

ABSTRACT

PREVATT, BETTY-SHANNON. Postpartum Mood Disorder Correlates, Service Utilization, and Program Effectiveness. (Under the direction of Dr. Sarah L. Desmarais).

Postpartum mood disorders (PPMDs) represent a serious public health concern affecting 10-20% of American women. PPMDs are defined as clinically significant disruptions in mood and/or sleep in the 12 months following the birth of a child. The deleterious effects of PPMDs are comprehensive with emotional, social, physical, and financial consequences to mothers. Children of mothers with PPMDs are also at risk for physical, emotional, social, and academic consequences. In response to this serious health problem, multiple agencies have highlighted the necessity for improved screening and early intervention for PPMDs. Indeed, the National Institute of Mental Health has identified high priority areas for research on women's mental health during pregnancy and the postpartum period; these include research on factors associated with postpartum mood disorder risk or protection, research that improves identification and treatment delivery, and research that deepens the evidence-base for intervention effectiveness. The manuscripts included in this dissertation were developed to align with these priority areas and are organized to address limitations in the field across three research domains: 1) correlates and consequences of perinatal mental health problems, 2) facilitators and barriers to perinatal mental health service utilization, and 3) effectiveness of perinatal mental health interventions.

In the first manuscript, I explored the effect of lifetime substance use on postpartum mood disruption. This study represented the first in the literature to examine the effect of lifetime alcohol and drug use, as opposed to use during or after pregnancy, on postpartum mood. Alcohol and drug use have been poorly examined as predictors of PPMDs and when included, have been examined in relation to postpartum depression to the exclusion of other postpartum disorders

(e.g. anxiety, obsessive-compulsive disorder, post-traumatic stress disorder). Findings revealed that lifetime substance use is associated with postpartum PTSD. Lifetime drug use, specifically, was associated with postpartum stress and anxiety while lifetime alcohol use was not related to any postpartum mood disorder studied.

In the second manuscript, I examined barriers and facilitators of postpartum mood disorder symptom disclosure to a healthcare provider in a community sample of women. The literature indicates many women experiencing PPMDs ultimately will not receive treatment. Findings revealed that over half of the sample reported experiencing PPMD symptoms but 21% did not disclose to a healthcare provider. Approximately half of women reported at least one barrier that made help-seeking “extremely difficult” or “impossible.” Further, over one-third indicated they had less than adequate social support. In the final model predicting disclosure, social support and stress, but not barriers, were associated with disclosure.

In the third manuscript, I examined the effectiveness and acceptability of a community-based, peer-support group for postpartum mood disorders. A mixed-methods approach was implemented using the tenets of community-based participatory research. Findings revealed that participant satisfaction was high with overwhelmingly positive perceptions of the program. Post-participation depression scores were similar to those of the community sample at follow-up. Pre-post analyses revealed reductions in depression symptoms with main effects for age and complications, and an interaction for Time X Delivery Method.

In aggregate, the manuscripts included in this dissertation advance the field of knowledge regarding postpartum mental health along three key areas, risk factors, treatment access, and intervention. In particular, an inquiry of drug history using a lifetime perspective may improve PPMD screening. Additionally, the efforts to enhance the social support networks of pregnant

women may promote increased disclosure rates to healthcare providers. Finally, peer-support interventions for PPMDs represent a promising mode for treatment. These findings, when integrated into practice and research have the potential to improve maternal mental health.

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Postpartum Mood Disorder Correlates, Service Utilization, and Program Effectiveness

by
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DEDICATION

This dissertation, indeed this degree, is dedicated to my husband, Jeff Prevatt. His love and unending support have allowed me to not only dream of a new career but see it through to fruition. Thank you for everything; the encouragement, single-parenting, clean laundry, and wine all made it possible for me to keep writing.

This dissertation is also dedicated to my children, Will and Wilder. I hope you never stop pursuing your dreams and that you always love reading as much as you do now.

And finally, to all the moms out there doing their best at the hardest job around.

BIOGRAPHY

Betty-Shannon Prevatt was born in Richmond, Virginia where she was raised by her parents, Ann McCarty Poates and Julius Lee Poates, III. She has one younger sister, Rebecca Frances Poates Mitchell. She married Jeff Prevatt in 2001 and the couple has two adventurous, booking-loving, video game playing children, Will and Wilder.

Betty-Shannon was a member of the inaugural class of the Governor's School for Government and International Studies where she graduated high school. She completed her Bachelor's of Arts at Meredith College in 1999 with a major in Psychology and minor in Women's Studies. Under the sage mentorship of Dr. David Heining-Boynton she completed an undergraduate thesis: *Effect of Rape Counseling Training on Rape Myth Acceptance*. Betty-Shannon then earned a Master's degree in Clinical Psychology from East Carolina University in 2001. Under the direction of Dr. Thomas Durham she completed a Master's thesis entitled *Interpersonal Skill Acquisition in an Inpatient Dialectical Behavior Therapy Program for Patients with Borderline Personality Disorder*.

Upon completing her Master's degree, Betty-Shannon worked in a variety of clinical settings including her own private practice where she specialized in reproductive mental health. In addition to her clinical work, Betty-Shannon worked as an adjunct professor in the Meredith College Psychology Department. These experiences revealed her curiosity for research and love of teaching and mentoring, ultimately leading to pursuit of a PhD.

Following graduation, Betty-Shannon will be serving as a tenure-track Assistant Professor in the Psychology and Social Work Department at Meredith College.

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To say that this degree has been a group effort, would be an understatement. I am indebted to my husband, my parents, and parents-in-law for all of their support, both instrumental and emotional. Your love and support made it possible for me to keep pushing myself to achieve this dream.

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CHAPTER 1

Introduction

Postpartum mood disorders (PPMD), including postpartum depression, anxiety, and obsessive compulsive disorders, represent serious public health concerns affecting women, their families, and our society more broadly. The effort to improve maternal mental health has become a global imperative in recent years, resulting in increased research, intervention, and policy (Brockington, Butterworth, & Glangeaud-Freudenthal, 2016; NIMH, 2015; PACT Consortium, 2017; WHO, 2008). Despite scientific advances due to these efforts, there are major gaps in our understanding of key components in etiology, barriers to treatment, and effective treatment. The research studies within this dissertation address three questions to improve our understanding of factors associated with risk, treatment seeking, and intervention for PPMDs. First, what factors are associated with PPMD risk? Second, how can we encourage women to share their postpartum emotional symptoms with healthcare providers to reduce barriers to treatment? Third, can community based interventions utilizing peer social support serve as an effective intervention model for reducing PPMD symptoms? Findings of this work may inform a comprehensive approach to improve maternal mental health outcomes through evidence-based interventions. In the sections that follow, I will provide an overview of the present literature regarding PPMD prevalence, consequences, correlates and risk factors, intervention, and barriers to treatment to establish a foundation for the present work.

Background

PPMDs affect approximately 10-20% of women in the United States (CDC, 2008; Gavin et al., 2005) and are defined as clinically significant disruptions in mood and/or sleep in the year following the birth of a child. While the *Diagnostic and Statistical Manual of Mental Disorders*,

Fifth Edition requires symptom onset to be within four weeks of delivery (American Psychiatric Association, 2013), symptoms most commonly peak between four and six weeks postpartum and can be triggered by a variety of situations common to parenthood in the first year (Stuart-Parrigon & Stuart, 2014). As such, prevailing practice dictates that a PPMD can be diagnosed in the postnatal period, or the first year following delivery (Stuart-Parrigon & Stuart, 2014). It is important to note that PPMDs are not exclusive to first-time mothers, and thus the term “new mother” refers to a woman in the postpartum period, not a woman who has not previously delivered a child. Additionally, mood disorders can occur in new adoptive parents, fathers, and non-biological parents (McKay, Ross, & Goldberg, 2010; Suto et al., 2016); although the focus of the present research is on biological mothers.

The term “postpartum depression” is commonly used as a catch-all to describe all PPMDs, however this term fails to reflect the array of psychiatric symptoms women may experience in the postpartum year. For example, postpartum anxiety, including generalized anxiety, panic disorder, and phobias, occurs in 4.4-11.1% of women (Reck et al., 2008; Ross & McLean, 2006; Wenzel, Haugen, Jackson, & Brendle, 2005), and postpartum obsessive compulsive disorder is experienced by approximately 2.3-3.9% of women (Allison, Wenzel, Kleiman, & Sarwer, 2011; Ross & McLean, 2006; Zambaldi et al., 2009). Similarly, up to 6.9% of women report experiencing a postpartum post-traumatic stress disorder (Alcorn, O’Donovan, Patrick, Creedy, & Devilly, 2010; Ross & McLean, 2006). Postpartum psychosis, characterized by hallucinations or abnormal perceptions which could lead to suicide or homicide, is the least common postpartum psychiatric disorder, affecting only 1-2 of every 1000 women in the postnatal year (Kendall, Chalmers, & Platz, 1987; Sit, Rothschild, & Wisner, 2006). Finally, postpartum depression is experienced by approximately 10-15% of women or more, as there is

some evidence that it is routinely underestimated (Agius, Xuereb, Carrick-Sen, Sultana, & Rankin, 2016; Halbreich & Karkun, 2006). Together, the various manifestations of PPMs are far more common than other serious adverse outcomes associated with labor and delivery (e.g., renal failure, hypertensive disorders, hemorrhage, pulmonary embolism, and respiratory distress) (Beck, 2008; CDC, 2017; Kuklina et al., 2009) but are also the most “underdiagnosed” complication of childbirth (Earls, 2010b, p. 1032).

Consequences

PPMs have comprehensive detrimental consequences extending across the emotional, physical, social, and financial domains. To demonstrate, although the risk for suicide is lower in pregnant and postpartum women than in the general population, women who are experiencing a PPM have an elevated risk for thoughts of self-harm and suicide when compared to the general population (Gold, Singh, Marcus, & Palladino, 2012). Indeed, suicide represents the leading cause of death among depressed women in the perinatal period (Lindahl, Pearson, & Colpe, 2005; Pope, Xie, Sharma, & Campbell, 2013). Likewise, while pregnancy motivates the cessation of substance use among many women, and substance use during pregnancy and the postpartum period are lower than in the general population (Kendler, Ohlsson, Svikis, Sundquist, & Sundquist, 2017), women experiencing perinatal mental illness are *more* likely to struggle with substance abuse than the general population and their pregnant peers (Dennis & Vigod, 2013; Fitzsimons, Tuten, Vaidya, & Jones, 2007). Beyond these emotional consequences, PPMs are also associated with worse physical health outcomes including perceived quality of physical health (Da Costa, Dritsa, Rippen, Lowensteyn, & Khalifé, 2006; Van Der Woude, Pijnenborg, & De Vries, 2015).

The sequelae of PPMDs can manifest in women's social relationships well. For example, women with PPMDs report greater discord in their marriages than women without PPMDs (Gotlib, Whiffen, Wallace, & Mount, 1991; Zerkowitz & Milet, 1996). Additionally, beyond the maternal mood disruption already established, paternal mood disorders occur in an estimated 10% of fathers in the year following the birth of their child (Paulson, Dauber, & Leiferman, 2006; Suto et al., 2016) and men whose partners are experiencing a PPMD are at increased risk for a mood disorder (Roberts, Bushnell, Collings, & Purdie, 2006). Importantly, poor social support – both within and outside of a marital relationship – is both a risk factor for and consequence of PPMDs (Beck, 2016; Dennis & Ross, 2006; Xie, He, Koszycki, Walker, & Wen, 2009). While inadequate social support contributes to an increased risk for mood disruptions, the behavioral inactivation, isolation, and withdrawal symptoms common in mood disorders may also contribute to a narrowing of one's social network and reduced social support (Robertson, Grace, Wallington, & Stewart, 2004). The extensive literature regarding social support reveals a strong association with PPMDs, suggesting it may be a potential target for intervention. However, critical gaps exist in our understanding of how to leverage social support to protect against PPMD development and improve symptom recovery.

In addition to the deleterious effects PPMDs have on mothers and their partners, children of mothers with PPMDs are at risk for adverse outcomes across the developmental spectrum (Canadian Paediatric Society, 2004). When PPMDs are untreated, children may experience disrupted mother-infant bonding, delays in infant motor development, and delays in infant cognitive development, such as language expression (Field, 2010; S. H. Goodman & Gotlib, 1999; Sohr-Preston & Scaramella, 2006). Additionally, untreated PPMDs contribute to higher rates of infant physical illness and infant hospitalization compared to infants of mothers without

PPMD diagnoses (Brummelte & Galea, 2016; Delatte, Cao, Meltzer-Brody, & Menard, 2009; Farr et al., 2013). Mothers experiencing PPMDs also engage in fewer infant safety practices, less healthy feeding and sleep practices (Paulson et al., 2006), exhibit less sensitivity to their child's cues (Herrera, Reissland, & Shepherd, 2004; Sohr-Preston & Scaramella, 2006), and use more punitive disciplinary responses (Cohn, Campbell, Matias, & Hopkins, 1990; Field et al., 1985). Unfortunately, these effects can extend into later childhood, resulting in academic delays and psychopathology among school-aged children of affected mothers (Lee & Gotlib, 1989; Lesesne, Visser, & White, 2003).

Untreated PPMDs also create significant economic burden for individuals and society. For example, more than 10% of the estimated \$83.1 billion cost of depression in the United States in 2010 is attributed to untreated PPMDs (Diaz, Jose & Chase, 2010; Greenberg, Fournier, Sisitsky, Pike, & Kessler, 2015). These costs are associated with decreased work productivity (WHO, 2015), long term costs of support (Stephens & Joubert, 2001), and increased cost of healthcare (O'Brien, Laporte, & Koren, 2009). It is likely that this figure is an underrepresentation of the financial burden as it does not include the costs of PPMDs beyond depression.

In aggregate, the comprehensive PPMD sequelae highlight a critical need for screening and treatment of women experiencing PPMDs. However, effective identification and intervention require a complete understanding of the risk factors associated with PPMDs in order to accurately predict which women are likely to experience disrupted moods in the postpartum period.

Correlates and Risk Factors

The exact causal mechanisms for PPMDs remain unclear, but there have been important advances in our understanding of risk factors for PPMDs. Drawing from ecological theory, risk factors for PPMDs can be organized using the social-ecological framework and exist across many levels (Bronfenbrenner, 1989). For example, risk factors at the individual level include pregnancy-related changes in hormones and endocrine system (Dennis & Dowswell, 2013; Howland, 2009), personal and family history of psychiatric illness (Beck, 2016), and complications in labor or delivery (Mills, Finchilescu, & Lea, 1995). As mentioned previously, substance use disorders can result as a complication of PPMDs – however, they have also been identified as a possible risk factor for developing PPMDs. Although substance use has been established as a robust predictor of poor mental health outcomes in other populations (Regier et al., 1990), the literature examining its association with PPMDs is limited. Specifically, the contributions of alcohol and drug use to PPMDs have been examined in only a handful of studies, and typically they are aggregated and treated as a single predictor variable (Lancaster et al., 2010; Ross & Dennis, 2009). The field is further limited by the potential for under-reporting of current substance use by pregnant women, due to stigma and fears of legal implications (Ernhart, Morrow-Tlucak, Sokol, & Martier, 1988; Jacobson et al., 1991). Consequently, exploration of the unique contributions of alcohol and drug use, from a lifetime perspective, e.g., use prior to pregnancy, on PPMD risk is needed to resolve these gaps in the literature.

Beyond the individual level, risk factors at the interpersonal level include stressful infant events, such as infant temperament and infant health complications (Beck, 2001), and stressful life events, such as divorce or the death of a loved one (Altshuler, Hendrick, & Cohen, 2000; O'Hara & Swain, 1996). Additionally, women who experience interpersonal violence are also at

greater risk for developing a PPMD (Lancaster et al., 2010). Examples of risk factors at the community level include unemployment and relocation to a new geographic area, as both are associated with increased PPMD symptoms (Salm Ward, Kanu, & Robb, 2016; Warner, Appleby, Whitton, & Faragher, 1996).

Social support can function across the interpersonal and community levels of the ecological model. As mentioned previously, there is strong evidence that inadequate social support also increases risk for PPMDs (Beck, 2001, 2002; O'Hara & Swain, 1996; Xie et al., 2009). Social support functions across four categories, including emotional, instrumental, informational, and appraisal (Cohen, 2004; Cohen & McKay, 1984; Cohen & Wills, 1985; Dunkel-Schetter, Folkman, & Lazarus, 1987). There is extensive work within the literature examining the mechanisms by which social support facilitates better health outcomes. According to the stress-buffering hypothesis, social support functions as a buffer by 1) allowing new mothers to appraise the stressor (motherhood) in a non-threatening manner and 2) promoting adaptive coping when stress is perceived (see *Figure 1*) (Cohen & Wills, 1985). The transition to motherhood (including pregnancy, labor, and delivery) and the various responsibilities and consequences of motherhood represent potentially stressful events. When motherhood is perceived as stressful, emotional and behavioral responses can include both adaptive responses, such as greater engagement, bonding, caregiving, and support seeking, and maladaptive responses, e.g. withdrawal, disengagement, emotional distress. In this stress-buffering model, social support may disrupt the appraisal of motherhood as a stressful event. In cases where motherhood is perceived as stressful, the social network may protect against postpartum mood disruption through normalizing the breadth of emotional responses to motherhood, providing instrumental support to new mothers that mitigates stress perception, and modeling/teaching

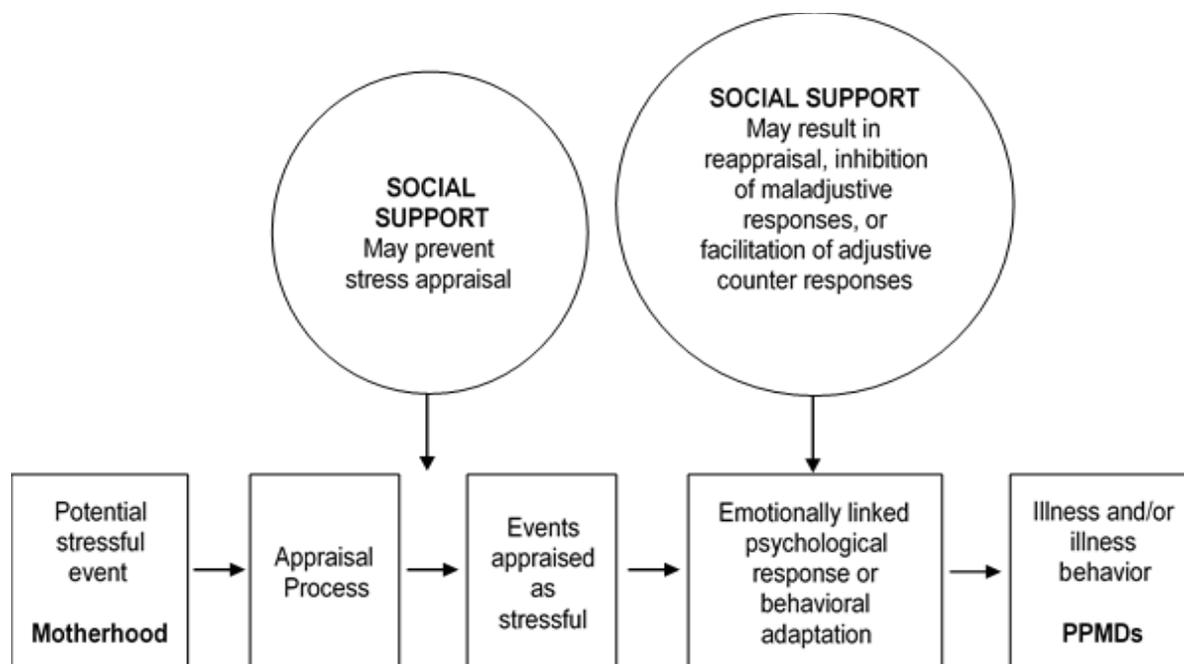


Figure 1. Social Support and Stress-Buffering. Adapted from “Stress, social support and the buffering hypothesis,” by S. Cohen and T. A. Wills, 1985, *Psychological Bulletin*, 98, p. 313. Copyright 1985 by the American Psychological Association.

adaptive coping strategies. Additionally, social support may also protect against the cumulative effect of stressors and barriers experienced by women at higher risk for PPMD due to lower socioeconomic resources (McDonald, Kingston, Bayrampour, Dolan, & Tough, 2014; Umberson, Crosnoe, & Reczek, 2011).

Several elements of socio-economic status (SES) are also associated with PPMD risk; and many of these have implications across several levels of the ecological model. For example, greater risk for PPMD is associated with lower-income (Price & Proctor, 2009), having less education (Goyal, Gay, & Lee, 2010), and residing in rural areas, particularly in developing countries (Villegas, McKay, Dennis, & Ross, 2011). These individual level components of SES have broader impacts across the ecological model. As an example, lower education may limit employment opportunities and income potential. Limited income is then associated with factors

across the ecological model – e.g., interpersonal (relationship strain arising from financial stress), community (inadequate housing and access to healthcare), and organizational (healthcare insurance). Additionally, in the United States, African-American women and Mexican-American women have higher rates of PPMDs than their Caucasian peers (Zittel-Palamara, Rockmaker, Schwabel, Weinstein, & Thompson, 2008), suggesting that women of minority racial status in the U.S. are more vulnerable to PPMDs due to multiple factors across the ecological model. Indeed, the SES factors associated with PPMD can compound into multiple stressful life events, and thus increase the odds of PPMD development (Goyal et al., 2010; Salm Ward et al., 2016).

Intervention

In response to the growing understanding of risk factors for PPMDs and the serious consequences when symptoms are untreated, a variety of interventions have been developed. PPMD interventions can be broadly categorized as either pharmaceutical (Howland, 2009) or non-pharmaceutical (Dennis, 2014; Dennis & Dowswell, 2013). A large body of research demonstrates that PPMDs can be managed with medication effectively (Pawluski, Lonstein, & Fleming, 2017), and consequently, a great deal of literature addresses efficacy of medications used to treat mood disorders outside of the postpartum period, such as selective serotonin reuptake inhibitors (De Crescenzo, Perelli, Armando, & Vicari, 2014), and hormone therapy (Bloch et al., 2000), for example. Other investigations focus on developing new medications specifically tailored to treat PPMDs. Several PPMD-specific medications, e.g., Brexanolone, appear promising but are currently in various stages of clinical-trials (Kanes et al., 2017). Despite the advances in psycho-pharmaceutical treatment of PPMDs, concerns persist regarding the benefits for symptom management over potential effects to the fetus and breastfeeding infant (Brandon, 2011; Little, Lyerly, & Faden, 2009; Lyerly, Little, & Faden, 2008). Indeed, many

women prefer non-pharmaceutical approaches for treating PPMDs (Dennis & Chung-Lee, 2006; J. H. Goodman, 2009). Over and above concerns regarding fetal/infant exposure, additional barriers to pharmaceutical intervention include cost, health insurance coverage, access to sufficiently trained providers, and stigma, among others (Einarson & Davis, 2013).

Non-pharmaceutical interventions for PPMDs, including bio-physiological and psychosocial treatments, are preferred by many mothers and present fewer concerns for side-effects for breastfeeding infants (Goodman, 2009). Bio-physiological treatments comprise behavioral interventions, such as increased physical contact between mother and infant. For example, some research suggests that the maternal mood stabilizing effect associated with a release of prolactin and oxytocin, primarily attributed to breastfeeding, may be elicited through other physical contact between mother and infant (Pawluski et al., 2017). Another promising bio-physiological PPMD intervention is Transcranial Magnetic Stimulation (TMS). TMS therapy consists of focused magnetic stimulation to the brain delivered by a noninvasive device placed next to a patient's head and has been shown to reduce postpartum depression symptoms in experimental trials (Garcia, Flynn, Pierce, & Caudle, 2010; Myczkowski et al., 2012).

Psychosocial interventions encompass a broad array of individual and group-based treatment (Lumley, Austin, & Mitchell, 2004; Sockol, Epperson, & Barber, 2011; Ugarriza, 2004) across the perinatal period (Hayes, Muller, & Bradley, 2001). Individual treatments, such as postpartum home visits by a medical professional, cognitive-behavioral therapy, interpersonal therapy, and telephone- or text-based support, are effective at reducing PPMDs (Dennis & Dowswell, 2013). However, programs that incorporate social support, rather than focusing exclusively on individual treatment, would theoretically be best suited to address the isolation (Mills et al., 1995) and perception of inadequate support (Negron, Martin, Almog, Balbierz, &

Howell, 2013) associated with PPMDS. Indeed, interventions that incorporate social support, either through group treatment programs facilitated by healthcare professionals or peer-support interventions, have demonstrated effectiveness in reducing symptoms of PPMDS.

The most common form of social support intervention is through direct face-to-face interaction. These programs exist in group and individual formats (Dennis, 2004; Dennis & Hodnett, 2007; Leger & Letourneau, 2015) and have shown success when offered in settings such as community organizations (King, Priddis, & Kane, 2015; MacArthur et al., 2002), and non-psychiatric medical offices (McKee, Zayas, Fletcher, Boyd, & Nam, 2006; Sutter, White, Bora, Morchen, & Magee, 2012) in order to accommodate maternal preferences (O'Mahen & Flynn, 2008). As an alternative to in-person interventions, online support programs offer opportunities for women to connect via virtual communication, allowing for a broader reach and the ability to provide treatment and support to geographically isolated women (Evans, Donelle, & Hume-Loveland, 2012; O'Mahen et al., 2013, 2014). Likewise, phone support represents an effective mechanism to provide peer-support to women at risk for PPMDS: one such example is a program developed in Canada, in which new mothers received phone support from trained community volunteers. Positive outcomes included a reduction in postpartum mood symptoms for the mothers and high satisfaction for both mothers and phone-support volunteers (Dennis, 2003, 2010, 2012).

Due to the associations between social support and improved maternal mental health, group social support programs have been identified as a promising yet understudied treatment modality. In particular, social support groups offered in a non-mental health setting align with preferences of new mothers (J. H. Goodman, 2009). As such, community organizations and public health providers have developed a wide variety of discrete programs across the United

States; however, systematic program evaluations are necessary to clarify which program models are most effective, and for whom.

Barriers to Treatment

Despite the range of treatment options available, the majority of women who experience a postpartum mood disorder go untreated in the United States (Goodman & Tyer-Viola, 2010; Santora & Peabody, 2010) as they face numerous barriers to care. Women may experience barriers to disclosure and help-seeking for PPMD at both the provider- and individual-level. Research examining provider-level barriers to PPMD screening, for example, has identified time constraints, insufficient reimbursement, and inadequate mental health training as reasons for low screening by OBGYNs (Santora & Peabody, 2010). Pediatricians, another health care provider frequented by new mothers, also report barriers to maternal mental health screening. Like OBGYNs, common barriers for pediatricians include insufficient time to gather history and/or provide counseling, inadequate training, and low confidence in ability to diagnose maternal and postpartum depression (Olson et al., 2002). Indeed, one study found approximately 85% of pediatricians received no training in adult mental health (Head et al., 2008). Moreover, less than 10% of a national sample of pediatricians felt it was their responsibility to treat postpartum mood disorders (Olson et al., 2002). Furthermore, surveys of physicians indicate that a lack of community resources to which identified mothers can be referred presents another significant barrier for physicians and patients alike (Wiley, Burke, Gill, & Law, 2004). For many of the reasons listed above, research demonstrates that PPMD screening is frequently inadequate and inconsistent. For example, findings from the CARE Study revealed that 32% of women across multiple hospital networks in the United States were not asked about their emotional health by

any clinician during their 6-week postpartum appointments (Horowitz, Murphy, Gregory, & Wojcik, 2009).

Efforts to overcome these barriers have begun with policies for universal screening. While universal screening mandates have the potential to improve identification and treatment receipt (Loudon, Nentin, & Silverman, 2016), provider uptake for such programs can be inconsistent and slow (Delatte et al., 2009). Furthermore, even when there is routine screening for postpartum mood disorders, not all women will follow up with treatment. Consequently, the vast majority of women are not receiving adequate treatment for disrupted mood in the postpartum period – in one study only 25% of women who screened positive for postpartum mood disorders received treatment (J. H. Goodman & Tyer-Viola, 2010). Therefore, while mandates for universal screening, such as those by the US Preventative Services Taskforce (Siu et al., 2016), the American College of Obstetrics and Gynecology (2015), and the American Academy of Pediatrics (Earls, 2010a) are essential for improving maternal mental health, taken alone they will be insufficient.

Ultimately, treatment will be effective only if women are willing to disclose their symptoms and are able to seek treatment. Beyond the provider-level barriers, research demonstrates that women also experience their own structural, knowledge, and attitudinal barriers to disclosure and help-seeking for PPMD (O'Mahen & Flynn, 2008). Structural barriers represent logistical and practical obstacles that impede treatment, including cost, lack of insurance (Santora & Peabody, 2010; Teaford, Goyal, & McNeish, 2015), time constraints, lack of childcare, and lack of available referral resources (Gjerdingen & Yawn, 2007). Knowledge barriers include a lack of understanding regarding PPMD symptoms, lack of awareness of the consequences of untreated maternal depression, and lack of knowledge regarding where to seek

treatment (Santora & Peabody, 2010). Attitudinal barriers are views or perspectives that reduce treatment receipt and include social stigma, fear that disclosure of mental health concerns will result in a notification to child protective services (Byatt, Biebel, Friedman, Debordes-Jackson, & Ziedonis, 2013; Santora & Peabody, 2010), and insensitive comments from health care providers (Teaford et al., 2015).

Together, these barriers suggest substantial impediments to treatment access yet little is known how much they preclude healthcare seeking. In particular, it is unclear if there are specific barriers which have greater impact on treatment access. Additionally, little is known regarding what resources women utilize to overcome these barriers when successful identification and treatment referral occur. Specifically, factors associated with symptom disclosure when women are screened for PPMDs, or even in the absence of being screening by a healthcare provider have yet to be identified. Therefore, efforts to improve screening and treatment interventions depend on first addressing this gap in the service utilization literature.

Overview of the Research Chapters

Improving maternal mental health requires a comprehensive and multi-faceted approach that is grounded in the research evidence. However, important gaps in knowledge remain. Specifically, the National Institutes of Mental Health has established high priority areas for maternal mental health which include: 1) Basic and Clinical Neuroscience, 2) Clinical Course, Epidemiological and Risk Factors Research, 3) Interventions Research, and 4) Screening and Services Research (NIMH, 2015). The work included in this dissertation was developed to align with these priorities and is organized across three domains: 1) correlates and consequences of perinatal mental health problems, 2) facilitators and barriers to perinatal mental health service utilization, and 3) effectiveness of perinatal mental health interventions. Each of the studies

addresses key limitations in the field and thus contributes to the depth of knowledge regarding PPMDs.

The first research study examines lifetime drug and alcohol use as risk factors for developing a PPMD. Alcohol and substance use have been poorly examined as predictors of PPMDs, and when included, have been examined in relation to postpartum depression to the exclusion of other postpartum disorders (e.g. anxiety, obsessive-compulsive disorder, post-traumatic stress disorder) and are typically aggregated into one “substance use” predictor. Additionally, this study utilized a lifetime use approach, as opposed to use during or after pregnancy, when assessing substance use in order to improve accuracy of reporting. This study was the first in the literature to examine the individual associations of lifetime drug and alcohol use on multiple postpartum mood disorders.

The second study examines facilitators and barriers to perinatal mental health service utilization, specifically as it relates to symptom disclosure. Informed by literature on the low rates of treatment receipt despite improved screening practices, this study sought to clarify the predictors of symptom disclosure. Disclosure of emotional health, requiring women to respond honestly when screened or proactively disclose in the absence of screening, was conceptualized as a critical initial step in the process to treatment. Perceived barriers were operationalized as women’s perceptions of factors that reduce the likelihood she will discuss her PPMD symptoms with a healthcare provider. Additionally, social support was examined as a potential factor in disclosure. Findings clarified specific facilitators and barriers of postpartum emotional health disclosure to a healthcare provider.

The final study included in this dissertation examines the effectiveness of a community-based peer-support program for reducing postpartum depression. This study builds upon the

literature indicating that group peer-support interventions represent a promising, yet understudied, intervention modality. As such, a study implementing the tenets of community-based participatory research was conducted to assess participant satisfaction and program effectiveness. Findings revealed not only participant perceptions of program strengths and weaknesses, but also information regarding specific participant characteristics which may relate to program effectiveness. Overall the study contributed to the field by offering specific lessons regarding community-based program intervention and evaluation.

CHAPTER 2

Lifetime Substance Use as a Predictor of Postpartum Mental Health

Purpose: Postpartum mood disorders (PPMD) affect approximately 10-20% of women and have adverse consequences for both mom and baby. Lifetime substance use has received limited attention in relation to PPMD. The present study examined associations of lifetime alcohol and drug use with postpartum mental health problems.

Methods: Women ($n = 100$) within approximately three months postpartum ($M = 2.01$, $SD = 1.32$) participated in semi-structured interviews querying lifetime substance use, mental health history, and postpartum symptoms of anxiety, stress, posttraumatic stress disorder (PTSD), depression, and obsessive-compulsive disorder. The study was conducted in an urban Canadian city from 2009-2010.

Results: Analyses revealed that lifetime substance use increased the variability explained in postpartum PTSD ($p = .011$), above and beyond sociodemographic characteristics and mental health history. The same trend, though not significant, was observed for stress ($p = .059$) and anxiety ($p = .070$). Lifetime drug use, specifically, was associated with postpartum stress ($p = .021$) and anxiety ($p = .041$), whereas lifetime alcohol use was not ($ps \geq .128$).

Conclusions: Findings suggest that lifetime drug use is associated with PPMD. Future research should examine whether screening for lifetime drug use during antenatal and postpartum care improves identification of women experiencing PPMD.

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Introduction

Postpartum mood disorders represent a serious health concern for mothers and their children. Postpartum mood disorders are defined as clinically significant disruptions in mood and/or sleep in the 12 months following the birth of a child (American Psychiatric Association, 2013). Estimates suggest that anywhere from 10-20% of women will experience postpartum depression in the year following the birth of a child (Ashley, Harper, Arms-Chavez, & LoBello, 2015; Gavin et al., 2005; Gaynes et al., 2005). Postpartum women also are at elevated risk for other mood disorders (Stone & Menken, 2008), including anxiety (prevalence of 4.4%-11.1%) (Reck et al., 2008; Ross & McLean, 2006; Wenzel, Haugen, Jackson, & Brendle, 2005), obsessive compulsive disorder (OCD) (prevalence of 2.3%-3.9%) (Allison, Wenzel, Kleiman, & Sarwer, 2011; Ross & McLean, 2006; Zambaldi et al., 2009), and post-traumatic stress disorder (PTSD) (prevalence of 0.0%-6.9%) (Alcorn, O'Donovan, Patrick, Creedy, & Devilly, 2010; Ross & McLean, 2006). Indeed, the American Academy of Pediatrics estimated that 400,000 babies are born each year to a mother who is clinically depressed or anxious, making postpartum mood disorders the most “underdiagnosed obstetric complication in America” (Earls, 2010, p. 1032). This trend begins prior to delivery: pregnant women are more likely to have undiagnosed mood disorders than their non-pregnant peers, despite their increased contact with medical professionals during pregnancy (Ko, Farr, Dietz, & Robbins, 2012).

Unfortunately, the impact of underdiagnosis of postpartum mood disorders and consequent lack of treatment extend beyond the new mom to her children. Indeed, research demonstrates that children of mothers with postpartum mood disorders experience disrupted mother-infant bonding, delays in infant cognitive development, and poor social development, as well as academic delays and psychopathology when they are school-aged (Field, 2010; Goodman

& Gotlib, 1999; Murrey & Cooper, 1997). Additionally, there is some evidence that untreated postpartum mood disorders can contribute to higher rates of physical illness and hospitalization among infants. For instance, a study of 24,263 infants born between 1998 and 2007 showed that infants of mothers who were diagnosed with perinatal anxiety or depression were seen more often for ear infections, respiratory infections, and injury compared to infants of mothers without depression and anxiety (Farr et al., 2013). Thus, early intervention for postpartum mood disorders has the potential to improve outcomes for both mothers and their children.

Accordingly, there have been many efforts focused on identifying factors associated with postpartum mood disorders, including sociodemographic characteristics and history of mental health problems. Predominantly, research to date has focused on antenatal risk factors; that is, those occurring during the pregnancy. For instance, Robertson, Grace, Wallington, and Stewart (2004) conducted a systematic review of more than 70 empirical, peer-reviewed, studies from 1990 through 2002 that examined antenatal risk factors for postpartum depression in approximately 22,000 participants. Results showed that depression and anxiety during pregnancy, adverse life events (e.g., death of a loved one, divorce, job loss), poor social support, and history of depression are good predictors of postpartum depression. Notably, substance use was not included as a risk factor in this review. A more recent systematic review by Lancaster and colleagues (2010) examined findings across 159 international studies published from 1980-2008 assessing antenatal risk factors for postpartum depression. Of the risk factors examined in the 57 studies rated as sufficiently high in quality, only life stress, lack of social support, and domestic violence emerged as unique predictors of postpartum depression in multivariate analyses.

As identified above, substance use--both during pregnancy and other periods in women's lives--has received relatively little attention as a predictor of postpartum depression or other postpartum mood disorders. In the Lancaster et al (2010) review mentioned earlier, for example, studies rarely reported on alcohol use or drug use at all (only $k = 10$ and 8 , respectively) and if they did, findings focused on current (as opposed to lifetime) use. Similarly, a meta-analysis of peer-reviewed studies published in French and English through August 2008 identified only five papers assessing associations between substance abuse and postpartum depression meeting inclusion criteria (Ross & Dennis, 2009). Findings indicated that mothers who abused substances after delivery (i.e. postpartum) had higher rates of depression compared to mothers who did not. In fact, to our knowledge, only one study has examined the associations of lifetime substance abuse with postpartum mental health. Specifically, in a retrospective, population-based study, Bryan and colleagues (1999) found that 20% of women with postpartum depression had a (prenatal) history of substance abuse noted in their medical record. Though substance abuse was associated with postpartum depression in bivariate analyses, associations were no longer significant in the multivariable models.

Evidence from research conducted in other populations suggests that lifetime substance use is well-established and a robust predictor of mood disorders (Regier, et al., 1990). To demonstrate, two population studies in the United States found a co-occurrence of mental illness in approximately 50% of individuals with a current substance abuse disorder (Kessler et al., 1996; Regier et al., 1990). There are additional reasons that it may be advantageous to focus on substance use prior to rather than during or after pregnancy. For example, querying lifetime substance use may provide a more accurate assessment of typical usage patterns and associated mood and coping strategies. Furthermore, the serious consequences of substance use during a

pregnancy, including placental abruption, preterm birth, fetal growth restriction (Pinto et al., 2010), low birth weight (Witt et al., 2016), and fetal alcohol spectrum disorder (Ornoy & Ergaz, 2010), are the focus of considerable media attention and public health campaigns, which may inadvertently contribute to underreporting of substance use (Ernhart, Morrow-Tlucak, Sokol, & Martier, 1988). Indeed, Jacobson et al. (1991) found that mothers underreport substance use when queried while pregnant but report greater usage when asked postnatally to provide retrospective reports of their antenatal substance use. Thus, querying lifetime substance use, rather than substance use during pregnancy, may improve our understanding of associations between substance use and postpartum mental health.

The Present Study

Our current understanding of the association between substance use and postpartum mood disorders is limited by a focus on substance use during or after pregnancy as a risk factor for postpartum depression to the neglect of substance use outside of this limited time frame and other postpartum mental health problems. For these reasons, the present study explored associations between lifetime substance use and postpartum mental health problems in a non-clinical, community sample of new mothers. Our specific research questions were:

1. How do symptoms of postpartum mood disorders, including depression, anxiety, stress, OCD, and PTSD, differ between women who do and do not meet criteria for lifetime substance abuse and lifetime substance dependence, respectively?
2. Are lifetime alcohol use and drug use risk factors for symptoms of postpartum mood disorders, above and beyond sociodemographic characteristics and history of mental health problems?

Methods

Compliance with ethical standards

The Research Ethics Boards of the University of British Columbia, the Children's and Women's Health Centre of British Columbia, and the Vancouver Coast Health Research Institute approved this study. All participants provided written informed consent.

Study population and recruitment

The study population was English-speaking mothers aged 18 years and older in the metropolitan area of a large, western Canadian city who were within three months postpartum. Women were recruited from 2009-2010 to participate in a one-time interview of factors that may affect women's health and well-being after pregnancy. Inclusion criteria for participation were: within three months postpartum; able to read and speak English; 18 years or older; residing in the study region; and able to provide informed consent. Accordingly, exclusion criteria were: more than three month postpartum at the time of recruitment; unable to read and/or speak English; less than 18 years old; not residing in the study region; and unable to provide informed consent. The study was advertised in area hospitals, local newspapers, and community venues frequented by new mothers (e.g., recreational centers, yoga and fitness studios, community centers, women's centers), as well as on websites targeting new mothers and on websites of other relevant organizations (e.g., community websites). The recruitment materials did not specify a focus on substance use or mental health, but rather described a broad interest in experiences occurring before and during pregnancy that may be associated with health and well-being after pregnancy. In total, 100 women participated in the study.

Measures

Depression, Anxiety and Stress Scales (DASS-21). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item self-report questionnaire designed to measure the severity of a range of symptoms common to depression, anxiety, and tension/stress. Each of the three DASS-21 scales contains seven items. Respondents use a 4-point scale to rate the extent to which they have experienced each state over the past week. Each item is scored from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Scores for Depression, Anxiety and Stress are calculated by summing relevant item ratings and multiplying by a factor of two. Total scores are calculated in the same way, using all items. The DASS-21 has demonstrated strong concurrent validity and psychometric properties in prior research (Antony, Bieling, Cox, Enns, & Swinson, 1998). When compared to clinical interviews, sensitivity and specificity scores are more than adequate with a Depression scale score cutoff of 12 (.91 and .46 respectively) and Anxiety scale score cutoff of 5 (.92 and .40 respectively) (Nieuwenhuijsen, de Boer, Verbeek, Blonk, & van Dijk, 2003). In the present study, reliability of the scale scores ranged from adequate ($\alpha = .67$ for Anxiety) to excellent ($\alpha = .87$ for Stress). Reliability of the total scores was excellent ($\alpha = .89$).

Continuous measures of symptom severity were calculated for each subscale following the guidelines provided by the DASS-21 developers (Lovibond & Lovibond, 1995). Specifically, for the Depression scale, scores from 0–9 indicate normal levels of depressive symptoms; scores of 10–13 indicate mild symptoms; scores of 14–20 indicate moderate symptoms; scores of 21–27 indicate severe symptoms; and scores greater or equal to 28 indicate extreme symptoms. For the Anxiety scale, scores from 0–7 indicate normal levels of anxious symptoms; scores of 8–9 indicate mild symptoms; scores of 10–14 indicate moderate symptoms; scores of 15–19 indicate

severe symptoms; and scores greater or equal to 20 indicate extreme symptoms. For the Stress scale, scores from 0–14 indicate normal levels of stress symptoms; scores of 15–18 indicate mild symptoms; scores of 19–25 indicate moderate symptoms; scores of 26–33 indicate severe symptoms; and scores greater or equal to 34 indicate extreme symptoms.

Yale-Brown Obsessive-Compulsive Scale (Y-BOCS). The Y-BOCS (W. K. Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; W. K. Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989) measures the presence and severity of obsessive-compulsive disorder symptoms. The instrument items are subdivided into the Obsessions scale and the Compulsions scale. For each scale, five aspects of obsessive and compulsive pathology are each rated on a scale ranging from 0 (no symptoms) to 4 (extreme symptoms): time spent, degree of interference, distress, resistance (greater resistance is assigned lower scores), and perceived control over the symptom. Subscale scores are summed to yield a continuous total score. In the present study, reliability of the Obsessions and Compulsions scales was excellent (both $\alpha = .90$), as was reliability of the total scores ($\alpha = .93$).

Like the DASS-21, severity of obsessive-compulsive disorder symptomatology can be calculated using the Y-BOCS total scores following the guidelines provided by the instrument developers (W. K. Goodman, Price, Rasmussen, Mazure, Delgado, et al., 1989; W. K. Goodman, Price, Rasmussen, Mazure, Fleischmann, et al., 1989). Specifically, scores from 0–7 indicate subclinical levels of obsessive-compulsive disorder symptoms; scores of 8–15 indicate mild symptoms; scores of 16–23 indicate moderate symptoms; scores of 24–31 indicate severe symptoms; and scores greater or equal to 32 indicate extreme symptoms. Prior studies have demonstrated that using a Y-BOCS cutoff score of 11 yields good sensitivity (.86) and specificity (.92) (Lewin et al., 2011).

Posttraumatic Stress Disorder Symptom Scale (PSS-SR). The PSS-SR (E. B. Foa, Riggs, Dancu, & Rothbaum, 1993) is a 17-item self-report measuring posttraumatic stress disorder symptomatology which directly corresponds to Diagnostic and Statistical Manual of Mental Disorders-III-Revised (DSM-III-R) criteria. For all items, symptom frequency over the preceding two weeks is reported on a 4-point scale, where 0 = not at all, 1 = once per week, 2 = 2 to 4 times per week, and 3 = 5 or more times per week. A total score is obtained by summing each symptom rating (E. B. Foa et al., 1993). Typically, total scores of 15 or greater indicate symptom severity consistent with posttraumatic stress disorder (Coffey, Gudmundsdottir, Beck, Palyo, & Miller, 2006; Sin, Abidin, & Lee, 2012). Continuous scale scores are calculated by summing responses to the re-experiencing (4 items), avoidance (7 items), and arousal (6 items) items. In the present study, reliability of the scale scores was good ($\alpha = .76-.80$) and reliability of the total scores was excellent ($\alpha = .90$) In prior research, the PSS-SR has demonstrated strong positive predictive power (100%) and negative predictive power (82%) when compared to the Structured Clinical Interview for the DSM-III-R (Edna B. Foa, Riggs, Dancu, & Rothbaum, 1993).

For all mental health measures, continuous variables reflecting severity of mental health symptoms were created in accordance with the instrument manuals. We then identified clinical thresholds for each symptom group; that is, the scale score which indicates a level of symptoms severe enough that they would warrant targeted services from a mental health professional. These clinical thresholds were taken from the manuals themselves, when possible. When a clinical threshold was not specified in the manual, moderate symptom severity was used as a proxy.

Substance Abuse Subtle Screening Inventory (SASSI-3). The SASSI-3 (Miller & Lazowski, 1999) is a brief self-report screening measure that helps identify individuals who have a high probability of having a substance dependence disorder. The SASSI-3 has strong psychometric properties and is a well-established screening tool with good specificity (99%) and sensitivity (91%) and 95% agreement with clinical diagnoses (Lazowski, Miller, Boye, & Miller, 1998). Additionally, the SASSI has been found to have better accuracy than a urine toxicology (Horrigan, Piazza, & Weinstein, 1996).

The SASSI-3 includes both face valid and subtle items that have no apparent relationship to substance use. The subtle items, which consist of 67 true-false items, are included to identify some individuals with alcohol and other drug problems who may be unwilling or unable to acknowledge their substance misuse or symptoms associated with it. The subtle items are used following the guidelines provided in the SASSI-3 manual to estimate an individual's likelihood of substance abuse or dependence. After completion of the subtle items, participants complete 12 face valid items regarding alcohol use and 14 face valid items about drug use. These latter items do not query use of specific drugs, but rather query misuse of any drugs. The face valid items are rated on a 4-point scale where "never" receives a score of 0, "once or twice" is scored as a 1, "several times" a value of 2, and "repeatedly" receives a value of 3. In the current study, participants were instructed to reflect on the situations presented in each item in the context of "your entire life" (Miller & Lazowski, 1999). Total administration time is approximately 10 minutes.

Continuous scale scores for the face valid alcohol (FVA) and face valid other drug (FVOD) scales were obtained by summing the participant's responses according to the SASSI-3 manual guidelines (Miller & Lazowski, 1999). Scores of 20 or greater on the FVA scale or 21 or

greater on the FVOD indicate a high probability of substance dependence. Reliability was excellent for both scales (FVA, $\alpha = .87$ and FVOD, $\alpha = .93$). We additionally created dichotomous variables reflecting whether participants met criteria for lifetime substance abuse and lifetime substance dependence (yes, no), also following the guidelines in the SASSI-3 manual. Specifically, the SASSI-3 manual provides 11 decision rules (yes/no) to consider for interpretation derived from the subscales of the measure; a positive indicator on any of the first nine rules suggests a high probability of a substance dependence disorder while a positive indicator on either rule 10 or 11 suggests a high probability of a substance abuse disorder. When all rules are negative, the probability of a substance use disorder is low (Lazowski & Miller, 2013).

Participant characteristics. Participants additionally reported on sociodemographic characteristics including their *age* (measured in years), *race* (0 = Caucasian, 1 = non-Caucasian), *number of biological children* (including their new baby/ies), *level of education* (0 = no high school diploma, 1 = high school diploma or greater), *relationship status* (0 = single, 1 = in a relationship), *employment status* (0 = not employed, 1 = employed at least part-time), and *history of mental health problems* (0 = no, 1 = yes).

Procedures

Potential participants contacted the research team via secure phone or email, at which time they were screened for eligibility and interviews were scheduled. Participants completed the study measures during semi-structured, calendar-based interviews conducted by female research assistants at safe locations of the women's choice. Briefly, calendar-based interviews are the state of the art in surveying and interviewing (Belli, 1998; Belli, Shay, & Stafford, 2001; Schwarz & Oyserman, 2001). These methods require respondents to retrospectively report, using

a calendar as a memory aid. Personally significant and easy-to-remember landmark dates are marked on the calendar to serve as temporal anchors (Belli et al., 2001). In the present study, the delivery date was used to calculate the approximate date of conception. These two dates then served as the primary temporal anchors. Additional anchors included dates of admission and discharge to the hospital. Following the interviews, information regarding local mental health services (e.g., helpline phone numbers, shelter information, legal services, etc.) was provided as necessary. Women received an honorarium of \$20 for their participation, and up to \$5 for expenses associated with participation (e.g., parking, bus or cab fare).

Statistical Analyses

Descriptive statistics were computed for all study variables to characterize the sample and to identify outliers, if any. To answer research question 1, we conducted bivariate analyses using *t*-tests to examine participant's mean levels of postpartum mental health symptoms by prevalence (yes, no) of lifetime substance abuse and lifetime substance dependence. We additionally conducted bivariate correlations between all study variables to identify covariates for inclusion in our multivariate models and to test for collinearity.

To further explore the relationship between lifetime alcohol use and drug use with postpartum mental health, above and beyond sociodemographic characteristics and prior mental health problems (i.e., Research Question 2), we performed a series of hierarchical regression analyses with symptoms of depression, anxiety, stress, OCD, and PTSD as the continuous dependent variables. In each set of analyses, the first step comprised of sociodemographic characteristics including, employment status, ethnicity, age, highest education and relationship status. The prior mental health problems variable was added in the second step. Lifetime alcohol

use and drug use were added in the third and final step. Statistical significance was set at $\alpha = .05$. All analyses were conducted with IBM SPSS Statistics version 19.

Results

Descriptive Statistics

Participant characteristics are described in detail elsewhere (Desmarais, Pritchard, Lower, & Janssen, 2014). Briefly, participants ranged in age from 20-49 years old ($M = 32.47$, $SD = 4.97$) and were predominantly Caucasian (71%). Approximately two-thirds (64%) were new mothers, with no other biological children; this was the second child for about one-quarter of women (27%). The majority of participants were in a partnered relationship, with 84% married and 10% living with their partner. The sample was well-educated, with only 4% having no high school diploma. The remaining participants (29%) reported some post-secondary or post-baccalaureate education. Additionally, most of the sample was employed, with 65% reporting full-time employment and 17% reporting part-time employment. On average, participants were 2.01 months postpartum ($SD = 1.32$, range = 0-5) at the time of their interview.¹

Table 1 provides the descriptive statistics for the prevalence of postpartum mental health symptoms and lifetime substance use and Table 2 presents statistics for postpartum mental health severity levels. While the majority of the women in the sample did not reach the clinical

¹All women were recruited within 0-3 months postpartum; however, some participants were ultimately not interviewed until 4 ($n = 10$) or 5 ($n = 3$) months postpartum due to scheduling difficulties. These participants were retained in all analyses, as there were no significant differences in any of the outcome variables or SASSI-3 scales as a function of baby age ($ps \geq .220$)

threshold for mental health or substance use disorders, 47% of participants nonetheless reported symptoms in the moderate to severe range of postpartum distress on at least one measure of mental health. Additionally, 43% of participants met the criteria for lifetime substance abuse, and 25% met criteria for lifetime substance dependence.

Bivariate Analyses

Table 3 presents results of pairwise *t*-tests comparing postpartum mental health symptoms between participants who do and do not meet criteria for substance abuse and substance dependence, respectively. Results showed that participants who met criteria for lifetime substance abuse or dependence reported significantly greater postpartum symptoms of anxiety, depression, obsessive compulsive disorder, and post-traumatic stress disorder compared to those who did not meet diagnostic criteria. Levels of postpartum stress did not differ significantly between groups, though the pattern of results was in the same direction.

Bivariate correlations of the sociodemographic characteristics, employment status, ethnicity, age, level of education, and relationship status were related to at least one of our postpartum mental health outcome variables, and, as a result, were retained as covariates for inclusion in the multivariate analyses. Specifically, DASS-21 Depression scale scores were greater for women who were single ($r = -.27, p = .007$), had prior mental health problems ($r = .50, p \leq .001$), had higher SASSI-3 alcohol (FVA) scale scores ($r = .26, p = .011$), and higher SASSI-3 drug (FVOD) scale scores ($r = .33, p \leq .001$). DASS-Anxiety scale scores were related to lack of employment ($r = -.20, p = .046$), younger age ($r = -.29, p = .003$), lower education ($r = -.32, p \leq .001$), being single ($r = -.31, p \leq .001$), prior mental health problems ($r = .49, p \leq .001$), higher SASSI-3 alcohol (FVA) scale scores ($r = .25, p = .012$), and higher SASSI-3 drug (FVOD) scale scores ($r = .40, p \leq .001$). DASS-21 Stress scale scores were greater for women

who were single ($r = -.20, p = .05$), had prior mental health problems ($r = .66, p \leq .001$), and higher SASSI-3 drug (FVOD) scale scores ($r = .34, p \leq .001$). PTSD symptoms were associated with lack of employment ($r = -.27, p = .007$), lower education ($r = -.31, p = .002$), being single ($r = -.44, p \leq .001$), prior mental health problems ($r = .48, p \leq .001$), higher SASSI-3 alcohol (FVA) scale scores ($r = .36, p \leq .001$), and higher SASSI-3 drug (FVOD) scale scores ($r = .47, p \leq .001$). Finally, OCD symptoms were greater for women who were white ($r = -.19, p = .055$), had prior mental health problems ($r = .50, p \leq .001$), and had higher SASSI-3 drug (FVOD) scale scores ($r = .23, p = .025$). Prior mental health problems was strongly related with all postpartum mental health outcome variables and thus, was included as a covariate in our subsequent multivariable models.

Multivariable Analyses

Table 4 presents the fit statistics for each step, as well as the regression coefficients for the final, full model. Step one of the regression analyses were significant for postpartum anxiety [$F(5,92) = 5.19, p < .001, R^2_{adj} = .178$], and PTSD [$F(5,92) = 6.10, p < .001, R^2_{adj} = .208$], but not depression [$F(5,92) = 1.74, p = .132, R^2_{adj} = .037$], stress [$F(5,92) = 1.19, p = .319, R^2_{adj} = .010$], or OCD [$F(5,92) = 1.66, p = .152, R^2_{adj} = .033$]. Three sociodemographic characteristics emerged as significant predictors across the five outcome measures. Specifically, being single was associated with depression ($\beta = -0.25, p = .030$), anxiety ($\beta = -0.28, p = .009$) and postpartum PTSD ($\beta = -0.39, p < .001$), age was negatively associated with symptoms of postpartum anxiety ($\beta = -0.28, p = .006$), and being Caucasian was associated with greater symptoms of OCD ($\beta = -0.21, p = .044$). The addition of prior mental health problems in step two significantly improved the model fit and amount of variance explained for all outcome variables ($F_{change}[1] > 23.76, ps < .001, R^2_{change} > .015$) (See Table 4). Prior mental health problems emerged as a significant predictor of

each outcome variable, above and beyond sociodemographic characteristics ($ps < .001$). Step three added lifetime alcohol use and lifetime drug use increasing the amount of variance explained in postpartum PTSD ($F_{change}[2] = 4.70, p = .011, R^2_{change} = .057$). The model fit improved in step three for stress ($F_{change}[2] = 2.92, p = .059, R^2_{change} = .034$) and anxiety ($F_{change}[2] = 2.74, p = .070, R^2_{change} = .036$), but did not reach significance. The addition of lifetime alcohol and drug use in step three did not improve model fit for depression ($F_{change}[2] = 1.65, p = .198, R^2_{change} = .025$) or OCD ($F_{change}[2] = 0.98, p = .380, R^2_{change} = .015$). Lifetime drug use, specifically, emerged as a significant predictor of postpartum anxiety ($\beta = 0.23, p = .041$) and stress ($\beta = 0.25, p = .021$), above and beyond prior mental health problems and sociodemographic characteristics, but was not a significant predictor of postpartum depression, PTSD, and OCD ($ps > .115$). Lifetime alcohol use did not emerge as a significant predictor for any of the outcome variables ($ps > .128$). (See Table 4 for a summary of the final model.)

Discussion

The purpose of this study was to examine lifetime substance use as a risk factor for postpartum mood disorders in a community-based, non-clinical sample of 100 postpartum women from an urban, Canadian city. We were specifically interested in whether women who met criteria for lifetime substance use disorders experienced higher levels of postpartum stress, anxiety, depression, OCD, and PTSD, as well as the unique associations of lifetime alcohol use and drug use with these same postpartum mental health problems. To our knowledge this is the first study to query substance use from a lifetime perspective and to explore associations with a diverse range of postpartum mental health problems. Overall, findings support lifetime substance use – and lifetime drug use, specifically – as a risk factor for postpartum mental health problems.

Reflective of our community-based, non-clinical sample, we saw relatively low levels of postpartum mental health problems, as well as lifetime alcohol and drug use, compared to what we would expect in a treatment-seeking sample. Nonetheless, 47% of the participants reported moderate to extreme levels of symptomatology on at least one of the postpartum mood measures. Additionally, 43% of participants reported behaviors indicative of lifetime substance abuse and 25% appeared to have experienced substance dependence at some point in their lifetime. In fact, these figures exceed population-based estimates for postpartum mood disorders, as well as substance use (Centers for Disease Control, 2008; Substance Abuse and Mental Health Services Administration, 2014). As noted earlier, our strategy of querying lifetime, as opposed to current or prenatal substance use, may have promoted increased disclosure and improved our detection of substance use problems among postpartum women.

Importantly, even in this community-based, non-clinical sample, lifetime substance use problems emerged as an important predictor of postpartum mental health problems. Bivariate analyses showed that women who met criteria for both lifetime substance abuse and substance dependence experienced higher levels of postpartum anxiety, depression, OCD, and PTSD. Women who met criteria for lifetime substance abuse also showed higher levels of postpartum stress compared to those who did not meet criteria for lifetime substance abuse, though the difference did not meet the threshold for significance ($p = .057$). Multivariable analyses revealed that consideration of lifetime substance use improves upon the variability explained in postpartum PTSD, above and beyond sociodemographic characteristics and prior mental health problems, and further revealed that lifetime drug use, in particular, is associated with postpartum stress and anxiety. Given the relatively low levels of symptomatology observed in the present study, we would expect to find even stronger associations between lifetime substance use and

postpartum mental health problems in a clinical—or even more normally distributed—population.

Findings are in keeping with the empirical evidence demonstrating associations between substance use and mental health problems. As was found in the present study's sample of postpartum women, population-based studies not only demonstrate the co-occurrence of substance use and mental health problems (Kessler et al., 1996; Regier et al., 1990, Regier et al., 1993), but also suggest stronger associations of drug use than alcohol use with mood disorders (Grant et al., 2004). Beyond comorbidity, findings of prior research demonstrate that substance use can precede mental health problems (de Graaf et al., 2003), providing further support for lifetime substance use as a risk factor for postpartum mental health problems. Specifically, through neuroadaptation, chronic drug use can disrupt the stress and reward pathways in the brain, resulting in mood disturbances in the absence of drug use (Brady & Sinha, 2005).

Taken together, findings suggest that lifetime drug use is associated with PPMD symptoms. Future research should examine whether routine screening for lifetime drug use during antenatal and postpartum care improves identification of women experiencing PPMD. Such routine screening is consistent with the Healthy People 2020 and US Preventive Services Task Force public health initiatives to improve maternal and child health (Siu et al., 2016; U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion., 2011) and may improve early intervention with women at elevated risk for postpartum mental health problems. Indeed, research suggests that pregnancy can be a period of abstinence for many women with substance use problems (Substance Abuse and Mental Health Services Administration, 2014). Moreover, it is possible that screening for lifetime substance use, as opposed to current substance use, could promote disclosure by reducing barriers associated with

social stigma (Daley, Argeriou, & McCarty, 1998; Finkelstein, 1994; Morrow-Tlucak et al., 1989; NIDA, 1997), fears of consequences (e.g., involvement of Child Protective Services, involuntary commitment, or criminal prosecution) (Lester, Andreozzi, & Appiah, 2004), or even denial (Ernhart et al., 1988), thereby improving screening accuracy. Though findings of the present study are promising, the contributions of screening for lifetime substance use during antenatal and postpartum care to the identification of women at risk of PPMD needs to be tested in future research.

Limitations

Conclusions based on the findings of the current study should be made within some limitations of the study design. For instance, the data are cross-sectional and do not afford longitudinal analyses of the effects of substance use on postpartum mental health. Also, lifetime substance use and postpartum mental health problems were queried retrospectively at one point in time. As such, we cannot speak to whether a participant reported on current substance use, use during pregnancy, or use that occurred in her distant past. Nonetheless, our findings show that any history of drug use – regardless of the timing – can have a negative impact on postpartum mental health. Additionally, we relied on self-report measures that may be susceptible to recall bias and errors, as well as the effects of social desirability. That said, self-report has been shown to be a valid and reliable method for collecting sensitive data, including reports of postpartum mental health problems (Boyd, Le, & Somberg, 2005) and substance use (Darke, 1998). Additionally, we employed a calendar-based interviewing approach, which has been shown to increase reliability and validity of retrospective, behavioral reports (Belli, Shay, & Stafford, 2001; Schwarz & Oyserman, 2001). However, future research should use a prospective design to establish the effectiveness of antenatal and postpartum screening for lifetime substance use in

identifying and reducing risk for postpartum mental health problems. Finally, we had a relatively small convenience sample of women who volunteered for a study on health after pregnancy and generalizability of our findings to larger and more diverse samples should be tested in future research.

Conclusions

Postpartum mental health problems remain a serious public health issue affecting at least one in 10 women. Though existing screening protocols frequently query current substance use, such a strategy may overlook women not currently using but nonetheless at elevated risk. This study provides the first evidence that lifetime drug use is associated with postpartum mental health problems. However, further research is necessary to clarify the mechanism(s) through which lifetime substance use contributes to the development of postpartum mental health problems, to better understand why lifetime substance use is associated with postpartum mental health problems. Future research also should continue to explore the potentially differential effects of lifetime alcohol use versus drug use on postpartum mental health. Such research would help identify treatment targets and inform the development of intervention strategies with the greatest potential to reduce risk for postpartum mental health problems among women with histories of substance use problems. Such evidence-based intervention strategies, in turn, would have the greatest potential to improve the health and well-being of mothers and their children.

Table 1

Prevalence and Severity of Lifetime Substance Use and Postpartum Mental Health Problems in a Community Sample of Women (2009-2010)

	<i>n</i>	<i>M</i>	<i>SD</i>	Range	% Meeting Clinical Threshold
Mental Health Symptoms					
Depression	100	5.74	5.70	0-24	14%
Anxiety	100	5.02	5.43	0-24	20%
Stress	100	14.36	9.21	0-38	30%
Obsessive Compulsive Disorder	100	5.58	6.88	0-23	13%
Post-Traumatic Stress Disorder	100	7.37	7.82	0-34	21%
Substance Use					
Alcohol Use	98	6.47	5.35	0-28	N/A
Drug Use	98	3.22	6.23	0-41	N/A
Substance Abuse	98				43%
Substance Dependence	98				25%

Note. Total *N* = 100. *n* = number of participants, *M* = mean, *SD* = standard deviation

Table 2*Severity of Postpartum Mental Health Symptoms in a Community Sample of Women (2009-2010)*

Mental Health Symptoms (Severity range)	%	<i>n</i>
Depression		
Normal (0-9)	74%	74
Mild (10-13)	12%	12
Moderate (14-20)	11%	11
Severe (21-27)	3%	3
Extreme (≥ 28)	0%	0
Anxiety		
Normal (0-7)	73%	73
Mild (8-9)	7%	7
Moderate (10-14)	14%	14
Severe (15-19)	4%	4
Extreme (≥ 20)	2%	2
Stress		
Normal (0-14)	59%	59
Mild (15-18)	11%	11
Moderate (19-25)	17%	17
Severe (26-33)	9%	9
Extreme (≥ 34)	4%	4
Obsessive Compulsive Disorder		
Subclinical (0-7)	68%	68
Mild (8-15)	19%	19
Moderate (16-23)	13%	13
Severe (24-31)	0%	0
Extreme (≥ 32)	0%	0
Post-Traumatic Stress Disorder		
Normal (0-14)	79%	79
Symptom-level consistent with diagnosis (≥ 15)	21%	21

Note. Total $N = 100$. n = number of participants.

Table 3

Bivariate Comparisons of Mean Postpartum Mental Health Symptoms by Lifetime Substance Abuse and Dependence in a Community Sample of Women (2009-2010)

	Postpartum Mental Health Symptoms									
	Stress		Anxiety		Depression		OCD		PTSD	
	<i>M (SD)</i>	<i>t (p)</i>	<i>M (SD)</i>	<i>t (p)</i>	<i>M (SD)</i>	<i>t (p)</i>	<i>M (SD)</i>	<i>t (p)</i>	<i>M (SD)</i>	<i>t (p)</i>
Substance Abuse										
No (<i>n</i> = 57)	12.84 (8.14)	-1.92 (.057)	3.40 (3.98)	-3.42 (.001)	4.07 (3.54)	-3.28 (.002)	4.35 (5.95)	-2.02 (.047)	4.84 (5.46)	-3.73 (< .001)
Yes (<i>n</i> = 43)	16.37 (10.21)		7.16 (6.32)		7.95 (7.14)		7.21 (7.71)		10.72 (9.18)	
Substance Dependence										
No (<i>n</i> = 75)	13.47 (8.58)	-1.52 (.137)	3.89 (4.76)	-3.43 (.002)	4.64 (4.93)	-3.06 (.004)	4.51 (5.95)	-2.35 (.025)	6.15 (6.60)	-2.29 (.029)
Yes (<i>n</i> = 25)	17.04 (10.63)		8.40 (5.97)		9.04 (6.61)		8.80 (8.46)		11.04 (9.96)	

Note. Total *N* = 100. *M* = mean, *SD* = standard deviation, OCD = Obsessive Compulsive Disorder, PTSD = Post-Traumatic Stress Disorder. Values in bold are significant at *p* < .05.

Table 4

Summary of Final Hierarchical Regression Models Predicting Postpartum Mental Health Symptoms in a Community Sample of Women (2009-2010)

Steps	Depression		Anxiety		Stress		PTSD		OCD	
1. Sociodemographic characteristics	$F(5,92)=1.74,$ $R^2_{adj}=.037$		$F(5,92)=5.19^{***},$ $R^2_{adj}=.178$		$F(5,92)=1.19,$ $R^2_{adj}=.010$		$F(5,92)=6.10^{***},$ $R^2_{adj}=.208$		$F(5,92)=1.66,$ $R^2_{adj}=.033$	
	β (SE)	t	β (SE)	t	β (SE)	t	β (SE)	t	β (SE)	t
Employment	0.60 (1.45)	0.63	-0.03 (1.27)	-0.35	0.39 (2.04)	0.47	-0.11 (1.77)	-1.30	0.06 (1.74)	0.58
Ethnicity	0.03 (1.14)	0.28	-0.00 (1.00)	-0.02	-0.07 (1.61)	-0.86	0.12 (1.39)	1.43	-0.19 (1.37)	-2.04*
Age	-0.06 (0.11)	-0.60	-0.27 (0.10)	-3.07**	-0.05 (0.16)	-0.54	-0.03 (0.14)	-0.36	-0.12 (0.13)	-1.29
Education	-0.03 (3.39)	-0.29	-0.04 (2.96)	-0.35	0.07 (4.76)	0.69	0.01 (4.13)	-0.04	-0.09 (4.07)	-0.76
Relationship	-0.11 (2.68)	-1.02	-0.14 (2.35)	-1.42	-0.04 (3.77)	-0.48	-0.24 (3.27)	-2.61**	0.10 (3.22)	0.95
2. Mental health history	$F(6,91)=6.38^{***},$ $R^2_{adj}=.250$		$F(6,91)=9.43^{***},$ $R^2_{adj}=.343$		$F(6,91)=12.01^{***},$ $R^2_{adj}=.405$		$F(6,91)=10.30^{***},$ $R^2_{adj}=.365$		$F(6,91)=6.87^{***},$ $R^2_{adj}=.266$	
	β (SE)	t	β (SE)	t	β (SE)	t	β (SE)	t	β (SE)	t
Prior Mental Health Problems	0.45 (1.09)	4.82***	0.38 (0.95)	4.43***	0.60 (1.53)	7.41***	0.37 (1.33)	4.45***	0.47 (1.31)	5.13***
3. Lifetime substance use	$F(8,89)=5.27^{***},$ $R^2_{adj}=.260$		$F(8,89)=8.03^{***},$ $R^2_{adj}=.367$		$F(8,89)=10.12^{***},$ $R^2_{adj}=.429$		$F(8,89)=9.53^{***},$ $R^2_{adj}=.413$		$F(8,89)=5.39^{***},$ $R^2_{adj}=.266$	
	β (SE)	t	β (SE)	t	β (SE)	t	β (SE)	t	β (SE)	t
Alcohol use	0.09 (.12)	0.82	-0.01 (0.10)	-0.05	-0.06 (0.17)	-0.60	0.15 (0.15)	1.54	-0.08 (0.14)	-0.70
Drug use	0.12 (.11)	1.03	0.23 (0.10)	2.08*	0.25 (0.16)	2.34*	0.17 (0.13)	1.59	0.17 (0.13)	1.40

Notes. * $p < .05$; ** $p < .01$; *** $p < .001$. Values in bold are significant at $p < .05$.

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CHAPTER 3

Facilitators and Barriers to Disclosure of Postpartum Mood Disorder Symptoms to a Healthcare Provider

Objectives: This study explored perceived barriers and facilitators to disclosure of postpartum mood disorder (PPMD) symptoms to healthcare professionals among a community-based sample.

Methods: A sample of women ($n=211$) within 3 years postpartum participated in an online survey including the Perceived Barriers to Treatment Scale, the Maternity Social Support Scale, the Depression, Anxiety and Stress Scales-21, and items querying PPMD disclosure. Analyses examined: 1) characteristics associated with perceived barriers; 2) characteristics associated with perceived social support; and 3) characteristics, perceived barriers, and perceived social support as predictors of disclosure.

Results: Over half of the sample reported PPMD symptoms, but 1 in 5 did not disclose to a healthcare provider. Approximately half of women reported at least one barrier that made help-seeking “extremely difficult” or “impossible.” Over one-third indicated they had less than adequate social support. Social support and stress, but not barriers, were associated with disclosure in multivariable models.

Conclusions for Practice: Many women experiencing clinically-significant levels of distress did not disclose their symptoms of PPMD. Beyond universal screening, efforts to promote PPMD disclosure and help-seeking should target mothers’ social support networks.

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Introduction

Postpartum mood disorders (PPMD) represent a serious public health problem affecting 10-20% of mothers (CDC, 2008). Despite their increased healthcare contact during the prenatal period, pregnant women are more likely to have undiagnosed mood disorders than their non-pregnant peers (Ko, Far Dietz & Robins, 2012). Accordingly, the US Preventive Task Force recently called for universal screening of perinatal women to improve postpartum mood disorder identification and treatment (Siu et al., 2016). While universal screening represents a critical step toward improving perinatal mental health, it will not serve as a panacea. Even when screening occurs, not all women will disclose and seek treatment. To demonstrate, among 491 women receiving obstetrical care, only 25% who screened positive for PPMD ultimately received treatment (Goodman & Tyer-Viola, 2010). Thus, there is a need for research on factors that act as barriers or facilitators to disclosure and help-seeking.

Women may experience barriers to disclosure and help-seeking for PPMD at both the provider- and individual-level. Research, for example, has identified time constraints, insufficient reimbursement, and inadequate mental health training as reasons for low screening by OB/GYNs (Santora & Peabody, 2010). Like OB/GYNs, pediatricians frequently report barriers to maternal mental health screening, including insufficient time to gather history and/or provide counseling, inadequate training, and low confidence in ability to diagnose maternal and postpartum depression (Olson et al., 2002). Indeed, a survey of 1,600 members of the American Academy of Pediatrics found approximately 85% of pediatricians received no training in adult mental health (Head et al., 2008). Moreover, less than 10% of a national sample of pediatricians felt it was their responsibility to identify and treat PPMD (Olson et al., 2002), even though they have frequent contact with new mothers. Finally, surveys of physicians indicate that a lack of

community resources to which they can refer mothers experiencing PPMD symptoms presents another significant barrier for physicians (Wiley, Burke, Gill, & Law, 2004).

Beyond these provider-level screening barriers, women may experience structural, knowledge, and attitudinal barriers to disclosure and help-seeking for PPMD (O'Mahen & Flynn, 2008). Structural barriers represent logistical and practical obstacles, such as cost, lack of insurance (Santora & Peabody, 2010; Teaford, Goyal, & McNeish, 2015), time constraints, lack of childcare, and dearth of available referral resources (Gjerdingen & Yawn, 2007). Knowledge barriers include limited knowledge regarding PPMD symptoms, unfamiliarity with the consequences of untreated PPMD, and lack of information regarding where to seek treatment (Santora & Peabody, 2010). Women also may hold attitudes that reduce their likelihood of disclosure, such as fear of social stigma, fear that disclosure will result in a notification to child protective services (Byatt, Biebel, Friedman, Debordes-Jackson, & Ziedonis, 2013; Santora & Peabody, 2010), and insensitive comments from healthcare providers (Teaford et al., 2015).

Social support may buffer against these barriers to facilitate disclosure and help-seeking for PPMD. A substantial body of research shows positive associations between health outcomes and social support (Cohen, 2004; Wang, Wu, & Liu, 2003) and, consequently, social support is frequently used to facilitate treatment engagement and improve other health outcomes across healthcare specialties (DiMatteo, 2004; Reblin & Uchino, 2008). There also is strong evidence documenting the associations of the availability and quality of social support with PPMD outcomes (Beck, 2001, 2002; Xie, He, Koszycki, Walker, & Wen, 2009); however, research on the effects of social support on PPMD disclosure has been limited, to date.

The Present Study

As we embark upon universal screening for PPMD, there is a need to identify factors that

may promote PPMD disclosure and help-seeking among new mothers. To that end, we conducted a survey of community-based women within three years postpartum regarding facilitators and barriers to disclosure and help-seeking for PPMD symptoms. We had three specific aims to examine: 1) participant characteristics associated with perceived barriers to help-seeking for PPMD; 2) participant characteristics associated with perceived social support; and 3) participant characteristics, perceived barriers, and perceived social support as predictors of disclosure of PPMD symptoms to healthcare professionals.

Methods

The North Carolina State University Institutional Review Board approved this study. All participants provided electronic written informed consent.

Study Population, Recruitment, and Procedures

The study population was English-speaking mothers who had delivered a child since January 1, 2012, aged 18 years and older in the metropolitan area of a large, southeastern U.S. city. Participants were recruited through convenience and snowball sampling using multiple strategies. Recruitment materials were posted at local OB/GYN offices and pediatrician offices and on the practice websites. The study was also advertised through a local news channel parenting website, a new mothers' support group listserv, as well as online communities, and social media networks targeting new mothers. Participants self-selected to participate by visiting the study website that described the study's focus on experiences that may be associated with health and well-being after pregnancy. Participants who consented to the study were then directed through the survey and provided with a list of local resources. Participants received either a \$10 Amazon gift card or were entered into a raffle to win one of 10 Amazon gift cards valued at \$25 each. Data were collected from June 2015 through December 2015.

Study Sample

Overall, 291 community-based women who met inclusion criteria consented to participate in the survey, and of those, 73% provided usable responses for a final study sample of 211 women. Participants ranged in age from 22-45 years old ($M = 32.99$, $SD = 4.10$) and were predominantly Caucasian (91%). One-half (51%) were new mothers, with no other biological children; this was the second child for about approximately forty percent. The majority of participants were in a partnered relationship, with 94% married and 4% living with their partner. The sample was well-educated, with 87% having earned at least a university degree and only 9% having some college or less. Additionally, most of the sample was employed, with 61% reporting either full-time or part-time employment. Accordingly, the majority of the sample reported combined household earnings in excess of the median income for the county (\$66,579) (“Wake County North Carolina Quickfacts from the US Census Bureau,” n.d.); over three-fourths of the sample had a combined household salary greater than \$70,000. On average, participants were 14.15 months postpartum ($SD=9.33$, range=0-36) at the time of participation.

Measures

Participant characteristics. Participants reported on sociodemographic characteristics including their *age* (measured in years), *race* (0=Caucasian, 1=non-Caucasian), *number of biological children* (including their new baby/ies), *age of most recent baby/ies* (measured in months), *level of education* (0=no high school diploma, 1=high school diploma or greater), *relationship status* (0=single, 1=in a relationship), *employment status* (0=not employed, 1=employed at least part-time), *mental health problems prior to pregnancy* (0=no, 1=yes), and *mental health problems during pregnancy* (0=no, 1=yes). Participants also were asked whether they *self-identified as having a PPMD* (0=no, 1=yes) and whether they received a *formal*

diagnosis (0=no, 1=yes). Participants also ranked individuals in their support network regarding their contribution to participants' postpartum adjustment.

Depression, Anxiety, and Stress Scales (DASS-21). The DASS-21 (Lovibond & Lovibond, 1995) is a 21-item self-report questionnaire designed to measure the symptoms severity of depression, anxiety, and tension/stress. Each of the three DASS-21 sub-scales contains seven items. Respondents used a 4-point scale to rate the extent to which they have experienced each state over the past week. Each item is scored from 0 (did not apply to me at all) to 3 (applied to me very much or most of the time). Scores for Depression, Anxiety and Stress are calculated by summing relevant item ratings and multiplying by a factor of two. Severity of symptomatology was calculated for each subscale following the manual guidelines (Lovibond & Lovibond, 1995). For all subscales, scores ranged from 0-28 indicating normal to extreme symptomatology: depressive scale (0-9=normal; 10-13=mild; 14-20=moderate; 21-27=severe; and ≥ 28 =extreme); anxiety scale (0-7=normal; 8-9=mild; 10-14=moderate; 15-19=severe; ≥ 20 =extreme); and stress scale (0-7=normal; 8-9=mild; 10-14=moderate; 15-19=severe; ≥ 20 =extreme). A total DASS-21 score is calculated by summing all items. In the present study, reliability was excellent (subscales $\alpha \geq .91$; total $\alpha = .96$).

Perceived Barriers to Psychological Treatment (PBPT). The PBPT (Mohr et al., 2010) scale consists of 27 items which combine to produce eight subscales: stigma, lack of motivation, emotional concerns, negative evaluation of therapy, misfit of therapy to needs, time constraints, participation restrictions, and availability of services. A single item regarding treatment cost was retained by developers, though there is not a cost subscale. In the present study, we included an item regarding childcare availability that was not retained by the PBPT developers. Additionally, two items regarding fear of negative evaluation of mothering abilities and fear of child protective

services involvement were added, given the prominence of these two factors in the literature. Participants rated the level to which each item interfered with them accessing mental health treatment while experiencing postpartum mood symptoms based on a 5-point Likert scale, such that 5=impossible, 4=extremely difficult, 3=moderately difficult, 2=slightly difficult, and 1=not difficult at all.

Subscale scores were interpreted dichotomously by identifying participants with at least one item rated as “impossible” or “extremely difficult.” Additionally, a total score was calculated by summing the items. Subscale reliability ranged from poor ($\alpha = .62$ for time constraints and $\alpha = .68$ for participation restriction), to adequate ($\alpha = .75$ for negative evaluation of therapy, $\alpha = .77$ for availability of services, and $\alpha = .78$ for misfit of therapy to needs), to excellent ($\alpha = .81$ for emotional concerns, $\alpha = .87$ for stigma, and $\alpha = .90$ for lack of motivation). Reliability of the total score was excellent ($\alpha = .91$).

Maternity Social Support Scale (MSSS). The MSSS (Webster et al., 2000) is a six-item questionnaire that queries friendship network, family support, partner support, conflict with partner, feeling controlled by partner, and perception of being loved by partner. Item responses use a 5-point Likert-type scale with 5=always, 4=most of the time, 3=some of the time, 2=rarely, 1=never. The partner conflict and control items are reverse coded. A total scale score is obtained by summing the items such that a higher total score reflects greater social support. Interpretation of the scores was consistent with guidelines set by developers: 0-18=low support, 19-24=medium support, and scores >24 =adequate support. Reliability of the total score was adequate ($\alpha = .74$).

Disclosure. Participants were provided with a list of healthcare profession types and asked to indicate to whom, if anyone, they had disclosed their PPMD symptoms (0=no, 1=yes).

For analyses, responses were collapsed into a dichotomous variable signifying *any disclosure* (0=no, 1=yes) to a healthcare provider.

Statistical Methods

We first calculated descriptive statistics on all study variables. We then conducted bivariate correlations examining associations between participant characteristics and our outcome variables (i.e., PBPT total scores, MSSS total scores, and disclosure) to identify covariates for inclusion in our multivariate analyses. Statistical significance was set at $\alpha=.05$. All analyses were conducted with IBM SPSS Statistics version 19.

To address our first research aim, we calculated subscale scores and total scores for the PBPT, as well as comparing frequency counts for subscales with at least one barrier rated as “impossible” or “extremely difficult.” We then performed a hierarchical linear regression analysis with sociodemographic characteristics in step one, and self-identification of postpartum symptoms as well as DASS subscales scores in step two. To address our second research aim, we calculated total scores for the MSSS. We then performed a hierarchical linear regression analysis with sociodemographic characteristics in step one; self-identification of postpartum symptoms and DASS subscales scores were added in step two with MSSS total scores as the continuous dependent variable. To address our third research aim, we computed a hierarchical logistic regression with disclosure to any healthcare professional as the dichotomous dependent variable (no, yes). The model was comprised of three steps: step one included sociodemographic characteristics that were significantly associated with either PBPT or MSSS total scores in the bivariate analyses; step two added DASS subscales scores; and step three added the MSSS and PBPT total scores.

Results

Descriptive Statistics

Over one-third (36%, $n=76$) of participants reported a mental health diagnosis prior to pregnancy, but only 4.3% ($n=9$) reported receiving a mental health diagnosis during pregnancy. When asked to compare their experiences to a list of PPMD symptoms, over half (51%, $n=107$) of the sample reported experiencing disrupted postpartum mood. Regarding formal psychiatric diagnoses, only 49% ($n=52$) of those who self-identified as having experienced PPMD symptoms received a diagnosis from a medical professional. Mean Depression and Anxiety subscale scores were in the normal range (Depression: $M=7.32$, $SD=8.86$, range 0-38; Anxiety: $M=6.65$, $SD=8.51$, range 0-36), while the Stress subscale was in the moderate range ($M=13.83$, $SD=10.48$, range 0-46). Additionally, 37.3% of the sample had at least one DASS-21 subscale for which symptom severity was moderate or greater.

Table 1 presents participants' disclosure of PPMD symptoms to different healthcare professionals. More than one in five (21%) participants indicated they did not disclose their PPMD symptoms to a healthcare provider. When they did disclose, participants were most likely to tell to their OB/GYN (53%), child's pediatrician (37%), or lactation consultant (18%). Participants were least likely to disclose to primary care staff (2%) or psychiatrist (9%). PBPT total scores ranged from 25 to 74 ($M=38.74$, $SD=13.01$). Almost half (46%) of the participants reported at least one barrier made treatment "impossible" or "extremely difficult." Stigma (19%), time constraints (18%), and lack of motivation (16%) were the most frequently reported barriers. Participants' average total score on the MSSS ($M=25.26$, $SD=3.54$, range 14-30) was in the adequate range. However, 35% of MSSS scores (6% low and 29% medium) failed to reach the

adequate range. Regarding social support, partner/spouse, other family, and friends were rated as most important, and doula/midwife and church community, least important.

Bivariate Associations

Table 2 presents bivariate correlations between all study variables to identify covariates for inclusion in our multivariate models. Results showed that current employment, prior mental health history, self-identification of postpartum symptoms, and all three DASS-21 subscale scores were significantly associated with PBPT total scores. Participant age, relationship status, mental health history, self-identification of PPMD symptoms, and all three DASS-21 subscale scores were associated with the MSSS total scores. Only the DASS Depression subscale scale and MSSS total scores were significantly associated with disclosure to a healthcare professional.

Multivariate Results

Table 3 presents the regression models predicting perceived barriers (PBPT) and maternal support (MSSS). The first step of the model predicting PBPT scores, consisting of employment status and history of mental health problems, was significant. Both employment status and history of mental health problems were significant predictors. The addition of self-identification of postpartum symptoms and DASS subscale scores in the second step significantly improved model fit; all variables in this step were associated with PBPT scores (see Table 3).

The first step of the model predicting MSSS scores, consisting of participant age, relationship status, and history of mental health problems, was significant; however, only relationship status and history of mental health problems predicted MSSS scores. The addition of self-identification of postpartum symptoms and DASS-21 subscale scores in the second step significantly improved model fit. Relationship status, self-identification of postpartum

symptoms, DASS Anxiety, and DASS Stress, but not DASS Depression, were associated with MSSS scores (see Table 3).

Table 4 presents results of the stepwise logistic regression analysis predicting disclosure. Step 1, which included participant age, relationship status, and employment, was not significant ($p=.500$). The addition of self-identification of PPMD symptoms and DASS-21 subscales in the second step improved model fit, but not sufficiently to achieve significance ($p=.299$). The addition of the MSSS and PBPT total scores resulted in a significant model. In this full model, the MSSS total scores and DASS Stress subscale scores were associated with disclosure (see Table 4).

Conclusions for Practice

Postpartum mood disorders (PPMD) represent a serious public health problem (CDC, 2008). Current recommendations for universal screening of all perinatal women (Siu et al., 2016) will only improve maternal mental health if women actually disclose their symptoms to healthcare providers and seek treatment (J. H. Goodman & Tyer-Viola, 2010). The purpose of this study was to examine perceived barriers and facilitators--social support, in particular--to PPMD symptom disclosure and help-seeking among new mothers. Specifically, we examined: 1) participant characteristics associated with perceived barriers; 2) participant characteristics associated with perceived social support; and 3) participant characteristics, perceived barriers, and perceived social support as predictors of disclosure of PPMD symptoms to healthcare professionals.

Summary of Findings

Despite our community-based sample, over half of the women self-identified as experiencing PPMD symptoms. Further, more than one-third of the women reported current

symptoms of depression, anxiety, or stress severity that were moderate or greater. Yet, among women who identified as experiencing PPMD symptoms, 1 in 5 did not disclose to a healthcare provider. Indeed, results of Aim 1 analyses showed that many women reported at least one barrier, with a third reporting multiple barriers, that made help-seeking “impossible” or “extremely difficult”. Consistent with the literature (Goodman, 2009; Ko et al., 2012), the most commonly reported barriers included stigma, time constraints, and lack of motivation. Unemployment, history of mental health problems, self-identification of postpartum symptoms, current depression, anxiety, and stress were associated with greater endorsement of barriers in bivariate analyses; however, only self-identification of postpartum symptoms and stress were predictors in a multivariable model. These findings suggest that those women most in need of treatment are also the ones who perceive the most barriers to receiving care. Because the current sample was fairly well-educated and affluent, we would expect even greater endorsement of barriers among new mothers of more modest education and means, who are at heightened risk of PPMD (Hutto, Kim-Godwin, Pollard, & Kempainen, 2011).

Regarding facilitators, women reported their greatest support from their spouse/partner, family, and friends, but a surprisingly high number—over a third—indicated they had less than adequate social support. Bivariate analyses showed that mothers who were in a relationship, were older, did not have a history of mental health problems, and who were experiencing lower levels of psychological distress felt that they had higher levels of social support. In multivariable analyses, relationship status, anxiety, stress, and PPMD self-identification remained significant predictors of social support. Findings are consistent with prior studies showing that women who experience postpartum mood disruption report less social support (Beck, 2001, 2002; Xie et al., 2009).

Results of our Aim 3 multivariable analyses revealed that social support and stress were facilitators of disclosure. Interestingly, perceived barriers were not related to disclosure in multivariable analyses, despite modest but significant bivariate associations. These findings suggest that social support may buffer against the effects of perceived barriers on disclosure of PPMD symptoms to healthcare professionals.

Limitations

Conclusions based on these findings should be made within study limitations. For instance, we had a relatively homogenous convenience sample of women who volunteered to participate in an online study of postpartum adjustment, which may not reflect the experiences of women from more diverse socioeconomic backgrounds. Additionally, the study relied on self-report measures, not clinical diagnoses, which are subject to the effects of social desirability and recall error. Furthermore, the data are cross-sectional and time since delivery ranged considerably (approximately 3 years), which could result in limitations due to recall bias and errors. That said, self-report has been shown to be a valid and reliable method for collecting sensitive data, including reports of postpartum mental health problems (Boyd et al., 2005). However, future research should use a prospective design, including clinical diagnoses, to establish effects of social support, perceived barriers, and psychological distress on disclosure in more diverse samples.

Implications for Practice

Current calls for universal screening for all pregnant and postpartum women represent a critical first step toward reducing the prevalence of PPMD (ACOG, 2015; Earls, 2010; Siu et al., 2016). However, women must be willing to disclose their PPMD symptoms. The primary barriers identified in this study--stigma, time constraints, and lack of motivation--could be

addressed through public awareness campaigns that highlight the wide variability of emotional reactions women experience following childbirth. Additionally, public policies to increase paid maternity leave may help alleviate time constraints, as well as economic barriers to disclosure and help-seeking.

Further, our findings suggest that social support and stress should be targeted in efforts to increase disclosure rates. Yet, the social support networks of expectant women are underutilized resources for improving maternal mental health. To that end, interventions should encourage women to fortify their social support network while pregnant and provide strategies for mobilizing this support during the postpartum period. For instance, healthcare providers could encourage expectant mothers to develop a post-birth plan in which they identify practical and emotional resources following delivery (e.g. people who can provide a meal, care for the child while she sleeps, or empathize with her emotional reactions). Childbirth education, as well as public awareness programs should focus on PPMD symptoms and actionable steps to empower family and friends to recognize and support new mothers' PPMD help-seeking. Such support should, in turn, reduce the stress that new mothers commonly experience as they adjust to caring for a newborn.

Table 1.*Percentage and Frequency of Participant Disclosure by Healthcare Provider*

Healthcare provider	% reporting disclosure	N
Any	79.3	165
OBGYN	53.4	111
Pediatrician	37.0	77
Lactation Consultant	17.8	37
OBGYN Staff	16.3	34
Doula	16.3	34
Psychologist/Counselor	14.4	30
Hospital Staff	14.9	31
Pediatrician Staff	12.0	25
Primary Care Physician	9.1	19
Psychiatrist	7.2	15
Primary Care Staff	1.9	4

Table 2.*Bivariate Correlations Between Study Variables*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Sociodemographic Characteristics															
1. Participant age															
2. Race	-.15*														
3. Relationship Status	-.15*	.04													
4. Education	.18*	.09	.01												
5. Employment		-.02	-.02	.21**											
6. Income	.24**	.01	.15*	.35***	.15*										
7. Baby age	.15*	-.02	.07	.06	.12	.08									
Mental Health Variables															
8. Prior Mental Health Diagnosis	.19*	-.08	-.08	.00	-.10	-.02	.12								
9. Mental Health Diagnosis-Pregnancy	-.11	.01	.03	-.01	-.23	-.08	-.03	.19**							
10. Self-Identified Symptoms	.00	.09	-.04	-.02	-.07	-.03	.05	.29***	.11						
11. DASS-21 Depression	.05	.11	-.06	.01	-.11	-.15	.01	.36***	.28***	.47***					
12. DASS-21 Anxiety	-.02	.06	-.07	-.08	-.09	-.12	-.04	.40***	.29***	.47***	.81***				
13. DASS-21 Stress	-.04	.10	-.07	-.04	-.10	-.05	-.02	.42***	.21**	.45***	.75***	.82***			
Outcome Variables															
14. MSSS	-.16*	-.04	.24***	-.04	.03	-.03	-.07	-.28***	-.04	-.38***	-.32***	-.23***	-.30***		
15. PBPT	-.06	.10	-.13	-.07	-.17*	-.09	-.12	.25***	.14	.49***	.44***	.44***	.53***	-.45***	
16. Any Disclosure	-.00	-.04	-.06	.02	.01	.01	-.04	-.04	.11	-.09	.32***	-.01	.06	.19**	-.03

Notes. * $p < .05$, ** $p < .01$, *** $p < .001$. Values in bold are significant at $p < .05$. DAS-21 Depression=Depression Anxiety Stress Scale Depression Subscale, DASS-21 Anxiety=Depression Anxiety Stress Scale Anxiety Subscale, DASS-21 Stress=Depression Anxiety Stress Scale Stress Subscale, MSSS=Maternity Social Support Scale, PBPT=Perceived Barriers to Psychological Treatment.

Table 3.

Summary of Hierarchical Linear Regression Models Predicting Barriers to Treatment and Maternal Support

Steps	Barriers to Treatment			Maternal Social Support		
1. Sociodemographic characteristics	$F(2,155)=8.44, R^2_{adj}=.088, p\leq.001$			$F(3,141)=8.46, R^2_{adj}=.137, p\leq.001$		
	β (SE)	<i>t</i>	<i>p</i>	β (SE)	<i>t</i>	<i>p</i>
Prior mental health	0.02 (2.00)	0.21	.833	-0.12 (0.62)	-1.46	.148
Employment	-0.11 (1.77)	-1.67	.097	--	--	--
Mother's age	--	--	--	-0.06 (0.07)	-0.79	.429
Relationship status	--	--	--	0.24 (3.18)	3.19	.002
2. Mental health variables	$F(6,155)=14.02, R^2_{adj}=.335, p\leq.001$			$F(7,141)=7.25, R^2_{adj}=.237, p\leq.001$		
	$F_{change}=15.23, R^2_{change}=.261, p\leq.001$			$F_{change}=5.51, R^2_{change}=.119, p\leq.001$		
	β (SE)	<i>t</i>	<i>p</i>	β (SE)	<i>t</i>	<i>p</i>
Self-identification of symptoms	0.31 (2.05)	3.95	<.001	-0.22 (0.62)	-2.45	.016
DASS Depression	0.03 (0.35)	0.26	.794	-0.24 (0.12)	-1.57	.119
DASS Anxiety	-0.09 (0.40)	-0.69	.491	0.37 (0.13)	2.26	.026
DASS Stress	0.41 (0.31)	3.31	.001	-0.30 (0.10)	-2.08	.040

Notes. – variable not included in model.

Table 4.

Final Logistic Regression Model with Maternal Support and Perceived Barriers to Treatment Predicting Postpartum Symptom Disclosure

Predictors	Postpartum Symptom Disclosure					
	β	SE	Wald	OR	95% CI	<i>p</i>
Mother's age	-0.00	0.06	0.00	1.00	0.88-1.13	.965
Relationship	--	--	--	--	--	--
Employment Status	-0.79	0.51	2.39	0.45	0.17-1.24	.122
Self-Identification of PPMD Symptoms	0.44	0.65	0.45	1.55	0.43-5.57	.501
DASS Depression Score	0.01	0.11	0.00	1.01	0.81-1.25	.964
DASS Anxiety Score	-0.21	0.13	2.45	0.81	0.63-1.05	.118
DASS Stress Score	0.25	0.11	5.72	1.29	1.05-1.59	.017
MSSS Total Score	0.26	0.08	9.82	1.30	1.10-1.53	.002
PBPT Total Score	0.01	0.03	0.07	1.01	0.96-1.06	.789

Notes. $N=129$. No disclosure served as the reference for the dichotomous outcome variable.

Model statistics: $\chi^2(9, N = 129) = 19.47, p = .022, -2 LL = 101.84, Nagelkerke R^2 = .230$.

-- unable to calculate.

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CHAPTER 4

Peer-Support Intervention for Postpartum Depression: Participant Satisfaction and Program Effectiveness

Objective – Postpartum mood disorders represent a serious problem affecting 10-20% of women and support groups offer a promising intervention modality. The current study examined participant satisfaction with and effectiveness of a peer-facilitated postpartum support group.

Intervention – The program consists of a free, peer-support group, developed to increase social support and destigmatize postpartum mood symptoms. The weekly group is co-facilitated by former group participants and maternal health professionals. **Setting** – The peer-support program is offered in an urban city in the southeastern United States.

Design – To address study aims, a community-based participatory research approach was implemented. Participant satisfaction was assessed via mixed methods analyses. Differences in depression scores at follow-up between group participants and a community sample were examined via weighted linear regression analysis following propensity score analysis. Finally, within-group change in depression scores were examined using a repeated measures ANOVA.

Participants – Intake program data were provided by the sponsoring organization ($n = 73$) and follow-up data were collected via an online survey from program participants ($n = 45$). A community sample was recruited to establish a comparison group ($n = 152$).

Measurements and findings – Participant satisfaction was high with overwhelmingly positive perceptions of the program. Post-participation depression scores were similar to those of the community sample at follow-up ($p=.447$). Pre-post analyses revealed reductions in depression symptoms with significant interactions for time X complications ($p\leq.001$) and time X delivery method ($p\leq.017$).

Key conclusions – Overall, findings indicate the peer-support group is an effective treatment option for women experiencing postpartum

depression; however, further evaluation is needed. Findings also emphasize the importance of integrating evaluation procedures into community-based mental health programming to support effectiveness. **Implications for practice** – Peer-support groups are an acceptable form of intervention for women experiencing postpartum depression. Additionally, peer-support groups may be particularly effective for women who delivered via unplanned Cesarean-section or who experienced complications during pregnancy or delivery.

Midwifery, under review.

Introduction

Postpartum mood disorders (PPMD), such as postpartum depression, are estimated to affect 10-20% of women and represent a serious health concern for mothers and their children (Centers for Disease Control, 2008; Gavin et al., 2005). PPMDs are defined as clinically significant disruptions in mood and/or sleep in the 12 months following the birth of a child (American Psychiatric Association, 2013). In addition to the deleterious effects PPMDs have on mothers, children of mothers with PPMDs are at risk for disrupted mother-infant bonding, delays in infant cognitive development, and poor social development, as well as academic delays and psychopathology when they are school-age (Field, 2010; Murray & Cooper, 1997). Additionally, there is some evidence that the effects of untreated PPMDs can contribute to higher rates of physical illness and hospitalization among infants (Farr et al., 2013). In response to this serious health problem multiple agencies have highlighted the necessity for universal screening and early intervention for PPMDs is essential (ACOG 2015; Siu et al. 2016). Accordingly, OBGYN practices are increasingly screening women for postpartum depression (Avalos, Raine-Bennett, Chen, Adams, & Flanagan, 2016).

Even when screening occurs, not all women receive treatment for a variety of reasons (Goodman & Tyer-Viola, 2010). Barriers to treatment commonly include structural barriers, such as cost, lack of insurance (Santora & Peabody, 2010), time constraints, lack of childcare, and dearth of available referral resources (Gjerdingen & Yawn, 2007), and attitudinal barriers, such as stigma and fear of Child Protective Services involvement (Byatt et al., 2013; Santora & Peabody, 2010). Accordingly, strategies are necessary for women to overcome these barriers to access treatment, such as through targeted interventions that address barriers and align with preferences of new mothers to achieve maximum effectiveness and reach. For example, a peer-

support model may function as an effective and appealing treatment option for women experiencing PPMDs. Indeed, research suggests that many women prefer programs that are offered in a non-mental health setting and in a group format (Goodman, 2009).

Additionally, the availability and quality of social support is an important factor related to the adjustment to motherhood. Strong evidence exists in the literature demonstrating inadequate social support as a predictor of poor postpartum mood outcomes – a relationship that remains true cross-culturally (Beck, 2002; Xie et al., 2009). Social support is particularly salient when offered by a partner and close family/friends as women who have low support from these sources have a greater risk for PPMD than when support is inadequate from other sources (Webster, Nicholas, Velacott, Cridland, & Fawcett, 2011). Group interventions which include a social support component appear to be a logical and theoretically-informed method for treating PPMDs. As such, an intervention that is group-based, offered in a non-mental health setting, and that, in some way, overcomes barriers to treatment and access, may be most effective in improving postpartum mental health.

Peer-Support Intervention

In 1998, a grass-roots effort by a mother experiencing postpartum depression and her psychiatrist led to the initiation of a peer-support group in a metropolitan area in the southeast United States. The goal of the group was to increase social support and destigmatize PPMD symptoms by offering a free, peer-moderated support group. The group meets weekly after-hours in the large waiting room of an OBGYN practice and lasts approximately 90 minutes. Fliers promoting PPMD awareness generally, and the program specifically, are provided in the discharge packet of every woman who delivers at the large birthing center adjacent to the program meeting location, reaching approximately 5,600 women each year (A. Wolf, personal

communication, January 19, 2015). Also, fliers are distributed through many local OBGYN and pediatric practices. Peer facilitators, who proctor the group, are moms who have recovered from their symptoms and are trained in group dynamics. Additionally, medical professionals with expertise in PPMDs, including psychologists, psychiatrists, pediatricians, obstetrician/gynecologists, and lactation consultants, serve as medical advisors who are also present at each group to co-facilitate. The group is led by two peer-facilitators, and the medical advisor is present to offer referral and support for mothers who may be experiencing acute distress.

Group members are self-referred, and the group is open, such that new members are welcome at each meeting. The group format is unstructured, such that after a review of the group guidelines and brief introductions of attendees, participants are encouraged to discuss whatever issues are currently relevant to them. Common topics of discussion include sharing of emotional reactions to motherhood, adjusting to caring for the infant, relationship issues, feeding issues, employment, sleep difficulties (for infant and mother), to name a few.

The program has served numerous women and families for almost two decades, sustained by former participants returning to volunteer and a non-profit board of directors. Despite its longevity, there has been no formal evaluation of program effectiveness in improving postpartum mental health, nor has there been systematic examination of participant feedback. These two issues have been identified by stakeholders, including program administrators and others, as priority areas to enable the program to meet participant needs and improve services.

The Present Study

The overall goal of this project was to evaluate peer-support program for postpartum depression in partnership with program participants and stakeholders. Specifically, we sought to

examine women's satisfaction with the program (Aim 1) and explore women's perceptions of the program, including their experiences of participation and the perceived impact on multiple domains of functioning (Aim 2). We also sought to evaluate program effectiveness by comparing postpartum depression symptoms between program participants and a community sample (Aim 3) and by examining changes in postpartum depression symptoms over time among program participants (Aim 4).

Methods

To address our research aims, we conducted a mixed-methods, community-based participatory research (CBPR) study. CBPR situates community members and program participants as valuable experts who should be actively engaged in all aspects of the research project from hypothesis formulation to results dissemination (Minkler & Wallerstein, 2008). As such, research procedures, assessment development, and data collection strategies were developed in collaboration with community stakeholders, including program administrators, group volunteers, former program participants, and community medical professionals.

Participant Recruitment and Procedures

The study population was English-speaking mothers aged 18 years and older in the metropolitan area of a large, southeastern U.S. city and comprised two distinct groups: 1) program participants, and 2) comparison participants.

Program participants. At the time of program intake, women in the peer-support group program completed a brief demographic form and the Edinburgh Postnatal Depression Scale. Intake data were available for women who entered the group between January 2012 and February 2015. Intake data were provided by program administrators for 73 participants and 45 participants completed the follow-up survey. Follow-up data were collected through an online

survey that was distributed by the program administrator via email. Program follow-up data were collected from June 2015 through December 2015. A \$10 gift card was provided as compensation for completing the follow-up survey. Matching intake and follow-up data was possible for 25 participants. Thus, the program sample included 45 participants for comparison with the community sample and 25 participants for within-group analyses. Attrition was examined by comparing participants who completed intake with those who only completed the follow up surveys. There were no significant differences on the two sociodemographic characteristics were collected at intake (race and relationship status).

Comparison participants. Adult, aged 18 or older, English-speaking women who had delivered a child in the past three years and not attended the peer-support program were eligible for inclusion in the community sample. Comparison participants were recruited through convenience and snowball sampling using multiple strategies. Recruitment materials were posted at local OB/GYN and pediatric offices. The study was also advertised through a local news channel parenting website, a new-mothers' support group listserv, as well as online communities and social media networks targeting new mothers. Participants self-selected to participate by visiting the study website that described the study's focus on experiences that may be associated with health and well-being after pregnancy. Data were collected from June 2015 through December 2015 as part of a broad study examining the experiences of women in the postpartum period (Prevatt & Desmarais, 2017). Comparison participants were entered into a raffle to win one of 10 gift cards valued at \$25 each. Of the 248 women who consented to participate, 152 (61.3%) met inclusion criteria and provided usable responses.

Measures

Participant sociodemographic characteristics. Participants reported on sociodemographic characteristics including their *age* (measured in years), *race* (0 = Caucasian, 1 = non-Caucasian), *age of most recent baby/ies* (measured in months), *sexual orientation* (0 = heterosexual, 1 = non-heterosexual), *relationship status* (0 = single, 1 = in a relationship), *level of education* (0 = less than a 4-year college degree, 1 = 4 year college degree or greater), *employment status prior to delivery* (0 = not employed, 1 = employed at least part-time), *household income in relation to the median income for the county* (0 = <\$70,000, 1 = ≥ \$70,000), and *insurance coverage at the time of delivery* (0 = no, 1 = yes).

Clinical characteristics. Participants reported on characteristics of their pregnancy and delivery as well as their mental health. Specifically, participants reported *complications* during pregnancy or delivery (0 = no, 1 = yes), *delivery method* (0 = planned delivery, 1 = unplanned Cesarean-section), *maternal health concerns* since delivery (0 = no, 1 = yes), and *baby health concerns* since delivery (0 = no, 1 = yes). Additionally, participants reported if they had *mental health problems prior to pregnancy* (0 = no, 1 = yes) and whether they received a *formal PPMD diagnosis* (0 = no, 1 = yes).

Postpartum depression. The Edinburgh Postnatal Depression Scale (EPDS) (Cox, Holden, & Henshaw, 2014) was used to assess postpartum symptoms. The EPDS is one of the most widely used and researched measures for screening and identifying postpartum depression and has shown to have strong reliability and validity as well as a sensitivity of 59-100% and a specificity of 49%-100% (ACOG 2015; Cox et al. 2014). Participants to respond to items targeting depression and anxiety symptoms by reflecting on their experiences in the past seven days. Responses are scored 0-3 according to increased (from none to high) symptom severity.

The EPDS total scores, thus, can range from 0-30, with variations in the clinical cutoff for diagnosing postpartum depression ranging from 9-13. Reliability was excellent for this study (intake $\alpha = .77$, follow-up $\alpha = .85$). Program participants were administered an EPDS at program intake and again at follow-up when they completed the study survey. Comparison participants were administered the EPDS when they completed the study survey.

Participant feedback. The Client Satisfaction Questionnaire-8 (CSQ-8) (Larsen, Attkisson, Hargreaves, & Nguyen, 1979) was used to assess program participants' general satisfaction with the peer-support program and their perception of the value of the services they received by attending the support group. The measure was not included in the comparison group survey. The CSQ-8 includes items related to quality, usefulness, and satisfaction with program services on a 4-point scale. Responses are scored 1-4 with high scores reflecting greater satisfaction. Total scores range from 8-32. Reliability was excellent for this study ($\alpha = .96$).

We additionally queried participants' perceptions of the peer-support program, including the experiences during the program and the perceived impact of the program on various aspects of their life and functioning. These questions were developed in collaboration with program administrators and former participants. Specifically, items assessed participants' experiences while in group and included both positively (e.g., feeling supported, feeling understood) and negatively (e.g., overwhelmed) valenced descriptors. Items were rated on a 5-point scale where 1 = Strongly Disagree and 5 = Strongly Agree. To assess indirect effects of the group, participants responded to a root item "The group affected..." that was followed by areas that may be affected by PPMD, such as child bonding, confidence, health care utilization, work performance, among others. These items were rated on a 5-point scale with 1 = Very Negatively and 5 = Very Positively. Finally, in collaboration with program participants and stakeholders, we developed

open-ended items to elicit more in-depth information regarding participants' perceptions of the strengths and weaknesses of the program.

Participants

Participant characteristics are provided in Table 1. Overall, participants ranged in age from 22-45 years old ($M = 33.38$, $SD = 4.25$) and were predominantly Caucasian (91.3%). Almost all of participants were in a partnered (98.5%) heterosexual (97.4%) relationship. The sample was well-educated, with 89.3% having earned at least a university degree. Across both groups, over three-quarters of participants were employed prior to delivery (86.2%) and almost as many (73.8%) reported combined household earnings in excess of the median income for the county (\$66,579)(US Census Bureau, 2016). Almost all participants (98.5%) reported medical insurance coverage at the time of delivery. On average, participants were 17.68 months postpartum ($SD = 15.43$). Over two-thirds of the sample delivered as they had planned (81.5%) while almost a fifth (18.5%) reported delivery via unplanned Cesarean-section. Complications during pregnancy or delivery were reported by just under half of participants (48.7%). Since delivery, approximately a quarter of participants reported health complications for themselves (23.9%) or their infant (23.4%). Over one-third (37.4%) of participants reported a mental health diagnosis prior to pregnancy and over one-quarter (28.2%) reported a diagnosis of PPMD by a medical professional in the year following delivery.

Analytic Approach

Descriptive statistics. To address Aims 1 and 2, we calculated descriptive statistics for the CSQ-8 items and examined the responses regarding participants' perceptions of the peer-support group. Qualitative data pertaining to participants' perceptions regarding strengths and weaknesses of the program were analyzed by the principal author using a qualitative description

approach (Neergaard, Olesen, Andersen, & Sondergaard, 2009). The data were coded, and then sorted and combined based on similar patterns and themes.

Between-participants comparisons. To address Aim 3, we employed a propensity score analysis (PSA) on study data to estimate the treatment effect in the treated (ATT) and to account for a non-equivalent comparison group design. Because the matching procedure required a complete dataset (i.e., the absence of missing data), we first addressed issues of missingness in study data for the purpose of this analysis. Primarily, we conducted a missing data analysis using the SPSS Missing Values package to determine whether data were missing completely at random (MCAR). The amount of missing data was negligible (4.5%) and results for Little's MCAR test were non-significant ($p > .05$), suggesting data were MCAR (Little, 1992). Multiple imputation was subsequently conducted on the entire dataset for 5 imputations. All scale level variables were imputed at the item level and summed following the imputation procedure. Value constraints were applied based on a range of plausible values.

Following multiple imputation, PSA was conducted to mimic a randomized, experimental design by creating equivalent treatment and control groups matched on relevant demographic covariates (Guo & Fraser, 2014). To determine variables for inclusion as covariates in the PSA, we followed the recommendations of Rubin & Thomas (2000) to include variables associated with both treatment exposure (i.e., group) and dependent variables. Bivariate analyses were conducted using the imputed data to determine variable inclusion. We used a $p < .15$ cutoff value to include variables associated with treatment exposure (Schafer & Kang, 2008). Analyses revealed 12 variables associated with group or EPDS scores: mother age, race, relationship status, sexual orientation, pre-pregnancy employment status, household income, insurance coverage at delivery, health of mother, health of baby, unplanned delivery method, prior mental

health diagnosis, and formal PPMD diagnosis. These variables were included as covariates in the PSA.

The PSA was conducted in R using the MatchIt package and a full matching procedure (Ho, Imai, King, & Stuart, 2011) for each of the 5 imputed datasets. Balance summary statistics and propensity scores were averaged across datasets to produce the final values (Mitra & Reiter, 2012). Weights generated by the full matching procedure produce subclasses of matched treatment and control group participants on a 1:k ratio of treatment to control participants (Stuart & Green, 2008). Prior to matching, six of twelve covariates showed standardized mean differences in excess of .25, suggesting substantial covariate imbalance between groups (Stuart, Lee, & Leacy, 2013). After matching, improvement in fit was seen across ten of twelve covariates, and all covariates showed standardized mean differences below .20 (range: 0.01—0.20). Only two covariates showed a decrease in fit; however, the magnitude was negligible (i.e., .02 reduction in balance.)

Following matching, between-group differences in EPDS total scores were examined using a weighted linear regression analysis in SAS 9.4 via the MIANALYZE function, which generates pooled results across imputed datasets. For the purpose of effect size calculation, the MIANALYZE procedure was used to produce univariate statistics across the five imputed datasets, overall and by treatment condition. Then we used M and SE to compute Cohen's d effect size using an online calculator.

Within-participants comparisons. To address Aim 4, we performed a repeated measures ANOVA in SPSS version 24 to assess within-participant changes in PPMD attributable to program participation and to identify factors associated with change. To determine covariates for inclusion in within-participants models, we first conducted bivariate comparisons of

participants who completed the EPDS at both intake and follow-up to those who only completed an intake EPDS. Comparisons between those included in the study and those lost to attrition revealed no differences. We next conducted bivariate correlations between program participant characteristics and follow-up EPDS total score. Results showed that among program participants, younger maternal age ($r = -.47, p = .018$), having an unplanned Cesarean-section ($r = .60, p = .001$) and experiencing complications during pregnancy or delivery ($r = .52, p = .008$) were associated with higher EPDS total scores. No other variables were related to EPDS total scores at follow-up ($ps \geq .073$). In the final model, the within-participants factor was occasion (intake and follow up) and the between-participants factors were delivery method and complications with maternal age included as a covariate.

Results

Aim 1: Participant Satisfaction

Table 2 presents the descriptive statistics for the CSQ-8 ratings. Participant satisfaction ratings of the program were high ($M = 30.15, SD = 5.50$, range 14-34). Over two-thirds of the program participants reported that they would “definitely” use the support group again if needed, and were “very satisfied” with the services they received. Over three-quarters of participants rated the program quality as “excellent” and over 80% reported that “most” or “almost all” of their needs had been met by the program. Practically none of the program participants reported that the program did not meet their needs (2.3%) or that they would not utilize program in the future if needed (2.3%).

Aim 2: Participant Perceptions

Table 3 presents the descriptive statistics for participant perceptions of the peer-support program. Overwhelmingly, the participants rated their in-group experiences positively. Their

responses to the open-ended questions provided further evidence of these positive perceptions. For example, approximately three-quarters of participants strongly agreed that they felt more normal and less isolated during the support group sessions. Regarding the most helpful aspects of the group, one participant noted the importance of a shared experience that normalized their thoughts and feelings,

...meeting other moms who were going through the exact issues I was helped me vent my frustrations and feel part of a community. In time, I was able to gain perspective and see how far I've come, and how I really was doing a good job as a mom.

Another participant stated,

Talking with other moms who were going through postpartum depression and anxiety I felt less isolated, and I felt like I could talk openly and honestly about what I was going through; this lifted such a weight off my shoulders.

This was echoed by others, for example, "...seeing survivors and meeting other women so I didn't feel like I was the only one", "...not feeling alone or crazy", "...not being judged & discovering I wasn't the only one with those thoughts", and "...I don't feel alone and before [participating in the group] I felt very alone." As a final example, another participant reported,

...knowing it is not just you. We are all going through a lot of the same things. Knowing that we can discuss without judgement.

Beyond normalizing participants' postpartum struggles, the program also cultivated a sense of support and understanding among its members. About two-thirds strongly agreed that they felt supported and understood. For example, one participant stated, "[The group is] a place of understanding and affirmation of thoughts, feelings, and difficult experiences. I felt truly cared for." Other participants reported similar experiences of acceptance from the group, for example,

“...the support and encouragement from the other mothers and peer facilitators”, “I felt very encouraged and welcomed. The facilitators were amazing!” Indeed, no participants “strongly agreed” to feeling judged, like an outsider, or pressured. Instead, the group confirmed their experiences, as expressed by this participant who stated,

[The group] validated what I was feeling. Helped decrease my feelings of shame and inadequacy. I recognized that what I was feeling was not unique. By listening to other women, I found comfort in expressing my hardship.

Additionally, the validation and support from the group cultivated a social network where it was safe to express authentic experiences of motherhood. For example, one participant wrote that the group represented “...finding a safety net I knew I could count on if I needed it”.

When queried about the impact on other areas of their lives, over half of the participants indicated their confidence as a mother was very positively affected by program participation. Furthermore, no participants reported any negative effects from the program on any aspect of their lives. However, when asked what they found to be the least helpful aspect of the program participant responses included the large group size, as evidenced in this comment: “Sometimes the groups were so large that introductions took a really long time; this left less time to discuss different topics.” Another stated, “Sometimes moms talked over each other, especially when groups got over 5+ people.” As a final example, one participant noted variability in facilitator effectiveness in managing larger groups,

There was a time when so many moms were coming that we barely got past introductions. I also think some facilitators were better than others about letting the moms talk & being more of a conversation guide than leader.

Another criticism of the group related to the possibility for participants to become overwhelmed by the struggles of other group members. One participant noted that exposure to other participants' experiences led to "...vicarious trauma - hearing the troublesome stories made me worse about myself and not being strong enough to handle my life without depression and anxiety." Another participant reported,

For me, hearing about things that all of the other moms worried about made me more anxious. That's why I personally only attended one meeting. I think it's a wonderful organization, though, and would highly recommend it to others.

Despite these challenges, participants identified benefits experienced beyond time spent in group. Specifically, when asked how their participation in the program had impacted other areas of their lives, participants responded that the group prompted the initiation of treatment, "...made me seek more professional help", and inspired community engagement for recovered participants, "...influenced me to help other women by volunteering for [the program]".

Aim 3: Between-Participants Comparisons

Results of the weighted regression analysis failed to find a significant difference between participants' post-program EPDS scores ($M = 6.92$, $SE = 0.68$) and those of the community sample ($M = 6.59$, $SE = 0.38$), $b = -0.56$, $SE = 0.74$, 95% CI (-2.01, 0.89), $p = .447$, $d = 0.07$.

Aim 4: Within-Participants Comparisons

Results of the repeated measures ANOVA indicated main effects for age [$F(1, 21) = 9.96$, $p = .005$, $\eta^2 = .32$] and complications [$F(1, 21) = 16.74$, $p \leq .001$, $\eta^2 = .44$]. Specifically, older women and women who experienced complications had higher depression scores across time points. However, the main effect for change over time was not significant [$F(1, 21) = 0.08$, $p = .775$, $\eta^2 < .00$].

Despite the absence of a main effect for delivery method, there was a significant interaction for change in EPDS scores pre-program and post-program and delivery method [$F(1, 21) = 6.70, p \leq .017, \eta^2 = .24$]. Figure 1 presents the post hoc analyses for EPDS total scores by delivery method. EPDS total scores at intake were similar between program participants who had delivered as they had planned ($M = 14.96, SE = 0.89$) and those who delivered via unplanned Cesarean-section ($M = 15.49, SE = 1.41$) $p = .755$. At follow-up, participants who delivered via unplanned Cesarean-section had significantly higher EPDS total scores ($M = 11.34, SE = 1.15$) than those who delivered as they had planned ($M = 5.17, SE = 0.72$) [$F(1, 21) = 20.78, p \leq .001, \eta^2 = .50$]. Both those who delivered as planned [$F(1, 21) = 66.28, p \leq .001, \eta^2 = .76$] and those who delivered via an unplanned Cesarean-section [$F(1, 21) = 4.68, p \leq .042, \eta^2 = .18$] showed significant reductions in their EPDS total scores from intake to follow up.

Figure 2 presents the post hoc analyses for pre-post EPDS total scores by complications. Program participants who reported complications in pregnancy or delivery reported significantly higher intake ($M = 16.54, SE = 0.92$) [$F(1, 21) = 6.82, p = .016, \eta^2 = .25$] and follow up ($M = 9.14, SE = 0.75$) [$F(1, 21) = 19.41, p \leq .001, \eta^2 = .48$] EPDS total scores than their peers who reported no complications (intake: $M = 12.34, SE = 1.32$; follow up: $M = 3.40, SE = 1.07$). Additionally, both those with complications [$F(1, 21) = 35.06, p \leq .001, \eta^2 = .63$] and those without complications [$F(1, 21) = 24.88, p \leq .001, \eta^2 = .54$] demonstrated significant reductions in their EPDS total scores from intake to follow up.

Discussion

The present study examined the perceived and actual benefits of a community-based peer-support program for women experiencing postpartum emotional distress. Our first research aim was to examine women's satisfaction with the postpartum peer-support program.

Satisfaction ratings can serve as a measure of program effectiveness (Ware & Davies, 1983) by providing information regarding strengths and weaknesses that affect retention, participation, and engagement (Sanders, Trinh, Sherman, & Banks, 1998). Overall, the program appeared to be well-received by participants. Women reported that the program met their needs and expectations and, accordingly, overall satisfaction ratings were positive for more than 9 out of 10. This satisfaction rate is consistent with or even higher than those found for other peer-support programs (Dennis et al., 2009). Over two-thirds reported that they would return to the group and refer a friend, reflecting essential components for program success: retention and referral. Retention and referral are particularly relevant, as the program relies on former participants returning to volunteer as facilitators.

Our second research aim was to explore women's perspectives of program strengths and weaknesses through qualitative analysis of open-ended questions. Perceptions were predominantly positive, with women reporting program strengths such as increased social support, acceptance, symptom normalization, and stigma reduction. These findings are consistent with research showing that group-based interventions are particularly beneficial due to enhanced social connectivity and increased social support (Lavender, Ebert, & Jones, 2016). Participants, however, did note some aspects of the program which they perceived to be the least beneficial or most challenging. These reflected two general categories: large group size and potential for secondary trauma. Women commented that there was less time for group discussion and support when attendance was high. Some women reflected that hearing the struggles of other group members exacerbated their own symptoms. These are common critiques of group-based interventions and there are tangible strategies that ameliorate or reduce these concerns (Yalom & Leszcz, 2005). For instance, regarding group size, facilitators should receive additional training

on large-group management to improve the opportunities for individual participation to ensure adequate “air time”. Alternately, group treatment is most effective with six to eight participants (Yalom & Leszcz, 2005), and as such, on occasions when the group has eight or more participants, the facilitators could break them up into two smaller groups. Further, to reduce the likelihood of secondary traumatization group members, facilitators could implement a desensitization protocol at the beginning of group sessions or encourage women to practice self-care during and after the session (Ulman, 2004).

Our third research aim was to compare program participants’ post-treatment symptoms to those of community-based women. Analyses showed that women who participated in the group had similarly low levels of postpartum depression symptoms at follow-up compared to women in the community, supporting the effectiveness of the program. These findings are consistent with prior research demonstrating group-based (Ugarriza, 2004) and peer-support (Dennis et al., 2009) interventions as effective treatment approaches across many domains. They also provide the first evidence of program effectiveness for this particular community-based peer-support program. However, due to the quasi-experimental nature of the study, replication of these findings in the context of a randomized control trial is necessary. Further, there are many aspects of the program and recovery more generally that go beyond simple symptom-relief, including perceived social support and health-related quality of life; these are important avenues of future research.

Finally, our fourth research aim was to examine changes in symptoms of postpartum depression before and after program participation. Results of our within-participant pre-post analyses provide insight to factors that moderate program effectiveness. Specifically, while women saw a reduction in their symptoms overall, those who had experienced an unplanned

Cesarean-section or had complications during pregnancy or delivery improved less than women who delivered as they planned or those who experienced no complications in pregnancy or delivery. These findings suggest that complications or unplanned Cesarean-section represent appropriate targets for early intervention, as women either started treatment with greater symptoms or were less responsive to interventions. Such lingering effects of complications and unplanned Cesarean-sections on maternal mental health have been documented elsewhere (Byatt et al., 2014; Grivell & Dodd, 2011). As such, using a risk-stratification method, such as targeting new mothers who experienced complications or an unplanned Cesarean-section, may result in a more effective and efficient concentration of resources on those with the greatest need (Rose, 1985) translating into overall cost savings and improved population health.

Limitations

Study limitations are consistent with commonly faced challenges in evaluating innovative community-based, community-developed programs (Merzel & D'Afflitti, 2003). For instance, the women who participated in the program and the current evaluation were predominantly well-educated middle-class white women. As such, the effectiveness of the program should be examined in samples with greater sociodemographic and economic diversity. Indeed, there are important racial/ethnic differences in mental health treatment preferences and utilization (SAMHSA 2015). Additionally, because the group meets on a weekday evening, this particular program may have been more accessible to mothers who are partnered, have access to childcare, and independent transportation. Future studies should examine the acceptability and utilization of peer-support group-based interventions for postpartum depression among women with less economic and social resources than this sample.

As another example, it was not possible to randomly assign participants to experimental and control treatment groups, as the intervention was ongoing and participants are self-referred. In keeping with the state-of-the-art in program evaluation (Thoemmes & Kim, 2011), we applied propensity score matching to promote equivalency between the samples and to reduce effects of confounding variables (Guo & Fraser, 2014). However, the lack of pre-post comparisons in the community sample remains a limitation. Additionally, a key limitation of the propensity score analysis is the inability to control for unmeasured confounders. We were only able to match on demographic variables and it is possible that unmeasured confounding variables, such as clinical variables (e.g. depression levels at intake in the community sample, or psychiatric treatment), were present and affected the findings.

Further, although the EPDS is integrated in the program intake materials, routine follow-up assessment of postpartum depression symptoms is not conducted. As a result, there was variability in the time from treatment completion to administration of the follow-up EPDS among our participants. We controlled for time-since-treatment in our analyses; however, a more rigorous approach would be to conduct prospective administration of the EPDS over a set follow-up period in future evaluations. Additionally, program attendance was not tracked by program administrators and could provide valuable information regarding effectiveness. These limitations highlight the importance of planning and integrating evaluation strategies a priori in community-based programs (Shadish, Cook, & Leviton, 1991).

Conclusions

Findings from this study add to the body of literature providing evidence that peer-support groups offer a safe and destigmatizing strategy to help women adjust to new life roles and improve their postpartum mood. We found, like prior work, that peer-support programs are

not only acceptable to group members but also that they provide a mechanism for improving mental health outcomes (Small et al., 2011). Further, findings of our evaluation suggest that this particular peer-support model is a promising, community-based intervention for women experiencing symptoms of postpartum depression. However, prior to implementation more broadly there are key challenges that should be addressed, such as the large group sizes and exacerbation of symptoms in response to the disclosures of other group members. Additionally, there is a need for consideration of the acceptability and effectiveness of this peer-support model in a more socioeconomically and racially diverse sample. Study findings, including suggestions for programmatic and evaluation improvement, were shared with program administrators and stakeholders. The most effective intervention for women experiencing symptoms of postpartum depression may be one that is free and facilitates healthy adjustments to motherhood by augmenting a new mother's social support network within her existing community. Such a population health strategy could serve the entire community by building awareness and eliciting continued engagement, ultimately, making the program self-sustaining and community approved.

Table 1.*Participant Characteristics for Program Participants and Community Comparison Sample*

Participant Characteristics	All Study Participants (<i>n</i> = 197)		Program Participants (Post-Treatment) (<i>n</i> = 45)		Community Sample (<i>n</i> = 152)	
	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)	<i>M</i>	(<i>SD</i>)
Continuous Variables						
Participant age (in years)	33.38	4.25	34.30	4.73	33.06	4.05
Total number of children	1.66	0.82	1.63	0.82	1.67	0.83
Age of baby (in months)	17.68	15.43	26.12	23.72	15.27	11.06
EPDS total scores	6.65	4.64	6.86	4.55	6.59	4.68
Categorical Variables	%	(<i>n</i>)	%	(<i>n</i>)	%	(<i>n</i>)
Race						
White	91.3	178	88.4	38	92.1	140
Non-white	8.7	17	11.6	5	7.9	12
Relationship status						
Partnered	98.5	192	95.3	41	99.3	151
Single	1.5	3	4.7	2	0.7	1
Education						
< 4 year degree	10.8	21	9.3	4	11.2	17
≥ 4 year degree	89.3	174	90.7	39	88.9	135
Sexual Orientation						
Straight	97.4	190	93.0	40	98.7	150
LGBTQ	2.1	4	7.0	3	0.7	1
Pre-pregnancy Employment						
Employed	86.2	169	75.0	33	89.5	136
Unemployed	13.8	27	25.0	11	10.5	16
Household Income (median income)						
<\$70,000	22.5	44	32.7	14	19.7	29
≥\$70,000	73.8	144	62.8	27	76.9	117
Insurance coverage at delivery	98.5	194	95.6	43	99.3	151
Type of Delivery						
Cesarean-section-unplanned	18.5	36	27.9	12	15.8	24
Planned delivery method	81.5	159	72.1	31	84.2	128
Any complications-pregnancy or delivery	48.7	95	62.8	27	44.7	68
Health Concerns-Mother	23.9	47	26.7	12	23.0	35
Health Concerns-Baby	23.4	46	35.6	16	19.7	30
Prior Mental Health Diagnosis	37.4	73	60.5	26	30.9	47
Formal PPMD Diagnosis	28.2	55	79.1	34	13.8	21

Notes. EPDS = Edinburgh Postnatal Depression Scale, CSQ-8 = Client Satisfaction Questionnaire-8. --Value unavailable as each cell must ≥ 1.

Table 2.*Program Participants' Client Satisfaction Questionnaire-8 Ratings*

<i>CSQ-8 Item</i>	<i>N (%)</i>	<i>M (SD)</i>	Rating			
How would you rate the quality of service you received at the group?	45 (100)	3.67 (0.74)	Poor 0%	Fair 2.9%	Good 20.6%	Excellent 76.5%
Did you get the type of service you wanted?	45 (100)	3.69 (0.63)	No, definitely not 2.9%	No, not really 2.9%	Yes, generally 20.6%	Yes, definitely 73.5%
To what extent has the group met your needs?	44 (97.8)	3.34 (0.75)	None of my needs have been met 2.9%	Only a few of my needs have been met 11.8%	Most of my needs have been met 41.2%	Almost all my needs have been met 44.1%
If a friend were in need of similar help, would you recommend the group to him or her?	44 (97.8)	3.77 (0.48)	No, definitely not 0%	No, I don't think so 2.9%	Yes, I think so 23.5%	Yes, definitely 73.5%
How satisfied are you with the amount of help you received from the group?	44 (97.8)	3.73 (0.54)	Quite dissatisfied 0%	Mildly dissatisfied 5.9%	Mostly satisfied 23.5%	Very satisfied 70.6%
Have the services you received at the group helped you deal more effectively with your problems?	44 (97.8)	3.50 (0.63)	No, they seems to make things worse 0%	No, they didn't really help 8.8%	Yes, they helped 38.2%	Yes, they helped a great deal 52.9%
In an overall, general sense, how satisfied are you with the services you have received from the group?	45 (100)	3.71 (0.59)	Quite dissatisfied 0%	Mildly dissatisfied 8.8%	Mostly satisfied 20.6%	Very satisfied 70.6%
If you were to seek help again, would you come back to the group?	45 (100)	3.67 (0.67)	No, definitely not 2.9%	No, I don't think so 5.9%	Yes, I think so 23.5%	Yes, definitely 67.6%

Table 3*Participant Perceptions of the Peer-Support Program*

	<i>N (%)</i>	<i>M (SD)</i>	Strongly Agree (5)	Agree (4)	Neither Agree nor Disagree (3)	Disagree (2)	Strongly Disagree (1)
<i>While in group I felt:</i>							
Supported	45 (100%)	4.64 (0.77)	65.7%	22.9%	5.7%	0%	5.7%
Understood	45 (100%)	4.64 (0.74)	67.6%	26.5%	2.9%	0%	2.9%
More Normal	45 (100%)	4.67 (0.83)	76.5%	14.7%	2.9%	2.9%	2.9%
Informed	45 (100%)	4.49 (0.90)	58.8%	29.4%	5.9%	2.9%	2.9%
Less Isolated	45 (100%)	4.64 (0.83)	73.5%	17.6%	2.9%	2.9%	2.9%
Overwhelmed	45 (100%)	1.80 (1.00)	2.9%	8.8%	8.8%	35.3%	44.1%
Judged	44 (97.8%)	1.44 (0.73)	0%	2.9%	5.9%	26.5%	64.7%
Like an outsider	45 (100%)	1.49 (0.73)	0%	2.9%	5.9%	32.4%	58.8%
Pressured	45 (100%)	1.42 (0.78)	0%	5.9%	2.9%	20.6%	70.6%
A reduction in my MH symptoms	45 (100%)	3.73 (1.23)					
<i>To what extent did participating in the group affect the following aspects of your life?</i>							
	<i>N (%)</i>	<i>M (SD)</i>	Very Positively (5)	Positively (4)	Neither Positively nor Negatively (3)	Negatively (2)	Very Negatively (1)
Bond with your children	43 (95.6%)	4.09 (0.78)	34.9%	39.5%	25.6%	0%	0%
Number of healthcare visits	38 (84.4%)	3.84 (0.79)	23.7%	36.8%	39.5%	0%	0%
Quality of healthcare visits	39 (86.7%)	3.87 (0.77)	23.1%	41.0%	35.9%	0%	0%
Support network	44 (97.8%)	4.14 (0.73)	34.1%	45.5%	20.5%	0%	0%
Confidence as a mother	44 (97.8%)	4.43 (0.66)	52.3%	38.6%	9.1%	0%	0%
Ability to manage your home	44 (97.8%)	4.14 (7.34)	34.5%	45.5%	20.5%	0%	0%
Performance at work	28 (62.2%)	3.86 (0.65)	14.3%	57.1%	28.6%	0%	0%

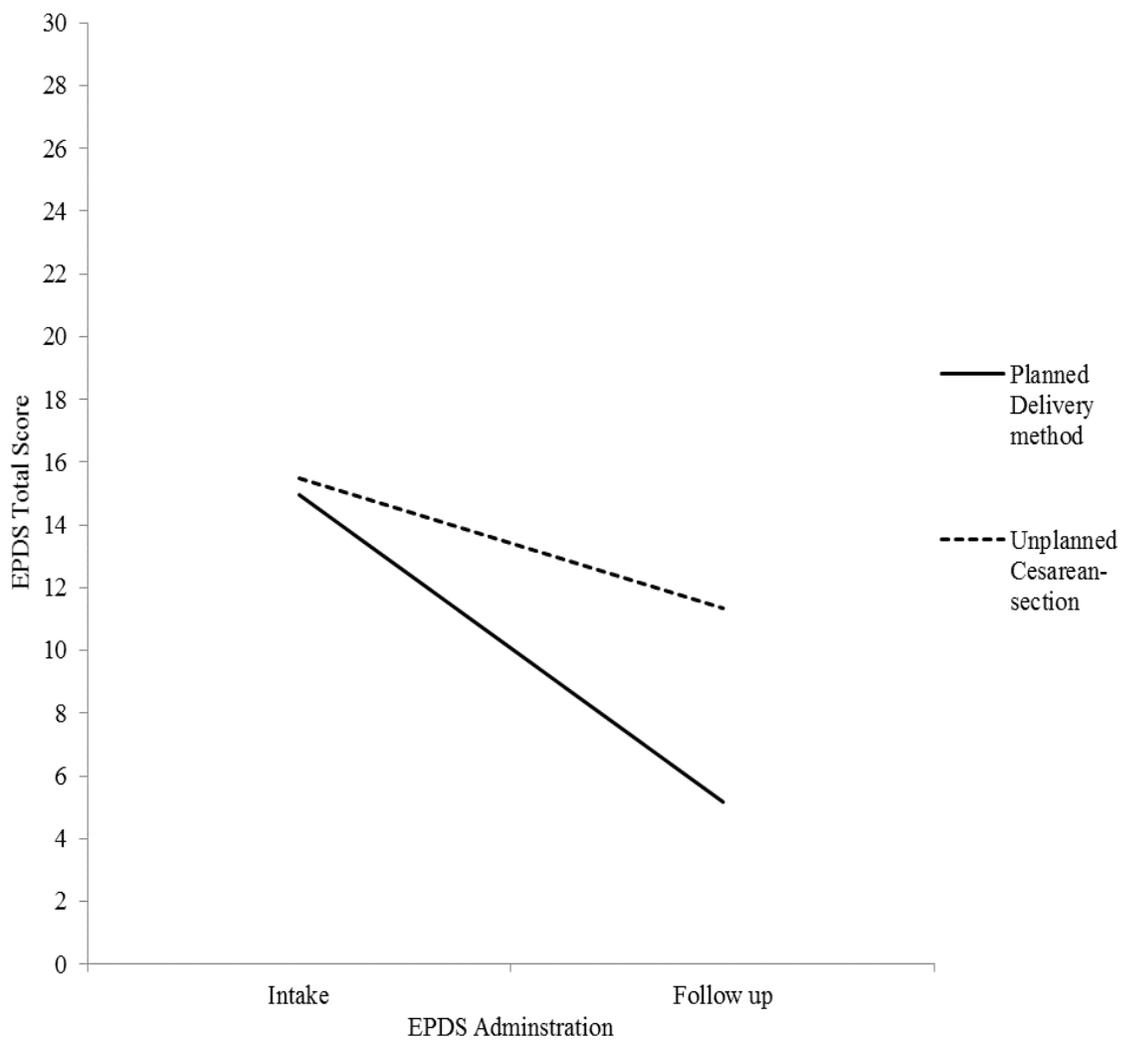


Figure 1. Edinburgh Postnatal Depression Scale total score at intake and follow up for program participants by planned and unplanned delivery method

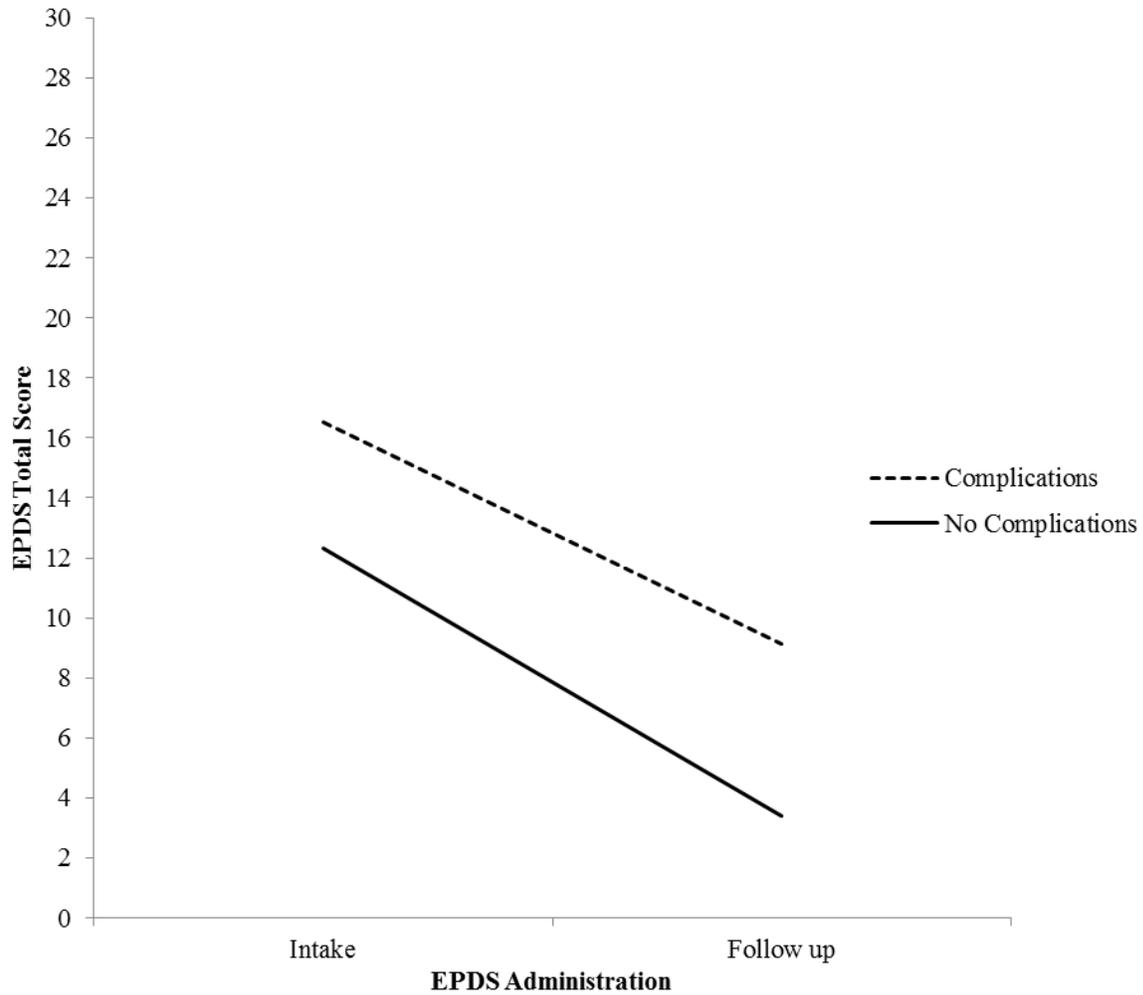


Figure 2. Edinburgh Postnatal Depression Scale total score at intake and follow up for program participants by complications

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CHAPTER 5

Integrative Review

Postpartum mood disorders (PPMDs) are a globally recognized threat to the health and wellbeing of women and their families (World Health Organization, 2008). To combat the comprehensive sequelae of PPMDs, practitioners, researchers, and policy makers are seeking strategies to improve maternal mental health. To facilitate these efforts, numerous policies have been initiated recently in the United States, including recommendations for improved screening practices by multiple healthcare organizations (ACOG, 2015; Earls, 2010; Siu et al., 2016) and legislation to increase the knowledge-base and enhance treatment utilization (Patient Protection and Affordable Care Act *SEC 2952*, 2010). However, as demonstrated in the prior four chapters, critical gaps in the scientific literature impede deployment of public health strategies with the greatest potential. The studies included in this dissertation contribute to the literature in three priority areas and address correlates of PPMDs, service utilization, and program effectiveness (NIMH, 2015). In the sections that follow, I summarize the findings of each study and then address the implications for research, practice, and policy. I will conclude with directions for future research in the field.

Summary of Findings

The first study (Prevatt, Desmarais, & Janssen, 2016) focused on lifetime substance use as a potential risk factor for PPMDs. Findings revealed that women who met criteria for a substance use disorder (either abuse or dependence) reported worse postpartum symptoms of depression, anxiety, obsessive compulsive disorder, and post-traumatic stress disorder, than their peers who did not meet criteria for a substance use disorder. Further, lifetime substance use, above and beyond sociodemographic characteristics and mental health history, was associated

with postpartum post-traumatic stress disorder. Lifetime drug use specifically emerged as a unique predictor for postpartum anxiety and stress symptoms. This was the first study to examine the effect of drug and alcohol use individually on postpartum mood disorders beyond depression. These findings are consistent with the literature on associations between substance use disorders and mental illness. Additionally, results indicate that screening for substance use disorders may improve efforts to identify women at risk for developing PPMDs.

The second study (Prevatt & Desmarais, 2017) explored healthcare service utilization by conceptualizing disclosure of emotional health as a critical step in PPMD screening and identification. The study examined possible barriers and facilitators to disclosure to better understand potential mechanisms for intervention. Most notably, the results revealed that 21% of the sample did not discuss their emotional wellbeing with any healthcare provider. With regard to barriers, approximately half of the sample reported at least one significant barrier impeding their access to treatment; stigma, time constraints, and lack of motivation were the most commonly endorsed barriers. Social support, a robust predictor of PPMD outcomes, was examined as a potential facilitator of disclosure. Over one-third of the sample reported insufficient social support and indicated that their partner/spouse, other family, and friends are the most important sources of support. In the final analyses, findings revealed that only social support and amount of perceived stress were associated with increased odds of symptom disclosure. This suggests important implications for practice and policy, in particular, leveraging mothers' support networks as an untapped resource for improving screening and identification interventions.

The third study (Prevatt, Lowder, & Desmarais, under review) addressed intervention research through a mixed-methods program evaluation of a community-based peer-support group

for reducing postpartum depression. This study utilized Community-Based Participatory Research tenants and engaged community stakeholders throughout the entire research process to examine participant satisfaction as well as program effectiveness. Program participants reported high levels of satisfaction and reviews of the group were overwhelmingly positive. Perceived strengths of the program related to four themes: the discovery of shared experiences, which normalized thoughts and feelings; establishing a supportive community; feeling understood and accepted; and finding a safe place for validation. Additionally, two primary themes emerged regarding participants' perceptions of program weaknesses. First, some participants reported an exacerbation of symptoms in response to hearing about other group members' struggles. Second, participants found the program less helpful when the groups were large.

Beyond participant satisfaction, program effectiveness was also explored. First, program effectiveness was examined by comparing group participants to a community comparison group. At follow up, group participants' depression levels were similar to their peers in the community. Program effectiveness was then examined by analyzing changes in group participants' depression scores from intake to follow-up. Analyses revealed that program participants who experienced complications or delivered via unplanned Cesarean-section had higher levels of depression symptoms following treatment than their peers who did not experience complications and delivered as planned. Findings suggest that women who experience complications or deliver via unplanned Cesarean-section may be appropriate targets for more intense intervention than available in this community program. Overall, the study indicated that a peer-support group program can be successful in meeting participant needs and reducing depressive symptomatology.

Implications

Taken together, the findings of these studies not only contribute to scientific knowledge regarding postpartum mood disorders but also hold specific implications for research, practice, and policy. These are discussed below.

Implications for Research. The value of research rests not only in the resulting practical applications, but also in the subsequent questions uncovered by the new discoveries.

Accordingly, each of these studies suggest unique directions for future research. The findings from the first study (Prevatt et al., 2016), reported in Chapter 2, revealed several potential avenues for further investigation. First, results indicated that lifetime substance use is associated with worse postpartum mental health. As such, further investigations in the field should build upon these findings and continue to examine how screening from this perspective, lifetime use instead of current use, can improve upon reporting accuracy and PPMD identification effectiveness. For example, a natural extension of the first study would be to determine if screening for lifetime substance use in an antenatal setting actually improves identification of women at risk for PPMDs. Results of such an investigation could inform guidelines for best practice, clarify screening methods, and prompt development of early identification protocols. Second, the Prevatt et al., (2016) clarified the unique contributions of alcohol and drug use on postpartum mood disruption. Moving forward, these findings support investigation of alcohol use as a separate construct from drug use, and consequently “substance use” should be disaggregated in future studies. This appears particularly relevant given the growing body of literature distinguishing opioid use disorder from other categories of substance use disorders (Smith & Lipari, 2017). The third implication for research indicated by Prevatt et al., (2016) is the value in considering the various diagnostic categories common in postpartum mood

disruption, beyond postpartum depression. Postpartum depression is commonly used inaccurately as an overarching term to encompass all PPMDs, yet it is clear that there are unique risk factors and symptoms for the different diagnoses. As such, researchers should adopt a strategy to examine the broad range of PPMDs in future investigations rather than limiting studies to only depressive symptoms.

In the second study (Prevatt & Desmarais, 2017), contained in Chapter 3, implications for research include PPMD nondisclosure, common barriers to treatment, and stress and social support as facilitators for treatment. First, findings establish that many mothers do not discuss their postpartum emotional health with their healthcare provider. As such, it is very likely that PPMD prevalence estimates underrepresent the true breadth of maternal mental illness. Therefore, research should examine strategies for improving screening accuracy in light of under-reporting. Additionally, research should examine elements of effective screening both from the provider and patient perspectives. Future studies could use a dyadic approach to better understand factors related to symptom disclosure within the patient-provider interaction. These studies should seek to pair patient and healthcare provider experiences to clarify perspectives of the screening process and inform interventions to improve screening efforts. Second, social support was revealed as a significant predictor of disclosure, indicating that further research is warranted to clarify the specific mechanism that social support plays in promoting symptom disclosure. Third, the findings indicate that perceived stress is associated with treatment seeking. As such, research of PPMDs should consider stress in addition to the more commonly assessed mood disorders in future studies. Fourth, while barriers to treatment were associated with worse postpartum mood, in contrast to the literature, barriers were not associated with PPMD symptom

disclosure. Future research should examine how perceived barriers, particularly stigma, time constraints, and motivation, are related to treatment seeking.

Findings from the third study (Prevatt, Lowder, et al., under review), reported in Chapter 4, also reveal several implications for research regarding peer social support groups. First, the peer support model is an acceptable and satisfactory method for promoting postpartum depression recovery yet little is known regarding the acceptability for women who are experiencing postpartum symptoms beyond depression. Accordingly, research should broaden program effectiveness studies to include anxiety, OCD, and PTSD. Second, to build upon the findings from study three, future studies should implement random assignment, or *a priori* community sample matching protocol, measure dosage, include assessments for the broad array of PPMD symptomatology beyond depression, and systematically collect pre-treatment and follow-up data for both treatment and control groups. These methodological improvements would increase rigor in experimental design. Third, study three revealed that women who experience complications in labor or delivery, or who deliver via unplanned Cesarean-section, are at risk for more persistent postpartum depression symptoms than their peers who delivered as expected and without complication. Research should further examine these particular risk factors with regard to treatment resistance and their associations with other postpartum mood disorders.

Finally, among the three studies, recruited samples represented a fairly homogenous group of women who were mostly Caucasian, well-educated, partnered, and with moderate to high levels of socioeconomic resources. It is essential to recruit more diverse samples to assess the generalizability of these findings in women with less socioeconomic resources and greater ethnic and racial diversity. This is particularly important given the cumulative effects for women who have restricted resources in multiple components of SES. For example, women who belong

to minority race/ethnic groups are at greater risk for worse outcomes across multiple levels of the social ecological model, and as such, it is important to clarify how the findings contained within this program of research apply to women with different racial and SES backgrounds.

Implications for Practice. Findings contained within this dissertation program of research have implications for practice. Findings from Prevatt et al., (2016) suggest that healthcare providers should be inquiring about lifetime drug and alcohol use in prenatal and postpartum medical appointments. While the specific effect of this additional screening on improving PPMD identification has yet to be verified, it is consistent with recommendations by Healthy People 2020 and the US Preventative Services Task Force (Moyer & US Preventative Services Task Force, 2013; U.S. Department of Health and Human Services. Office of Disease Prevention and Health Promotion., 2011). Women who meet criteria for a substance use disorder from a lifetime perspective could then receive counseling and referral for substance use treatment and/or be targeted for early PPMD intervention. Use of the lifetime perspective is also supported by this study, and by extant literature, in that it may serve to reduce stigma and promote more accurate self-reporting (Daley, Argeriou, & McCarty, 1998; Ernhart et al., 1988; Finkelstein, 1994; Lester, Andreozzi, & Appiah, 2004; Morrow-Tlucak et al., 1989; NIDA, 1997).

Findings in Chapter 3 (Prevatt & Desmarais, 2017) present several implications for clinical practitioners. First, it is clear that the social support network of pregnant and postpartum women represents a key, yet underused, component for treatment utilization. Clinicians could activate the social support network of their patients in several ways. First, women should be encouraged to develop a *post-delivery* plan, similar to the birth plan commonly used to facilitate a sense of preparedness for labor and delivery. This post-delivery plan would prompt women to

consider their needs upon returning home with the infant and help them identify individuals or resources to provide support across the four domains: instrumental, emotional, knowledge, and appraisal. Secondly, with the permission of their patient, clinicians could target interventions to the support networks of pregnant and postpartum women by requesting their presence at appointments or providing psycho-education about the needs of new mothers and ways to offer support. Psycho-education could occur via various media, in-person sessions, brochures, email, or text messaging, and warrants further investigation to determine which mode possesses superior efficacy. Thirdly, many infant-care programs are targeted toward mothers, these programs could expand promotion to include a wide array of caregivers which may reduce the role-strain and stress experienced by mothers attempting to balance caring for the infant's needs with her other responsibilities and self-care. Finally, clinicians could also promote a family-care approach in postpartum obstetric appointments and pediatric appointments. This approach could emphasize the value of wellness for the entire family unit and prompt all members to comment on the mental and physical health of each other as well as themselves.

Engaging the social support network early in the pregnancy or shortly after delivery could also represent a key opportunity to begin education about common emotional responses to motherhood. As mentioned previously, awareness of PPMDs is typically limited to depression and often this limited awareness has a negative connotation. The findings from Chapter 3 (Prevatt & Desmarais, 2017) and Chapter 4 (Prevatt, Lowder, et al., under review) indicate that stigma is a barrier to treatment and that women desire validation of their PPMD experiences. Clinicians should work to educate patients and support networks about the risk factors and diverse manifestations of PPMDs. This education should also include data on prevalence, cues to seek treatment, and local resources. New mothers and their families should be encouraged to

consider emotional distress in a similar manner as they would any physical illness for mother or child, as a trigger to seek treatment quickly.

Finally, findings from Chapter 4 (Prevatt, Lowder, et al., under review) indicate that women who experience complications during pregnancy or childbirth or who deliver via an unplanned Cesarean-section are appropriate targets for early intervention. It appears that PPMD symptoms are likely to persist and may require more concentrated interventions for these women than their peers who deliver as planned or have uncomplicated birth experiences.

Implications for Policy. Beyond research and clinical implications, there are several policy-level implications supported by the findings from this dissertation research. Results from the studies reported in Chapters 3 and 4 indicate the importance of policies aimed at reducing the stigma associated with PPMDs. As evidenced by the most commonly endorsed barrier to treatment (Prevatt & Desmarais, 2017), and the qualitative responses of group participants expressing their desire for a safe place to share their PPMD experiences (Prevatt, Lowder, et al., under review), it is clear that interventions aimed at normalizing the varied emotional responses in the postpartum period are necessary. These could include policies to increase public awareness, implementing psycho-education about PPMDs being provided by hospitals at registration, or mandated reimbursement for screening, referral, and counseling regarding PPMD risk factors and treatment (Creedy, 1993).

Healthcare providers represent an obvious resource to combat stigma and have been used successfully in stigma reduction interventions across other health issues (Corrigan, Druss, & Perlick, 2014; Nyblade, Stangl, Weiss, & Ashburn, 2009). However, engaging providers in stigma reduction assumes that the providers are adequately prepared to address PPMD. Although provider-level perceptions were not directly assessed in this dissertation, there is ample evidence

in the literature indicating many barriers to providing care, including a lack of training, low confidence in ability to treat, low sense of responsibility to address maternal mental health, and uncertainty regarding referral options (Legere et al., 2017). Therefore, when taken together with the extant literature, the findings from this dissertation support the need for policies to increase PPMD training for healthcare providers as they represent a critical component in reducing stigma.

The harmful effects of stigma are not limited to PPMD. Indeed, stigma is a primary barrier to effective screening for substance use in the perinatal period as well. The findings from Chapter 2 (Prevatt et al., 2016) suggest that drug use in particular is associated with worse maternal mental health. As such, policy-level interventions aimed at reducing substance use should employ gain-based messaging emphasizing the importance of maternal and child health instead of the traditional fear-based focus on the detrimental effects of substance use on the fetus. Additionally, there is some indication that routine screening for lifetime substance use, drug use in particular, may improve early identification of women at risk for PPMDs. These findings also lend support to the extant literature for querying substance use from a lifetime perspective although the exact effect awaits further investigation.

Future Directions

Despite these important advances in knowledge, the current literature is still limited in several critical ways. First, the pregnancy and postpartum experiences of women who belong to marginalized populations are under-examined. Second, while there is a growing body of literature on social support interventions to *treat* PPMDs, research examining social support to prevent PPMDs is virtually non-existent. Third, policies to remove barriers to care are being implemented, yet effectiveness of these policies in improving access to care has not been

empirically validated. Fourth, little is known about how maternal cognitive style, such as mindset and cognitive flexibility, may function as possible factors associated with PPMD risk or resilience. Each of these directions for future research will be discussed in the sections below.

Women of minority status or low socioeconomic status are at a greater risk for developing a PPMD following the birth of a child (Howell, Mora, Horowitz, & Leventhal, 2005), yet are much less likely to receive treatment than their counterparts who belong to the racial majority or possess greater socioeconomic resources (Santora & Peabody, 2010). Therefore, as we prioritize maternal mental health in an effort to protect both women and their families, it is imperative that more attention be paid to these high risk populations. I suggest there are three populations in particular that warrant further investigation: Hispanic mothers, Lesbian, Gay, Bisexual, and Transgender (LGBT) parents, and pregnant incarcerated women.

Studies examining PPMDs in Hispanic women in the United States reveal that 21-53% of Hispanic mothers experience PPMD symptomatology (Gress-Smith, Luecken, Lemery-Chalfant, & Howe, 2012; Hutto, Kim-Godwin, Pollard, & Kemppainen, 2011; Kuo et al., 2004). Hispanic mothers' maternal mental health is particularly relevant in North Carolina and the United States, as 15% of births in North Carolina in 2014 and 23% of American births were to Hispanic women (Hamilton et al., 2016; NCDHHS, 2014). Unfortunately, Hispanic mothers are largely unrepresented in the empirical literature, and, consequently, relatively little is known regarding their experiences and needs in the postpartum period.

Likewise, the transition to parenthood for LGBT individuals is woefully understudied. A recent study indicates that over a third of lesbian, gay, or bisexual adults in the United States have had a child (Gates, 2013) yet literature is scant regarding postpartum mood disruptions in lesbian and bisexual mothers beyond estimates of greater prevalence of PPMDs than in

heterosexual women (Ross, 2005; Ross, Steele, Goldfinger, & Strike, 2007). Additionally, LGBT parents face stigma and disparities in general healthcare access which could compound barriers to PPMD treatment access (Chapman, Watkins, Zappia, Combs, & Shields, 2012; Goldberg & Smith, 2011). Finally, despite the important associations between social support and PPMDs, little is known regarding how LGBT parents engage with their support networks (Clarke, 2008; Ross, Steele, & Sapiro, 2005; Wilton & Kaufmann, 2001). Clearly, to adequately meet the needs of LGBT women and their families, the aforementioned gaps in literature must be addressed.

Finally, the needs and care for pregnant and postpartum women who are incarcerated are likely the most overlooked with a paucity of publications (Shaw, Downe, & Kingdon, 2015). The United States is experiencing a substantial growth in incarcerated women; between 1990 and 2009 the number grew 153%, with approximately 6-10% of incarcerated women being pregnant (ACOG, 2011). Common foci of the literature on incarcerated pregnant women include use of restraints, nutritional needs, substance use treatment, and pregnancy screening; yet even this literature is quite limited (Kelsey, Medel, Mullins, Dallaire, & Forestell, 2017). As such, research examining the mental health needs for pregnant and postpartum women who are incarcerated needs greater attention. The American College of Obstetrics and Gynecology provides recommendations for the care of incarcerated mothers, representing efforts to protect maternal and infant health by preventing mother-child separation and promoting breastfeeding (two factors associated with worse postpartum mental health outcomes). However, structured examination of these recommendations and the associated impact on maternal and infant health has yet to be conducted.

Our understanding of the mothering experiences of women who belong to these marginalized groups is limited at the most basic level. Before any program development or

adaptation can occur they must be addressed. It is only after the study of the unique needs, resources, and experiences of women belonging to these marginalized groups has been completed that interventions can be adapted for use. Subsequent policy and program development must be evidence-based as well as practical and feasible. Therefore, research with these populations should proceed using the tenants of community-based participatory research as collaborations with community stake-holders and research-practitioners will be essential in conducting relevant and meaningful investigations.

The second area of future research implicated by the work within this dissertation relates to examining the effectiveness of programs providing *prenatal* social support in reducing PPMD incidence. Despite the strong association between social support and PPMDs, and the positive effects of social support interventions to treat PPMDs, use of social support as a prevention mechanism has yet to be fully examined. Cohort, or group-based, prenatal care represents a theoretically-grounded approach offering the unique opportunity to incorporate social support with didactic childbirth education resulting in improved maternal mental health, infant health outcomes, and reduced health disparities (Lathrop, 2013; Picklesimer, Billings, Hale, Blackhurst, & Covington-Kolb, 2012). Group-based prenatal care is grounded in Social Cognitive Theory which integrates self-efficacy, knowledge of risks and benefits of health practices, outcome expectations, personal goals, and perceived barriers and facilitators to health (Bandura, 2004).

CenteringPregnancy is an example of group-based prenatal care that has been implemented across the United States. CenteringPregnancy is a manualized, empirically validated program where women are grouped by gestational age to establish a cohort of 6-10 women. The traditional model of 10 prenatal appointments is enhanced as CenteringPregnancy participants follow the private provider appointment with a 90-120-minute group session. Group

sessions include didactic components covering perinatal wellness (e.g. nutrition, stress management, labor and delivery, breastfeeding, and infant care) and provide social support (Centering Healthcare Institute, n.d.). Integrating mental health treatment into existing systems of care has the potential to overcome many barriers to treatment and align with women's preferences. Indeed, when PPMD screening, diagnosis, and treatment occur in the same setting, referral rates are higher than in non-integrated settings, where referral rates drop to less than 50% (Myers et al., 2013). Therefore, in light of the extant literature, there is a need for further examination and systematic review of the CenteringPregnancy model (Catling et al., 2015) as a potential intervention to reduce PPMDs.

A third area of future research indicated by the previous chapters relates to improving access to care. While access to perinatal mental health care requires individual and provider-level interventions, policy level programs cannot be ignored. At the policy level, there are several promising interventions aimed at improving treatment access whose effectiveness remain untested. Future studies should target these interventions to determine the benefits to access to care and treatment utilization. Below I provide three examples of policy efforts which require careful program evaluation to clarify effectiveness prior to dissemination and broad adoption.

First, improved screening policies are receiving increased attention as an initial step to enhancing identification and referral outcomes. Particularly given the increased interactions women have with healthcare professionals in the year following childbirth, there appear ample opportunities for identifying and engaging women in need of treatment (Cheng, Fowles, & Walker, 2006). As the findings in Chapter 3 (Prevatt & Desmarais, 2017) indicated, a push for universal screening alone will not serve as a panacea. Therefore, the initial step to clarifying the benefit of universal screening is to conduct a systematic assessment of universal screening

program effectiveness. Presently, the feasibility of universal screening programs (Venkatesh et al., 2016) as well as effectiveness of discrete screening programs in improving PPMD identification, have been established in the literature. However, to date, no systematic review exists to specify which protocol is superior, nor identify the unique elements responsible for the effects of the screening programs. Beyond screening for PPMD identification, there remains a gap in the literature examining the mechanisms within the screening-to-treatment process — beginning with screening, and ending with receipt of treatment. Indeed, many studies measure referral or diagnosis as the outcome variable proxy for treatment access or screening success. Ultimately, however, successful interventions should result in treatment *receipt* and *symptom reduction*, not just identification and referral.

Beyond PPMD identification, the literature has established poor physician training as another barrier to improving maternal mental health. In response, Massachusetts has developed a physicians' support model, the Massachusetts Child Psychiatry Access Program for Moms, to improve physician support and training in perinatal mental health (Byatt et al., 2016). This program provides three key components of support to healthcare providers: 1) trainings and toolkits on perinatal mental health, 2) psychiatric phone consultation, and 3) care coordination for referral and treatment. Psychiatric consultations can include differential diagnoses, medication guidance, and assistance in treatment planning and psychotherapy. Should the provider be seeking assistance with resource identification and referral, they will speak to a specialist who can facilitate referral to mental health services such as psychotherapy or family services in the patient's geographic area. This state-wide program appears to be a feasible and sustainable tool to improve support and training for perinatal care providers seeking assistance in

managing maternal mental health. However, there has yet to be a program evaluation to establish effectiveness in improving patient outcomes.

Integrating mental health services into primary care represents another policy requiring further investigation as a potential mechanism for improving PPMD treatment access (Avalos, Raine-Bennett, Chen, Adams, & Flanagan, 2016). Indeed, it would seem that providing psychiatric services in primary care, or specialist settings, such as obstetric (Sit et al., 2009) or pediatric (Liberto, 2012) offices, has the potential to reduce numerous barriers including stigma, attitude, provider training, and knowledge of resources – both at the provider and patient level, just to name a few. In North Carolina specifically, I have preliminary data from a state-wide assessment of perinatal health care providers indicating that integrated care is the top recommendation to improve access to maternal mental health care (Prevatt, Bryson, Davis, & Perkins, in progress). However, to garner full support for this model, it is imperative that feasibility and effectiveness studies, both from a health and financial standpoint, be conducted to establish the value of integrated care to maternal mental health.

The final area implicated for further investigation is maternal cognitive style, particularly cognitive flexibility and mindsets, as a possible risk or protective factor for PPMD symptom development. This area is the least developed, as thus far, the literature has focused on maternal self-efficacy, appraisal, rumination, negative inferential style, and neurotic characteristics (Barnett & Gotlib, 1988; Barnum, Woody, & Gibb, 2013; Gross, Conrad, Fogg, & Wothke, 1994). However, findings from Chapter 4 (Prevatt, Lowder, et al., under review) revealed that women who experienced complications in childbirth or who delivered via unplanned Cesarean-section experienced more persistent postpartum depression symptoms than their peers. While the greater depression symptomatology could be related to the physical impact of these

complications, it is possible that complications represent manifestations of unexpected outcomes that require a cognitive shift in appraisal or expectation. Perhaps, there is an association between PPMD symptoms and cognitive style is related to meaning making, expectations, or growth mindset. The various potential stressors encountered in motherhood could be understood as an intersection of Mindset Theory (Dweck, 2006) and Stress and Coping Theory (Folkman, Lazarus, Gruen, & Delongis, 1986). Indeed, there is some evidence that growth mindset can buffer the effect of stressful life events and psychological distress (Schroder et al., 2017). Exploring this process would first require the development and validation of a maternal mindset instrument. The next step would then be to clarify which maternal cognitive approaches are at play and how they contribute to PPMD, while teasing apart the effect of various coping strategies.

Conclusion

It is clear that PPMDs negatively impact the lives of both mothers and their families with lasting impacts when untreated. The findings contained in this dissertation add to the growing literature focused on clarifying risk factors, improving treatment utilization, and identifying effective treatment options. Specifically, I have 1) identified lifetime substance use, and drug use in particular, as a risk factor for PPMDs; 2) determined that stress and social support are critical in PPMD symptom disclosure; and 3) clarified that peer support groups are a promising and acceptable mode for addressing postpartum depression. Furthermore, the implications and associated future directions provide practical guidance for furthering efforts to improve maternal mental health. It is only through evidence-based interventions that we will have the greatest likelihood of success in implementing public health strategies to improve maternal mental health.

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