.e., hypervigilance), 'I check to make sure nothing bad has happened or that everything is OK' (i.e., checking), and 'I avoid saying or doing things that worry me' (i.e., avoidance) were most representative of GAD (Mahoney et al., 2018b). However, it remains unknown whether including these behaviors in the diagnostic criteria of GAD leads to improved classification and understanding of the condition, particularly during the perinatal period during which time these behaviors are common (Inness et al., 2022; Inness et al., 2023). As such, the present study examines: 1) the interrater reliability of GAD diagnoses during the perinatal period using a semi-structured clinical interview; 2) the proportion of perinatal individuals with and without GAD that endorse hypervigilance, checking and avoidance; 3) whether querying about hypervigilance, checking and avoidance during

clinical assessment of GAD leads to improved interrater reliability; and 4) if hypervigilance, checking and avoidance significantly predict GAD diagnostic status beyond current features of the disorder. We predicted that: 1) interrater reliability of GAD during the perinatal period would be comparable to interrater reliability of GAD in the general population; 2) perinatal individuals with GAD would endorse a higher proportion of hypervigilance, checking, and avoidance behaviours than perinatal individuals without GAD; 3) inclusion of hypervigilance, checking, and avoidance behaviours in the diagnostic criteria of GAD would lead to higher interrater reliability than standard criteria; and 4) hypervigilance, checking, and avoidance behaviours would significantly predict GAD diagnostic status beyond current features of the disorder.

4.3   Method

4.3.1   Participants

This was a prospective study that utilized a convenience sample of perinatal individuals referred to a mental health clinic or from the community and expressed interest in participating. Thirty-eight pregnant ($n = 7$) and postpartum ($n = 31$) individuals participated in this study. Sample size was determined based on guidelines which suggest that at least 30 participants are needed to evaluate interrater reliability using kappa coefficients (McHugh, 2012). Participants were included if they were 18 or older, fluent in English, and pregnant or between 0-6 months postpartum. All participants ($N = 38$) identified as women. Seventy-six percent ($n = 29$) of participants identified as white, 5% ($n = 2$) identified as east Asian, 5% ($n = 2$) identified as southeast Asian, 5% ($n = 2$) identified as biracial, 2.6% ($n = 1$) reported that they did not know their race, and 2.6% ($n = 1$) did not disclose their race. Participants ages ranged from 22 to 41 years ($M = 32.00$, $SD = 4.04$). The sample was highly educated (81.6% with a college degree or higher) and roughly half were primiparous (52.6%). Roughly seventy-four percent of our sample

(n = 28) met diagnostic criteria for GAD. Sixteen of those participants with GAD also met diagnostic criteria for a comorbid mood (i.e., bipolar I disorder, bipolar II disorder, persistent depressive disorder, major depressive disorder), anxiety and related (i.e., specific phobia, agoraphobia, illness anxiety disorder, social anxiety disorder, obsessive-compulsive disorder) or substance and alcohol use disorder. The remaining ten (26.3%) participants that did not meet diagnostic criteria for GAD had major depressive disorder (n = 2), panic disorder (n = 1), social anxiety disorder (n = 1), specific phobia (n = 1), adjustment disorder (n = 1), or no current psychopathology (n = 4).

4.3.2   Procedures

Participants were recruited between June 2023 and May 2024 through clinical referrals to the Women's Health Concerns Clinic, St. Joseph's Healthcare Hamilton, and through advertisements in the Hamilton and surrounding area. Participants were contacted by study staff via telephone or email to discuss the study and determine interest and eligibility. Eligible and consenting participants were block randomized, using an online block randomization generator to one of two study assessors (author BEI or MF), and scheduled for an audio-video study visit, using the Zoom platform. Study assessors were PhD candidates in clinical psychology, supervised by a licensed clinical psychologist (author SMG). During the study visit, the Mini International Neuropsychiatric Interview for the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (MINI; version 7.02; Sheehan et al., 1998) was administered to determine if participants met current diagnostic criteria for GAD, as well as other mental health disorders (see measures section below for a full list of administered modules). Additional questions were embedded within the MINI that allowed assessors to query about engagement in hypervigilance, checking and avoidance (see measures section for specific interview prompts).

All interviews were audio recorded using a stand-alone recorder and the MINI was independently scored by two additional raters (either author BEI or MF, whomever did not complete the assessment, as well as author BE). All raters had extensive experience with the MINI, with diagnostic assessment of mood and anxiety disorders, and specialized in the clinical management of anxiety and related disorders. Authors BEI and MF had extensive training in the assessment of GAD during the perinatal period, specifically. In addition to the assessment, participants completed demographic questions and the Generalized Anxiety Disorder Questionnaire for DSM-IV (Newman et al., 2002; see measures section below) via Research Electronic Data Capture (REDCap), a web-based data management and storage system. All participants were compensated with a $20 e-gift card. Study procedures were approved by the Hamilton Integrated Research Ethics Board.

4.3.3   Measures

Mini International Neuropsychiatric Interview for DSM-5 (MINI; version 7.02; Sheehan et al., 1998). The MINI is a semi-structured diagnostic interview used to assess DSM-5 mental health diagnoses (APA, 2013). The MINI contains questions querying about the intensity, frequency and duration of specific symptoms and the degree of distress and impairment associated with them. The MINI is a reliable and valid assessment tool (Lecrubier et al., 1997; Sheehan et al., 1997) and has demonstrated good concordance with other diagnostic interviews (Spitzer et al., 1990). Participants in this study were assessed using the mood disorder (mania, hypomania, major depression, persistent depression), anxiety disorder (generalized anxiety, panic disorder, agoraphobia, social anxiety, specific phobia), suicidality, illness anxiety disorder, obsessive-compulsive disorder, posttraumatic stress disorder, substance and alcohol use disorder,

eating disorder (bulimia nervosa, anorexia nervosa, binge eating) and psychosis screener modules.

Embedded Behavior Questions. To assess engagement in hypervigilance, checking and avoidance, interview prompts were developed and embedded within the MINI to inquire about each of the proposed behaviors. Prompts were developed from items assessing hypervigilance, checking and avoidance in the Worry Behaviors Inventory (WBI; Mahoney et al., 2016) and Worry Behaviors Inventory–Perinatal Revised (WBI-PR; Inness et al., 2023). If assessors determined that participants met current DSM-5 diagnostic criteria for GAD, they asked the following questions at the end of the GAD module to determine engagement in hypervigilance, checking and avoidance behaviors, respectively:

When you have been anxious or worried over the past 6 months, do you often:

a) Keep a close watch for anything bad that could happen?

b) Check to make sure nothing bad has happened or that everything is okay?

c) Avoid saying or doing things that worry you?

Clinical judgement and additional prompts were used as necessary to clarify that endorsed behaviors were reflective of the behavior categories of interest (e.g., *'Can you provide an example of [hypervigilance, checking and avoidance] behavior?'*), and that behaviors were used to manage worry (e.g., *'Do you do this in response to [reported] worry?'*). If assessors determined that participants did not meet current diagnostic criteria for GAD, participants were still asked about engagement in hypervigilance, checking and avoidance at the end of the assessment to better understand how endorsement of behaviors compares between those with and without GAD. The following prompts were used for those without GAD:

Over the past 6 months, do you often:

a) Keep a close watch for anything bad that could happen?

b) Check to make sure nothing bad has happened or that everything is okay?

c) Avoid saying or doing things that worry you?

Generalized Anxiety Disorder Questionnaire for the DSM-IV (GAD-Q-IV; Newman et al., 2002). The GAD-Q-IV is a 9-item self-report measure that assesses GAD symptoms as described by the DSM-IV. The GAD-Q-IV remains a valid assessment tool, as core features of GAD remain the same in DSM-5 and DSM-5-TR (APA, 2013; 2022). To create a total score, yes answers to questions one, two, three, four, and six were coded a 1 and no answers are coded 0. Question five asks participants to list up to six frequent worry topics and they are given one-third point for each topic listed (i.e., up to 2 points). Question seven asks participants if they are bothered by any of the six physical symptoms of GAD and they are given one-third point for each symptom endorsed (i.e., up to 2 points). Items eight and nine query about GAD-associated interference and distress and ask participants to rate each on an 8-point scale from 0 (no interference/distress) to 8 (very severe interference/distress). Participants receive up to two points for each question (please see Newman et al., 2002 for further clarification). Possible GAD-Q-IV scores range from 0 to 12, with higher scores representing greater GAD symptom severity. The GAD-Q-IV has been shown to have good internal consistency, discriminant and convergent validity, and test-retest reliability (Newman et al., 2002; Rodebaugh et al., 2008). The GAD-Q-IV has also been validated for use during the postpartum period, where a cut-off score of 6.38, with sensitivity 81% and specificity 80%, has been suggested for detecting a probable diagnosis of GAD during the postpartum period (Pierson et al., 2017).

Demographic and Health Review form. Additional sociodemographic questions were included to help characterize the sample. Sociodemographic information collected included participant's gender, age, education, ethnicity, and parity.

4.3.4   Data Analysis

Frequencies were calculated to estimate the proportion of perinatal individuals with and without GAD that endorse hypervigilance, checking and avoidance.

Interrater reliability between the three raters was estimated using Fleiss's kappa (κ). Interpretation of kappa values is as follows: excellent agreement ($\kappa \geq .75$), good agreement ($.60 < \kappa \_ < .74$), fair agreement ($.40 < \kappa < .59$), and poor agreement ($\kappa < .40$; Brown et al., 2001; Fleiss et al., 1979). Interrater reliability of GAD using current DSM-5-TR criteria (APA, 2022), and current GAD criteria plus each behavior of interest (e.g., endorsement of GAD criteria *and* hypervigilance) was evaluated.

Finally, hierarchical logistic regressions were used to evaluate whether endorsement of hypervigilance, checking and avoidance significantly predicted GAD diagnostic status beyond current GAD criteria (as measured by the GAD-IV-Q).

4.4   Results

The proportion of individuals endorsing hypervigilance, checking, and avoidance was higher in those with GAD compared to those without GAD (see Table 1 for frequencies).

Table 1

Frequency of hypervigilance, checking and avoidance behaviors in those with and without generalized anxiety disorder

	GAD ($n = 28$)	Non-GAD ($n = 10$)
	n (%)	*n* (%)

Behaviors

Hypervigilance	19 (67.9)	3 (30.0)
Checking	25 (89.3)	3 (30.0)
Avoidance	17 (60.7)	5 (50.0)

Interrater reliability of GAD diagnoses among the three raters was $\kappa = 0.91$ (95% CI .73 to 1.00, $p < .01$), suggesting excellent agreement. When examining interrater reliability of GAD plus each behavior of interest, inclusion of hypervigilance ($\kappa = 0.89$, 95% CI .71 to 1.00, $p < .01$), checking ($\kappa = 0.92$, 95% CI .74 to 1.00, $p < .01$), and avoidance behaviors ($\kappa = 0.78$, 95% CI .60 to .97, $p < .01$) also resulted in excellent agreement. Inclusion of hypervigilance and avoidance behaviors led to slightly lower agreement than agreement of current GAD criteria alone, whereas checking behaviors led to comparable agreement.

All assumptions were met prior to hierarchical logistic regressions. Checking behaviors, but not hypervigilance or avoidance behaviors, significantly predicted GAD diagnostic status beyond existing features of the disorder (see Table 2).

Table 2

Hierarchical logistic regression outcomes of behaviors predicting GAD diagnostic status

Predictors	β	S.E.	χ^2	df	p-value	R^2_N
Step 1:						
GAD-Q-IV	0.31	0.12	6.45	1	.01	.28
Step 2:						

Model	-	-	10.52	2	<.01	.36
GAD-Q-IV	0.30	0.13	5.36	1	.02	
Hypervigilance	1.40	0.89	2.52	1	.11	
Model	-	-	14.26	2	<.01	.46
GAD-Q-IV	0.20	0.14	2.00	1	.16	
Checking	2.43	0.98	6.09	1	.01	
Model	-	-	10.61	2	<.01	.36
GAD-Q-IV	0.51	0.20	6.50	1	.01	
Avoidance	-2.10	1.43	2.14	1	.14	

Note. R^2_N = Nagelkerke R Square; One participant did not complete the GAD-Q-IV and was not included in regression analyses.

4.5   Discussion

This study sought to examine the frequency, interrater reliability, and contribution of hypervigilance, checking, and avoidance to the diagnostic category of GAD in a sample of perinatal individuals. Interrater reliability of GAD diagnoses among the three raters was κ = 0.91, suggesting excellent agreement. Agreement in the current sample was higher than is typically observed in those with GAD, as kappa values typically range from κ = 0.63 to 0.81 (Brown et al., 2001; Rutter & Brown, 2015; Zanarini et al., 2000). It is possible that the clinical presentation of worry during the perinatal period is more homogenous than in the general population (Goldfinger et al., 2020), making GAD easier to identify in the present study. High agreement may also be attributed to the fact that raters had substantial training in diagnostic

assessment of anxiety disorders. Study design factors may have also led to high agreement, as the same assessment was used to generate three independent ratings to reduce participant burden and eliminate variance associated with repeated assessments.

Hypervigilance behaviors (i.e., *'Keep a close watch for anything bad that could happen.'*) were reported more frequently in the GAD group compared to the non-GAD group. Specifically, roughly two-thirds of those with GAD reported hypervigilance behaviors compared to one-third of those without GAD. However, inclusion of hypervigilance in the diagnostic criteria of GAD led to slightly lower interrater agreement, and hypervigilance did not significantly predict GAD diagnostic status beyond current features of the disorder. Hypervigilance behaviors are evident in those with GAD (Inness et al., 2022; Mahoney et al., 2016; 2018b), as perinatal individuals often report "closely watching" and monitoring their infants for signs of threat (Inness et al., 2022). GAD has also been conceptualized as an 'unsuccessful search for safety' in which individuals scan their environment for signs of threat, leading to increased vigilance (Woody & Rachman, 1994). Interestingly, 'vigilance and scanning' also comprised part of the DSM-III diagnostic criteria for GAD (APA, 1987). Hypervigilance, however, is not unique to GAD, as attention to threat is evident across anxiety disorders (Cisler & Koster, 2010; Pergamin-Hight et al., 2015), and hypervigilance comprises part of the diagnostic criteria for posttraumatic stress disorder (APA, 2022). This may explain why hypervigilance did not add to our diagnostic understanding of GAD in the present sample. It is also possible that hypervigilance is more challenging for participants to recognize and clinicians to assess, as watching and scanning one's environment for signs of threat may be more subtle than other behaviors, such as overt checking.

Checking behaviors (i.e., '*Check to make sure nothing bad has happened or that everything is OK*') were also reported more frequently in the GAD group compared to the non-

GAD group, with almost 90% of individuals with GAD reporting checking, compared to 30% of individuals without GAD. Further, inclusion of checking behaviors in the diagnostic criteria of GAD led to comparable interrater reliability to that observed for current GAD criteria (i.e., κ = .92 versus κ = .91). Checking behaviors also significantly predicted GAD diagnostic status beyond current features of the disorder, explaining an additional 18% of the variance in GAD diagnoses. To date, checking behaviors have been the most studied behavior in GAD (Coleman et al., 2011; Schut et al., 2001; Tallis and de Silva, 1992; Townsend et al.,1999). Perinatal individuals with GAD also engage in various checking behaviors to confirm that their infants are 'okay' and their needs are met (e.g., listening to their infant's heartbeat; checking their sleeping infant; taking their infant's temperature; Inness et al., 2022). As such, checking appears particularly relevant to GAD and should continue to be evaluated and considered as a behavioral feature of the disorder.

Finally, avoidance behaviors (i.e., *'Avoid saying or doing things that worry you'*) were reported more frequently in the GAD group (61%) compared to the non-GAD group (50%). However, like hypervigilance behaviors, inclusion of avoidance in the diagnostic criteria of GAD led to lower interrater agreement, and avoidance did not significantly predict GAD diagnostic status beyond current features of the disorder. Interestingly, in our regression model, avoidance was inversely related to GAD diagnostic status, suggesting that GAD was associated with the absence of avoidance behaviors. While those with GAD engage in avoidance behaviors (Beesdo-Baum et al., 2012; Robichaud, 2013; Robichaud et al., 2019), preliminary evidence suggests that avoidance may be less common than other approach behaviors (e.g., checking, reassurance seeking) during the perinatal period (Inness et al., 2022), which may explain our results.

Taken together, while perinatal individuals with GAD engage in hypervigilance and avoidance, checking appears particularly relevant to GAD, as checking behaviors were endorsed by 90% of those with GAD, led to excellent inter-rater agreement, and explained an additional 18% of the variance in GAD diagnoses. This suggests that checking behaviours may be an important therapeutic target in the treatment of GAD. Given that maladaptive cognitions and physical symptoms (as opposed to behavior) are typically the focus of CBT for GAD treatment (Newman et al., 2020), it would be worth evaluating if more behaviorally oriented interventions lead to improved clinical outcomes for those with GAD. However, bidirectional relationships have been found between the cognitive, behavioral, and physiological components of GAD (Donegan et al., 2012; Green et al., 2021; Mahoney et al., 2018a), suggesting that this is perhaps unnecessary. Future research should evaluate if greater reductions in checking behaviors throughout treatment for GAD leads to better end-state functioning, to determine the therapeutic relevance of checking behaviors.

4.5.1   Limitations and Future Directions

There are several limitations of the present study. First, our study consisted mainly of white women who were highly educated, which affects the generalizability of our results. Specifically, all participants in the present study identified as women. Emerging research suggests that the perinatal period is associated with unique challenges for gender diverse individuals, including increased fear of mistreatment from healthcare providers (Kirubarajan et al., 2022), which has been associated more broadly with healthcare avoidance (Clark et al., 2022; Liu et al., 2024). As such, it is plausible that avoidance behaviors may have been more relevant in gender diverse samples. Relatedly, health inequity such as discrimination, less frequent mental health assessment, and poor communication by medical professionals exists for perinatal people

of color (Miller et al., 2024), which may also affect behaviors. Overall, more research is needed to elucidate how findings may converge or differ in more diverse sociodemographic samples. Further, while our sample was appropriately powered for interrater reliability analyses, larger sample sizes are suggested for multilevel modelling (Maas & Hox, 2005) and thus, our study was likely under powered to detect desired effects in the hierarchical regression models. Additionally, assessors and raters were not blind to the study objectives, which may have biased raters' endorsement of behaviors of interest. For example, if raters determined that a participant had GAD, they may have been more likely to interpret ambiguous responses as indicative of hypervigilance, checking, or avoidance. The interrater agreement of GAD in the present sample was also much higher than is typically observed (Brown et al., 2001; Rutter & Brown, 2015; Zanarini et al., 2000). As such, generalizing these results to other perinatal samples and the general population should be done with caution. It is also plausible that high baseline agreement in the present sample affected our ability to assess the true significance and contribution of behaviors to the diagnosis of GAD by means of a ceiling effect. Further, although those with GAD in the perinatal period and general population have been found to engage in comparable behaviors in response to worry, it will be important to replicate these findings in the general population prior to considering including behavioral features in the diagnostic criteria of GAD. Future research should also evaluate if and how checking behaviors in GAD can be distinguished from checking behaviors in other mental health disorders, such as obsessive-compulsive disorder (Ruscio et al., 2008). Finally, it is worth noting that the definition of checking behaviors (e.g., *check to make sure nothing bad has happened or that everything is okay?*) was much more specific than the definitions of hypervigilance (e.g., *keep a close watch for anything bad that could* happen) and avoidance (e.g., *avoid saying and doing things that worry you*). While we

adopted these definitions to be consistent with the wording of items from the WBI that were found to be most representative of GAD (Mahoney et al., 2018b), it is possible that participants could more easily conjure examples of checking behaviors than hypervigilance and avoidance. This may explain why checking behaviors were more common in the present study. As such, it may be worth refining and specifying the definitions of hypervigilance and avoidance prior to disregarding their role in GAD.

4.5.2   Conclusion

Checking behaviors may be particularly relevant to the diagnostic category of GAD, as inclusion of checking in the diagnostic criteria of GAD is associated with excellent interrater reliability and significantly predicts GAD diagnostic status beyond current features of the disorder. These results support continued evaluation of the phenomenology, nosology, and therapeutic relevance of checking as it applies to GAD.

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Chapter 5: General Discussion

5.1   Summary of Findings

GAD is a common mental health concern, particularly during the perinatal period (Dennis et al., 2017; Fawcett et al., 2019; Vesga-Lopez et al., 2008), yet remains poorly defined and understood (Dugas et al., 2010; Olantunji et al., 2010). Research examining the clinical features of GAD has primarily focused on the role of worry and other cognitive processes (e.g., cognitive and experiential avoidance; Behar et al., 2009), whereas understanding the role of behaviour has been largely neglected. Those with GAD engage in behaviours to manage their distress (Beesdo-Baum et al., 2012; Coleman et al., 2011; Green et al., 2021b; Mahoney et al., 2016; Malivoire et al., 2019; Pawluk & Koerner, 2016; Schut et al., 2001; Townsend et al., 1999), which appear to have phenomenological, theoretical and diagnostic implications for GAD (Beeso-Baum et al., 2012; Brown & Tung, 2018; Green et al., 2021; Hebert et al., 2019; Mahoney et al., 2018; Malivoire et al., 2019; Marcotte-Beaumier et al., 2021; Mennin, 2004; Roemer & Orsillo, 2002; 2005; Wells, 1999); However, little is known about the specific behaviours that individuals with GAD engage in and their contribution to GAD pathology, particularly during the perinatal period. As such, this program of research sought to: 1) identify the behaviours that perinatal individuals with GAD engage in; 2) adapt and validate a self-report measure to assess GAD behaviours during the perinatal period; and 3) examine the contribution of specific behaviours to the diagnostic criteria of GAD during the perinatal sample.

5.1.1 Study One

Given the paucity of research devoted to understanding behaviours associated with GAD during the perinatal period, our first study sought to gain an in-depth understanding of the behaviours that perinatal individuals with GAD engage in, in response to worry, using qualitative methodology. Specifically, we conducted focus groups with pregnant and postpartum individuals

whose symptoms met diagnostic criteria for GAD. Open-ended questions were developed to query about the behaviours that participants engaged in, as well as the frequency and severity of endorsed behaviours.

Overall, five behaviour themes and 12 subthemes were identified. Specifically, perinatal individuals with GAD reported engaging in reassurance seeking (subthemes: seeking reassurance from others; information seeking), checking (subthemes: confirming baby is 'ok'; confirming baby's needs are met), overcontrol (subthemes: overseeing baby care; reluctant separation; inflexible practices; documenting), overpreparation (subthemes: planning; purchasing) and avoidance (subthemes: avoiding worrisome topics of conversation; avoiding worrisome situations). These findings suggest that perinatal individuals with GAD, like those with GAD in the general population, engage in various behaviours to manage their distress (Beesdo-Baum et al., 2012; Coleman et al., 2011; Green et al., 2021b; Mahoney et al., 2016; Malivoire et al., 2019; Pawluk & Koerner, 2016; Schut et al., 2001; Townsend et al., 1999), supporting continued systematic evaluation of the role of behaviour in GAD pathology. These results further suggest that the specific behavioural strategies used to manage distress appear to be contextually and functionally related to worry (e.g., checking infant breathing in response to worry of sudden infant death syndrome). This finding is important from a clinical management perspective, as clinicians can expect behaviours to be functionally related to the perceived worry outcome, thus elucidating specific therapeutic targets. Further, the functional relation between cognition and behaviour is not always observed in other anxiety and related disorders (e.g., counting rituals in response to thoughts of doubt in OCD), which may help differentiate behaviours in GAD from other disorders, such as OCD, where high phenomenological overlap exists (Comer et al., 2004). Finally, although worry has been conceptualized as functionally equivalent to the overt

behavioural responses observed in other anxiety and related disorders (Borkovec et al., 1998; Hoehn-Saric & McLeod, 1998; Lyonfields et al., 1995; Thayer et al., 1996), this study suggests that those with GAD also engage in overt behaviours to manage their distress, highlighting additional mechanisms through which maintenance of GAD symptoms may occur.

5.1.2   Study Two

Study two adapted and validated a self-report measure of GAD behaviours that captured behaviours reported by perinatal individuals in study one. Specifically, we examined the factor structure of the Worry Behaviors Inventory item pool (Mahoney et al., 2016) to determine if a divergent factor structure emerged during the perinatal period. We then evaluated the internal consistency and construct validity of the Worry Behaviors Inventory–Perinatal Revised (WBI-PR) and evaluated the contribution of behaviours (as measured by the WBI-PR) to the prediction of GAD diagnoses during the perinatal period.

Exploratory factor analysis supported a 10-item, two factor scale that was easily interpretable, measuring safety and avoidance behaviours. Interestingly, the factor structure and number of items indexed by each factor was consistent with the original WBI (Mahoney et al., 2016) but some of the retained items within each factor differed. The WBI-PR demonstrated acceptable internal consistency, and we found initial support for its construct validity, as those with GAD scored significantly higher on the WBI-PR than those without GAD, and the WBI-PR was more strongly associated with measures of GAD and worry than depression. Finally, WBI-PR total scores significantly predicted GAD diagnostic status both alone and beyond existing features of the disorder, although the contribution was small. Overall, this study provides initial support for a psychometrically sound measure of GAD behaviours during the perinatal period, which is necessary for continued evaluation of the behavioural features of GAD and their

specific role in GAD pathology. These results also suggest that inclusion of behaviours in the diagnostic criteria of GAD may add unique variance and understanding to the diagnostic category of GAD.

5.1.3   *Study 3*

Study three evaluated whether including hypervigilance (i.e., 'I keep a close watch for anything bad that could happen'), checking (i.e., I check to make sure nothing bad has happened or that everything is OK'), and avoidance (i.e., 'I avoid saying or doing things that worry me') behaviours in the diagnostic criteria of GAD led to improved understanding and classification of the disorder. Specifically, we examined: 1) the proportion of perinatal individuals with and without GAD who endorsed hypervigilance, checking and avoidance; 2) the interrater reliability of GAD during the perinatal period; 3) whether inclusion of hypervigilance, checking, and avoidance in GAD diagnostic criteria led to improved interrater reliability; and 4) if hypervigilance, checking and avoidance significantly predicted GAD diagnostic status beyond current features of the disorder.

Results of this study suggested that those with GAD endorsed a higher proportion of hypervigilance, checking, and avoidance behaviours than those without GAD. Interrater reliability of GAD diagnoses was excellent. Inclusion of hypervigilance and avoidance behaviours in the diagnostic criteria of GAD led to slightly lower agreement, whereas inclusion of checking behaviours led to comparable agreement. Finally, only checking behaviours significantly predicted GAD diagnostic status beyond existing features of the disorder. Overall, these findings suggest that checking behaviours appear particularly relevant to GAD. To date, checking behaviours are the most well-documented behaviour in GAD (Coleman et al., 2011; Schut et al., 2001; Tallis and de Silva, 1992; Townsend et al.,1999), and we provided evidence

that checking behaviours extend to GAD during the perinatal period. These results support continued evaluation of the phenomenology, nosology, and theoretical importance of checking behaviours to GAD. If these findings are replicated within the general population and further research supports the maintaining role of checking behaviours in GAD, the inclusion of checking as a behavioural marker of GAD should be considered in future editions of the DSM.

5.2   *Implications*

Taken together, this body of work suggests that behaviours are both theoretically and clinically relevant during the perinatal period and converge with findings within the general population. A central tenet that unifies the theoretical models of GAD is the idea that those with GAD have a problematic relationship with emotions (Koerner et al., 2020), including a hypersensitivity to abrupt increases in negative emotions and decreases in positive emotions (Llera & Newman, 2017). Further, more recent evidence suggests that those with GAD may use worry to create and sustain a negative emotional baseline preventing these potentially destabilizing emotional shifts (Llera & Newman, 2014). In addition to managing emotional distress, our work also supports the idea that worry leads to engagement in overt behaviours to prevent feared outcomes from occurring. Engagement in these behaviours are theorized to negatively reinforce the worry process, which may indirectly maintain a chronic negative emotional state, further reinforcing individual's problematic relationship with emotions. As such, future studies should explore the temporal relations between emotional contrasts, worry, mood state, and behaviour in those with GAD.

From a clinical perspective, our work is the first to systematically document the time-consuming and debilitating behaviours associated with GAD during the perinatal period. Our work provides an in-depth and rich understanding of the experience of GAD during the perinatal

period, allowing clinicians to better assess and query about potential behavioural symptoms and their impact. From a diagnostic perspective, inclusion of a behavioural criterion within the DSM may be warranted. Changes to DSM criteria often occur based on evolving evidence that better aligns with clinical observation and leads to improved validity and/or reliability of the diagnostic category. It is evident from the literature and our work that behaviour is a prominent feature of GAD that has been documented for years, and that individuals with GAD engage in behaviour to manage their distress (Beesdo-Baum et al., 2012; Coleman et al., 2011; Orsillo et al., 2003; Schut et al., 2001; Townsend et al., 1999; Woody & Rachman 1994). As such, inclusion of a behavioural criterion would invariably reflect clinical observation. Further, behavioural criteria in other anxiety disorders, such as social anxiety disorder for example, is used to help differentiate normal from pathological concerns, as behaviours are thought to be indicative of severity and functional interference. Given that distinguishing normal from pathological worry is often challenging, and engagement in overt behaviours has been linked to greater GAD severity (Brown & Tung, 2018), inclusion of a behavioural criterion may lead to better differentiation between normal and pathological worry. Our work also showed that behaviours, particularly checking, predicts GAD diagnostic status beyond current features of the disorder and is associated with excellent interrater agreement, suggesting that the threshold for inclusion of a behavioural criterion within the DSM may be met.

5.3   *Limitations and Future Directions*

In addition to the limitations presented for each individual study, several limitations of the larger research program should be considered. First, the samples were homogenous, mostly consisting of white, married/common-law, cisgender women, who were highly educated. Individuals from diverse sociodemographic backgrounds were underrepresented in our work.

This limits the generalizability of our findings, particularly considering research which suggests that certain sociodemographic variables, such as socioeconomic disadvantage, lower education level, and limited interpersonal support have been linked to heightened anxiety during the perinatal period (Furtado et al., 2018; Leach et al., 2017). It also remains unclear how GAD and associated behavioural features may differ in individuals who do not fit our demographic profile. For example, perinatal individuals from racial and ethnic minority groups have been found to engage in significantly lower service utilization than their racial and ethnic majority counterparts, which is partially attributed to fear of disclosure of mental health challenges (Rokicki et al., 2024). While avoidance behaviours were less relevant than other approach-based behaviours in the current program of research, it is plausible that avoidance behaviours may have been more relevant if individuals from diverse racial and ethnic backgrounds were better represented in our work. Replication of these findings in a more diverse sociodemographic sample is therefore needed to elucidate similarities and differences in GAD behaviour features.

Further, the sample sizes included in our program of research, particularly in study one and three, were quite small. As such, our studies may have been underpowered to detect desired effects, and results may not be representative of the larger perinatal population with GAD. Assessment of GAD behaviours in all three studies also relied on participant endorsement of behaviour, either through use of self-report measures or clinical interview. Our results are therefore limited by participants' insight into their symptoms and behaviours. Given that everyone engages in avoidance and safety behaviours to some extent (e.g., it is normal to seek reassurance from others, double-check tasks, or procrastinate from time to time), it is plausible that some individuals with GAD may not recognize the problematic nature of their behaviours, particularly when they lead to short term decreases in distress. As such, an interesting and

complementary future research direction may be to incorporate behavioural observation of individuals with GAD to determine if objective and subjective reports of GAD behaviour engagement coincide.

Finally, this program of research focused on the perinatal period and thus, the extent to which these results apply to the broader GAD population is unknown. While the same criteria are used to diagnose GAD both within and outside of the perinatal period, some differences exist between GAD occurring during the perinatal period and within the general population. First, GAD is twice as common during the perinatal period (Dennis et al., 2017; Vesga-Lopez et al., 2008), suggesting that there is something unique about the perinatal period that leads to increased rates of GAD. Further, there is some evidence to suggest that worry content is more maternally focused during the perinatal period (Goldfinger et al., 2019) and thus, associated behaviours would also be expected to shift. As such, our findings should be replicated in the general population prior to considering changes to theoretical or diagnostic formulations of GAD. Alternatively, if future research endeavours reveal that behaviours only appear relevant to GAD during the perinatal period and are associated with unique diagnostic or treatment implications, inclusion of a perinatal GAD specifier within the DSM should be considered.

Overall, future research endeavours should seek to more clearly elucidate the role of checking behaviours in GAD. More specifically, as checking is seen in a variety of mental health disorders (e.g., obsessive-compulsive disorder, illness anxiety disorder; Scarella et al., 2019; Ruscio et al., 2008), research attempting to elucidate aspects of checking or potential checking processes that are unique to GAD is needed. Finally, it will be important to know whether checking behaviours contribute to the maintenance of GAD and if reductions in checking behaviours during treatment lead to better end state functioning and prognosis in GAD.

5.4   Conclusions

While the behavioural features of GAD have long been alluded to in GAD literature, systematic evaluation of the role of behaviour in GAD pathology, particularly during the perinatal period, is lacking. This program of research suggests that perinatal individuals with GAD engage in a range of maladaptive safety and avoidance behaviours in response to worry, both to manage distress and prevent feared outcomes from occurring. It also provides clinicians and researchers with a measure of GAD behaviours for use during the perinatal period, necessary for continued evaluation of the behavioural features of GAD. Finally, this program of research suggests that checking behaviours may be particularly relevant to GAD, with potential implications for diagnostic and theoretical formulations of GAD.

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