Considering a Relational Model for Depression in Women

by

Julie A. Kruse

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Doctoral Committee:

      Professor Emeritus Reg A. Williams, Chair
      Associate Professor Cleopatra H. Caldwell
      Associate Professor Bonnie M. Hagerty
      Associate Professor Julia S. Seng

DEDICATION

To my family…..

    Liam, Sophia, & Bill…..the reason for

    Mom, Dad, Oma & Aunt Karen…..the reason it happened

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I believe it takes a village to "raise" a PhD student and it would have been impossible for me to get to this point in my academic life without the support and guidance from several key people.

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PREFACE

This dissertation is designed as a manuscript-style dissertation and includes a collection of research papers. Chapter 1 includes a review of the literature paper entitled: *Considering a Relational Model for Postpartum Depression: A Literature Review* and is a comprehensive review regarding the predictors of postpartum depression in context of the relational model of depression. Chapter 2 pertains to the study related to depression in female Navy recruits and is entitled: *Considering a Relational Model for Depression in Female Navy Recruits.* Chapter 3 is a second study that examined the relational model for depression however; the model is explored in postpartum women. The final Chapter 4 of the dissertation is a synthesis of the research and is focused on a summary of the study results, significance of the studies, strengths and limitations, and future directions.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

ABSTRACT

Purposes of these secondary analyses studies were to extend testing of a relational theory of depression and show that low sense of belonging, poor social support, and loneliness were salient risk factors in women. The models took additional known predictors into account including adult attachment, mother-infant bonding, and conflict. Data came from: (1) a cross-sectional cohort study of female Navy recruits (n=114), and (2) a prospective longitudinal cohort study of diverse women enrolled in prenatal care (n=564). Participants in both studies were administered a battery of instruments that included the aforementioned model variables. Structural equation modeling was used to test the "fit" of the theoretical models and determine significance of direct and indirect paths. The proposed model for female Navy recruits explained 53% of the variance in depressive symptoms with loneliness and sense of belonging as the strongest indicators of depression. Perceived social support indirectly impacted depression as well. The Navy should consider interventions that increase perceived social support and sense of belonging in high risk for depression recruits to decrease loneliness and depression and circumvent recruits not completing basic training. The assumption that recruits are in close quarters and contact with other people and therefore are not lonely and receive adequate social support is not supported. In the second study, the model for postpartum depression (PPD) explained 35% of the variance in depressive symptoms with impaired bonding and loneliness as

the strongest indicators. Sense of belonging, perceived social support from a healthcare practitioner and a partner, and parenting sense of competence were additional indicators. Findings from this study challenge current thinking about the relationship between impaired bonding and PPD as this study raises the possibility that impaired bonding is a risk for PPD as opposed to the reverse relationship. Additionally, the study provided evidence of the importance of healthcare practitioners' alliance with patients especially for women who were sociodemographically disadvantaged as the healthcare relationship influenced PPD more than family or a partner. Sense of belonging, social support, and loneliness were strong predictors of depression in women, which highlights that there is a relational component to depression.

CHAPTER 1

CONSIDERING A RELATIONAL MODEL FOR POSTPARTUM DEPRESSION:

A LITERATURE REVIEW

Abstract

The purpose of this paper was to provide background information and a review of the literature regarding the predictors of postpartum depression using the novel model proposed by Hagerty and Williams (1999). Specifically, the model components of perceived social support, conflict, sense of belonging, and loneliness were explored. This paper contributes to advancing the science of women's mental health in relation to PPD. A review of the literature was conducted using the Cumulative Index to Nursing and Allied Health Literature, Medline, PsycINFO, and Women's Studies International to examine the variables of perceived social support, conflict, sense of belonging, and loneliness in relation to PPD. The emerging theme from this review is that PPD is a multifaceted perinatal mood disorder in which no one variable will explain a large portion of the variance for depression. However, inadequate social support, high relational conflict, sense of belonging, and loneliness emerge as major contributors. Further exploration of the model proposed by Hagerty and Williams (1999) in postpartum depressed women is warranted.

Introduction

Postpartum depression (PPD) is a serious and complex mood disorder affecting approximately one out of eight (Beck & Watson-Driscoll, 2006; Kendall-Tackett, 2010; Mancini, Carlson, Albers, 2007) of the more than four million women who give birth in the United States every year (U.S. National Center for Health Statistics, 2010). This common health issue impacts not only the mental well-being of the mother, causing poor health and bonding problems, but also may have negative effects on the infant including dysregulation patterns that make the infant prone to depression in the future. The long term effects of PPD in children includes the display of overanxious and depressed symptoms as well as behaviors related to defiance, aggression, and conduct problems (Hay, Pawlby, Angold, Harold, & Sharp, 2003; Murray, Halligan, Adams, Patterson, & Goodyer, 2006; Ashman, Dawson & Panagiotides, 2008).

PPD has a financial and resource impact on the mother and society as well. In 2008, it was estimated that of the 5.4 % of the United States population suffering from depression, including women with PPD, the overall cost to society was as high as $83 billion (Centers for Disease Control and Prevention, 2008). Roberts et al. (2001) concluded that depression was one of the top five variables contributing to higher nursing costs with nursing costs almost double for mothers with PPD versus non-depressed mothers.

PPD symptoms may be similar to symptoms noted from major depressive episode. There are however, characteristics that are unique to postpartum women. A postpartum depressed mother may experience loss of self, difficulty transitioning to the motherhood role, worrisome thoughts about the ability to be a good mother, and

3

"incongruity between expectations and reality of motherhood" (Beck & Watson-Driscoll, 2006, p.79).

Significant predictors of PPD include low social support, life stress, depression history, prenatal anxiety, marital dissatisfaction, and infant temperament. In fact, low social support has been considered a major predictor of PPD (O'Hara & Swain, 1996; Beck, 2001, & 2002b; Beck & Watson-Driscoll, 2006) however, Hagerty and Williams (1999) examined the relationship of perceived social support, conflict, sense of belonging, and loneliness on depressive symptoms in a depressed clinical sample and in college students and noted social support had only a small, indirect effect on depressive symptoms. All of the aforementioned model variables explained 64% of the variance of depressive symptoms with sense of belonging explaining the most variance (R^2=.52) making it the strongest predictor of depression (Hagerty & Williams, 1999). The impact of sense of belonging on depression has been noted by others as well (Anant, 1967; Sargent, Williams, Hagerty, Lynch-Sauer, & Hoyle, 2002; McLaren, 2006; McLaren & Challis, 2009).

Purpose

Studies reviewed indicate the concepts of conflict, sense of belonging, and loneliness have not been well explored in women with PPD. In fact, a Cumulative Index to Nursing and Allied Health Literature (CINAHL), Medline, PsycINFO, and Women's Studies International search resulted in no studies that examined the relationship between sense of belonging and PPD, despite the fact that in the depression literature sense of belonging appears to be the major predictor of depression.

Therefore, the purpose of this paper is to provide background information and a review of the literature regarding the predictors of PPD using the innovative model proposed by Hagerty and Williams (1999). Specifically, the model components of perceived social support, conflict, sense of belonging, and loneliness will be explored.

Background

Postpartum Depression

The maternity "baby blues" is a common phenomenon affecting 30-75% of all new mothers within the first 3 weeks postpartum. Symptoms of the "baby blues" may include fatigue, worry, sleep problems, sadness, and irritability (Beck & Watson-Driscoll, 2006; Seyfried & Marcus, 2003). PPD, however, is a more serious and complex mood disorder affecting approximately 10-20% of all women in the postnatal period and is diagnosed based on Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV) criteria similar for major depressive episode or other types of depression disorders. The onset of symptoms may begin within the first 4 weeks postpartum yet, a third of women are diagnosed after 3 months. (Beck & Watson-Driscoll, 2006; Mancini et al., 2007). A report from the Agency for Healthcare Research and Quality indicated that prevalence rates for major and minor depression peaked at 3 months postpartum with a rate of 12.9% and slowly decreased to 9.9% in the 6th month postpartum. By the 7th month postpartum, it appeared the rate of PPD stabilized around 10.6% (Gaynes et al., 2005). PPD symptoms may linger for up to a year and may include a depressed mood most of the day-every day, insomnia or hypersomnia, feelings of worthlessness, recurrent suicidal thoughts, and an overall sense of loss of control over

thoughts, emotions, and actions. (Beck, 1996; Beck, 2002a; Beck & Watson-Driscoll, 2006; Kendall-Tackett, 2010; Mancini, et al., 2007).

PPD may also have negative effects on the infant. Field (1998) demonstrated through numerous studies in the 1980's and 1990's that infants of depressed mothers have dysregulation patterns that make the infant prone to depression in the future. This dysregulation included: "excessive indeterminate sleep, elevated norepinephrine and cortisol levels, limited responsivity to facial expressions, lower vagal tone" (p.201) and right frontal EEG activation. Infants of depressed mothers have also been noted to be more discontent, fussy, avoidant, and vocalize or make fewer positive facial expressions than infants of non-depressed mothers. The long term effects of PPD in children included the display of overanxious and depressed symptoms as well as behaviors related to defiance, aggression, and conduct problems (Ashman et al., 2008; Hay et al., 2003; Murray et al., 2006).

Although changes in hormone levels is a widely accepted view as to why women experience the "baby blues" immediately postpartum, the exact etiology of PPD has not been established and no biological or hormonal cause has been identified (Baker, Mancuso, Montenegro, & Lyons, 2002; Mallikarjun & Oyebode, 2005). PPD appears to be a complex and multifaceted mood disorder comprised of internal and external factors. It is theoretically possible that psychological and psychosocial interventions may prevent or decrease PPD symptoms (Mallikarjun & Oyebode, 2005). Considering the limited evidence regarding the use of pharmacological interventions in the treatment of PPD and the concern of the possible effects on newborns, attention to internal and external factors associated with depression including perceived social support, conflict, sense of

belonging, and loneliness are posited as important factors. In a previous study using a path analysis model 64% of the variance in depression in a depressed clinical sample and college students may be explained by the aforementioned variables (Hagerty & Williams, 1999). If these variables are factors that assist in explaining PPD, future public health interventions may be tailored around these concepts.

Theoretical Framework

The theoretical model proposed by Hagerty and Williams (1999) displays the relationship of perceived social support, conflict, sense of belonging, and loneliness on depression (Figure 1.1).
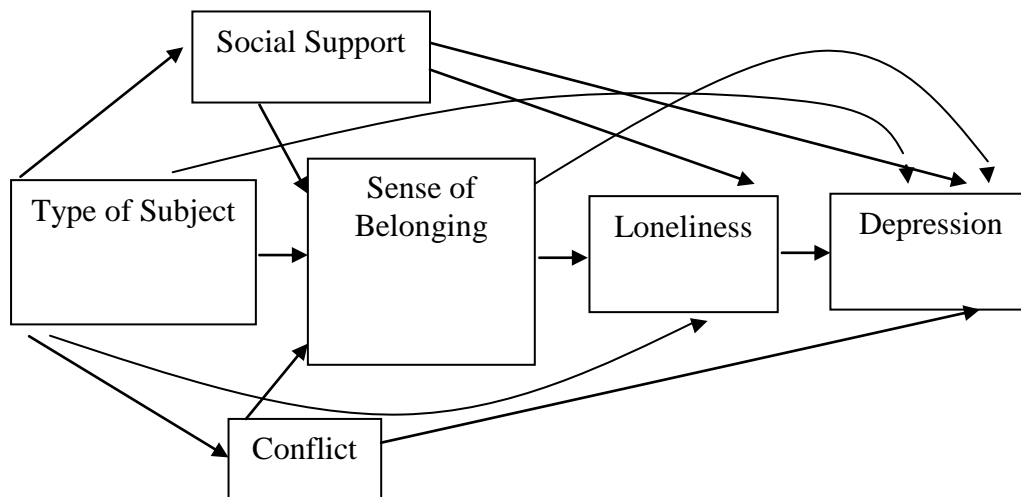
Figure 1.1. Theoretical model proposed by Hagerty and Williams (1999).

In this path model, all of the variables have a direct and/or indirect effect on depression with the exception of loneliness. Loneliness only has a direct impact on depression and affects no other variables yet is a mediator between sense of belonging and depression. Sense of belonging is a mediator between type of subject, social support, and conflict on depression. All of the variables in the model are described below with the

exception of type of subject, which includes depressed clients and community college students (according to the Hagerty and Williams study).

Databases for Searches

There were four separate searches conducted for each of the major model components (social support, conflict, sense of belonging, and loneliness) using CINAHL, Medline, PsycINFO, and Women's Studies International as major databases explored in relation to PPD. Inclusion criteria for all four searches included use of the English language and journals published from 2006 to present (July 2012). Exclusion criteria included: articles that did not examine the relationship between social support and PPD nor conflict and PPD, studies that only measured social support in pregnancy, studies that measured a mental health disorder other than PPD, studies that assessed PPD in adolescence, and studies that measured only paternal PPD. A search for articles related to the relationship between sense of belonging and loneliness on PPD achieved no results therefore, the publication years were expanded to include the years 1990 to July 2012. This resulted in no articles found related to sense of belonging and seven related to loneliness. Therefore the relationship between sense of belonging on general depression was searched with 18 results. In terms of loneliness and general depression, a hand search of articles were collected based on authors who were highly published in the field to expand the number of articles reviewed.

The following key terms were utilized to explore the relationship between *social support* and PPD: *social support, partner support, PPD,* and *perinatal mood disorders* ($n=207$); conflict and PPD: *conflict, marital conflict, partner conflict, PPD,* and *perinatal mood disorders* ($n=23$); sense of belonging and PPD: *sense of belonging, belonging,*

8

PPD, perinatal mood disorders, and *depression* (*n*=18); and loneliness and PPD: *loneliness, PPD, perinatal mood disorders*, and *depression* (*n*=7).

Review of the Literature Based on Model Paths

Social Support

There is an abundance of research related to the concept of social support. Social support is considered a metaconstruct and as such, there is no single, simple definition. What are common to most social support definitions are the underlying assumptions that support is given to one in need of support and that the support is positive (Tilden & Nelson, 1999). Cobb (1976) defined social support as "information leading a person to believe that he/she is cared for and loved, esteemed and valued, and/or that he/she belongs to a network of communication and mutual obligation" (p. 18).

Perceived and enacted social support are two board frameworks of social support that exist in the social support literature. An explicit difference exists between these two types of social support categories that are worth mentioning. Cohen (1992) defines perceived social support as "the function of social relationships—the perception that social relationships will (if necessary) provide resources such as emotional support or information" (p. 109). Perceived social support consists of the "availability and adequacy" of supportive assistance from social network members whereas enacted support may be considered the actions that members carry out to assist a central person (Barrera, 1986).

House and Kahn (1985) described the most widely accepted *components* of perceived social support which includes emotional, appraisal, informational, and instrumental support. Emotional support includes trust, concern, love, and listening.

9

Appraisal support is feedback that builds self-confidence and self-esteem. Informational

support is advice, suggestions, and directions. Finally, instrumental support includes

labor, money, time, services, and tangible aid. There are other frameworks with slightly

differing elements to their definitions (e.g., Caplan, 1974, Cobb, 1976, and Kahn &

Antonucci, 1980), but the four-factor framework by House predominates in empirical

studies.

Social Networks

The notion of social networks has been defined with less ambiguity when

compared with the concept of social support. Israel and Rounds (1987) stated that a social

network "refers to the existence and nature of social ties" (p. 314) and may be

categorized in terms of structural, interactional, and functional characteristics. Structural

network characteristics include the size (number of individuals) and density (how well-

integrated people in the network are and the degree to which people in the network know

one another) (Wellman, 1981). The nature of relationships is what defines the

interactional characteristics of networks and includes concepts such as reciprocity (give

and take), content (the meaning of relationships), durability (length of time in a network),

frequency (number of interactions), dispersion (ability to contact individuals easily),

homogeneity (how alike members are), and intensity (strength of relationship). Finally,

the functional characteristics of a social network include the notion of social support as

described previously (Israel, 1982).

Health Benefits of Social Support

Social support and its relationship to positive health outcomes has been a subject

of study for many years. As examples, researchers have examined the impact of social

support on cardiovascular health in men and women (Heitman, 2004), condom use in adolescents (Harper, Callegari, Raine, Blum, & Darney, 2004), violence prevention in youth (Canty-Mitchell & Zimet, 2000), and obesity prevention in adults and children (Baturka, Hornsby & Schorling, 2000; Teufel-Shone, 2006). A positive linear relationship has been noted by Lin and Peek (1999) in terms of emotional support and emotional adjustment to stressful life events such as birth of a baby.

Relationship between Social Support and PPD

The relationship between social support and PPD is well documented and a significant negative correlation is consistently demonstrated between PPD and emotional and instrumental support (Banti et al., 2009). However, there is a significant flaw in many research designs as many researchers are not specific in terms of what definition of social support they are using and/or the type or types of social support they are measuring. In addition, many researchers do not identify whether they are measuring perceived or enacted support. For purposes of this review, the framework (perceived or enacted support) and components (emotional, appraisal, informational, and instrumental support) will be identified when identified by researchers.

The review of the literature from the last five years reveals the following themes regarding studies from researchers who have examined the relationship between social support and PPD: (1) inadequate social support as a predictor of PPD in women; (2) social support was not a predictor of PPD; (3) social support intervention and prevention studies; (4) social support from network members; (5) and negative social support.

Inadequate social support as a predictor of PPD in women. Banti et al. (2009) conducted a review of the literature related to perinatal mood disorders and anxiety and

noted that inadequate social support is almost the strongest predicator of PPD and has a strong-moderate effect size. The only predictor that was stronger was a history of depression in the prenatal or antenatal period.

Antenatal depression, PPD & social support. An ancillary study including 367 women was conducted by Leigh and Milgrom (2008) from a National Postnatal Depression Program in Australia. These researchers assessed PPD at 10-12 weeks postpartum and noted that low social support was a significant predictor of antenatal depression (β=-.18, *p*<.001) and also a predictor variable for PPD as mediated by antenatal depression. Ingram and Taylor (2007) also assessed antenatal depression in women and developed a screening instrument that predicted PPD in the postpartum period. Poor antenatal social support, a high antenatal Edinburgh Postnatal Depression Scale (EPDS) score, and negative childhood experiences had a positive predictive value of 86% using an EPDS of 15 or greater.

Prospective studies. Milgrom et al. (2008) conducted a large national prospective study that included 40,333 participants. Availability of emotional and practical supports was measured via the psychosocial risk factor questionnaire in women with PPD (7.5% of the sample) and it was noted that women with no instrumental or emotional social supports were more likely to have PPD symptoms (EPDS >12)(*OR*=2.67, 95% CI [1.92, 3.72], *p*<.001).

Another prospective study that addressed a significant gap in the literature was a study by Howell, Mora, DiBonaventura, and Leventhal (2009) who assessed the relationship between social support and depressive symptoms postpartum in four groups of mothers (never, always, remission, and late onset depressive symptoms) at two time

points (2 weeks and 6 months postpartum) and noted inadequate social support was a significant predicator of depressive symptoms when comparing these groups. Emotional and instrumental support as well as partner support appeared to have a buffering effect for women who never displayed depressive symptoms postpartum when compared to: women who always had depression symptoms (*OR*=0.85, 95% CI [0.78, 0.93]), women who had a remission postpartum (*OR*=0.90, 95% CI [0.84, 0.97]), and women who had a late onset of depression symptoms (*OR*= 0.90, 95% CI [0.83, 0.98]) (Howell, et al., 2009).

What is particularly noteworthy about this research is that women from the late-onset group had high levels of social support immediately postpartum and then at 6 months, this social support dropped significantly when compared to the remission and never groups. Therefore, it is suggested that social support acted as a buffer for depression in these women. The researchers also suggested that women with a history of depression may not develop symptoms of PPD with social support as "13% of the never group reported a past history of depression but never screened positive for depression" (Howell et al., 2009, p. 119).

Haga et al. (2012) measured the following social support constructs: perceived available support, received social support, need for support, and support sought. The researchers noted that at 6 months postpartum perceived available support and need for support were the support variables that predicted PPD. In addition, Wang, Wu, Anderson, and Florence (2011) reported woman with low social support at 6 months postpartum were more likely to have PPD when compared with women with high levels of social support (*OR*=3.38, 95% CI [2.31, 4.95]). Finally, at 6 months postpartum, Ngai and Chan

(2012) noted in a path model that social support had a significant direct effect on PPD (r=-12).

Cross-sectional studies. Wilkinson and Mulcahy (2010) conducted a cross-sectional study of 115 women to examine interpersonal relationships and attachment in PPD. "Irrespective of diagnostic status, attachment styles characterized by a negative model of self were associated with higher depression and lower quality of relationship with baby and spouse and the perception of less social support" (Wilkinson & Mulcahy, 2010, p. 252). Additionally, postpartum depressed women (*M*=76.29, *SD*=19.32) had lower mean social support scores on the Interpersonal Support Evaluation List when compared to the control group (*M*=98.00, *SD*= 12.33); *t*=-7.36, *p*<.001. Similar findings related to the relationship between social support and PPD were noted by Cheng and Pickler (2009) (*r*=-.50, *n*=152, *p*<.01), Yağmur and Ulukoca (2010) (*r* = -0.36, *n*=730, *p* = 0.001), Leahy-Warren, McCarthy, and Corcoran (2012): total functional social support (*r*=-.43, *n*=410, *p*<.001), informational support (*r*=-.29, *n*=410, *p*<.001), instrumental support (*r*=-33, *n*=410, *p*<.001), emotional support (*r*=-.40, *n*=410, *p*<.001), and appraisal support (*r*=-.41, *n*=410, *p*<.001), Lee, Liu, Kuo, and Lee (2011), and Quelopana, Champion, and Reyes-Rubilar (2011). In addition, Boothe, Brouwer, Carter-Edwards, Østbye (2011) reported that PPD predicted unmet social support needs.

In a cross-sectional study of 334 Spanish women assessed at 6 weeks postpartum, it was noted that women with major and minor postpartum depression versus a control group of postpartum women had lower social support (*OR*=5.97, 95% CI [−2.62, 13.62]) and a poorer relationship with her partner (*OR*=3.16, 95% CI [−1.35, 7.39]) (Garcia-Esteve et al., 2008). Similar findings were noted by Howell, Mora and Leventhal, (2006).

New mothers who reported having affirmative interactional support and affection support available some of the time versus women who reported having these supports all of the time were more likely to have PPD (*OR*=2.37, 95% CI [1.24, 4.53]) (Chojenta, Loxton, & Lucke, 2012). Hierarchical multiple regression analysis predicted lower mental health status in women with low social support scores and high life stress in a study by DaCosta, Dritsa, Rippen, Lowensteyn, and Khalifé (2006).

    Cultural considerations. It is also important to denote the various cultural considerations noted in the reviewed studies as various cultures have specific traditions that may influence the relationship between social support and PPD. The Korean traditional postpartum care provided by a mother or mother-in-law for 3 weeks following delivery is referred to as *Sanhujori* and includes support related to sleeping, eating, resting, and cleanliness (Song, Chang, Park, Kim & Nam, 2010). In a study where researchers examined the relationship of the variables of social support, PPD, and *Sanhujori*, it was noted that there was a moderate negative correlation between PPD and emotional support, *r*=-34, *n*=291, *p*<.001 and a small negative correlation between PPD and satisfaction with the contents of *Sanhujori*, *r*=-.27, *n*=291, *p*=.001. In a path analysis model for explaining postpartum fatigue, social support explained 24% of the variance for depression in the proposed model (Song, et al., 2010).

    Xie, He, Koszycki, Walker, and Wen (2009) assessed subjective, objective, and support availability in postpartum women and noted that the effect of postnatal social support (*OR*=9.64, 95% CI [4.09, 22.69]) is a more powerful predictor of risk for PPD in these Chinese women than prenatal support (*OR*=3.38, 95% CI [1.64, 6.98]). The researchers stated that this increased risk may be attributed to the fact that the women

with higher PPD and lower social support postpartum gave birth to female infants. The preference for boys in China is a well recognized occurrence which may be explained by the fact that sons after marriage will continue to bear the family name as well as provide economic support for their parents in their old age (Xie, et al., 2009).

Masmoudi et al. (2010) conducted an exploratory study of women in Tunisia and noted that 19.2% (*n*=213) of the study participants scored higher than nine on the EPDS. It was noted that these depressed women had lower social and family supports as well as a dysfunctional martial relationship.

In a review of the qualitative literature related to culture and PPD, Callister, Beckstrand, and Corbett (2010) reported that there is scant research related to cultural practices and PPD however, these researchers noted three studies which have mixed results concerning social support received from cultural practices and PPD. In China, women who "do the month" (zuoyuezi) experienced less PPD (This finding was further supported by Wan et al., (2009) who reported that women who perceive zuoyuezi as unhelpful had twice the odds of developing PPD). "Doing the month" involves social seclusion, activity and dietary restrictions, and "mothering the mother". In Japan, *satogaeri bunben,* a cultural practice where the mother returns to her hometown to rest in the third trimester and immediately postpartum did not result in any difference in depressive symptoms for women who did and did not adhere to this practice. Finally, in African American women, "doing the month" was viewed as helpful as these women were not isolated and obtained tangible and intangible resources however, another study noted this practice as constraining with women reporting conflict with others. Mixed

results regarding cultural factors & PPD were also noted in a review of the literature by Bina (2008).

   Immigrant women. Another vulnerable population of postpartum depressed women includes "newcomer" mothers. Stewart, Gagnon, Saucier, Wahoush, and Dougherty (2008) examined the PPD rates for "newcomer" women ($n=268$) versus that of native born Canadians ($n=73$) and noted that, "immigrants (35.1%), asylum seekers (31.1%), and refugees (25.7%) were significantly more likely than Canadian-born (8.1%) women to score ≥10 ($p = 0.008$) on the EPDS" (p.121). In addition, lower social support scores were noted in newcomer women with EPDS scores ≥ 10 when compared with their Canadian-born counterparts ($p<0.0001$). Similar findings were reported by Chien, Tai, and Yeh (2012).

   Collins, Zimmerman, and Howard (2011) conducted a review of the literature related to newcomer women and noted that of the eight studies reviewed, PPD may be as high as 42% in newcomers as compared to 10-15% in native born women. Taniguchi and Baruffi (2007) noted a PPD rate of 31.1% in Japanese women who immigrated to Hawaii. Common predictor variables noted in these studies included inadequate social support, stressful life events, and cultural factors.

   Social support was not a predictor of PPD. In a research study by Zelkowitz et al. (2008), inadequate social support was *not* an important risk factor for PPD in a sample of 119 women who immigrated to Canada. In fact, the researchers note that there was little difference between "depressed and non-depressed women in terms of network size, need for support, and satisfaction with available support" (p.9). The quality of the partner relationship is what appeared to be a significant predictor of PPD with the rationale that a

partner relationship is especially important for an immigrant woman when her family and friends are living in her country of origin. These results are similar to findings from a prospective prevalence study of women from eastern Turkey in which it was noted that there was no relationship between family social support and women with PPD (M=13.1, SD=4.9) versus women without, M=14.2, SD=4.5; $t(479)$= 1.8, p=.07 (Kirpinar, Gözüm, & Pasinlioğlu, 2010). It is important to note that in this same study a significant relationship was noted in poor marital relationship during the first 6 weeks postpartum and risk of PPD, $\chi^2(1, n=479) =6.8, p<001$.

Finally, in a randomized control trial to measure the effects of a nurse-community health worker intervention involving home visits pre and postnatally no difference was noted in the Multidimensional Scale of Perceived Support (MSPS) scores for women who received and did not receive the intervention (which consisted of approximately 24 home visits designed for "increasing self-esteem through positive regard; promoting positive health behaviors; developing self-awareness of stressors, causes of stressors and active problem solving; increasing self-determiniation through the development of personal life goals; and using community resources" (Roman et al., 2009, p. 383) around 24 weeks gestation and continuing through the first year postpartum). This study appears to be well designed and implemented however; it appears that these researchers may have chosen the wrong instrument to measure social support. The MSPS measures social support perceived from family, friends, and significant others yet the nurse and community health workers were the people providing a significant amount of support to these postpartum depressed and non-depressed women. Therefore, if the researchers would have chosen an instrument that measured emotional, informational and appraisal support (which are the

types of support provided by the nurse and community health workers) then the researchers might have obtained significant results in their study.

The aforementioned three studies did not demonstrate a relationship between social support and PPD, however this is unusual when compared to most of the research reviewed in the last six years. In fact, there was a significant moderate correlation noted between EPDS scores and the Social Provisions Scale (n=157, r= -0.38, p= <0.05) in Australian postpartum women (Phillips, Sharpe, Matthey, & Charles, 2010); the Beck Depression Inventory (BDI) and MSPS (r=0.24, n=207, p<0.001) in Australian postpartum women (Skouteris, Wertheim, Rallis, Milgrom, & Paxton, 2009); the EPDS and poor social support in postpartum women in the U.S. military (r=.37, n=87, p<.01) (Appolonio & Fingerhut, 2008); the EPDS and the Social Support Rating Scale in first-time Chinese mothers (r=-.68, n=130, p<0.01) and fathers (r=-.58, n=130, p<0.01) (Gao, Chan, & Mao, 2009); and significant differences in significant other, friends, and "other" support as measured by the MSPS in PPD (M= 4.05, SD= 0.12) compared to non-depressed Pakistani women (M=4.47, SD=0.16), p< 0.005 (two-tailed) (Husain, et al., 2006).

Social support intervention and prevention studies. Social support interventions also may assist in the recovery and prevention of PPD. In a randomized control trial (RCT) comparing PPD women who received an 8 week Interpersonal Psychotherapy Group (IPT-G) with a "usual care" group of PPD women, women who received IPT-G had significant improvements in their level of depression. Improvements were also noted with social network relationships such as increased partner and infant relations (Mulcahy, Reay, Wilkinson, & Owen, 2010). Similar findings were noted by

Zlotnick, Miller, Pearlstein, Howard, and Sweeney (2006) in a prevention intervention that utilized small group sessions to decrease PPD in high risk women (PPD= 20% in the standard care group and 4% in the intervention group).

In a qualitative study examining immigrant new mothers symptoms of depression, it was noted that the major catalysts to recovery included "social support from friends, partners and family, and community support groups" (Ahmed, Stewart, Teng, Wahoush, & Gagnon, 2008, p. 295). Similar findings were also reported in a qualitative study by DiMascio, Kent, Fiander, and Lawrence (2008) who assessed 158 women who had recovered from PPD and noted that emotional and practical support from a partner, mother-in-law, mother, and/or friends; support from siblings; "listening visits" and advice about care for the baby from a health visitor; and postnatal depression support groups were viewed as some of the most important factors that assisted in their recovery. The need for social support is not limited to women with PPD, in fact, a Pregnancy Risk Assessment Monitoring System (PRAMS) Survey identified that the top needs postpartum identified by 324 women was the need for social support (Kanotra et al., 2007).

A RCT that used a telephone based peer support prevention intervention was conducted with women who were at high risk for PPD. At 12 weeks postpartum, 14% of women in the intervention group scored >12 on the EPDS as opposed to 25% who were in the control group. This resulted in a relative risk reduction of *OR*=0.46, 95% CI [0.24, 0.62] suggesting peer based telephone social support may be an effective strategy in preventing PPD in high risk women (Dennis et al., 2009).

A RCT by Gao, Chan and Sun (2012) focused on the effects of interpersonal psychotherapy childbirth education classes focused on developing social support and networks antenatally with a telephone intervention at 2 weeks postpartum. Women in the intervention group reported less depressive symptoms (t=2.33, p=.02) and more social support (t=-2.39, p=.02) at 3 months postpartum. Ammerman et al. (2011) reported similar findings in a home based cognitive behavioral therapy intervention for depressed mothers and noted a 50% reduction in depressive symptoms for the treatment group as well as increased social support.

Zlotnick, Capezza, and Parker (2011) developed an interpersonal intervention focused on enhancing social support for a group of low-income pregnant women who experienced intimate partner violence. The intervention consisted of four education sessions in pregnancy to enhance interpersonal relationships and increase social networks with a "booster" session given 1 to 2 weeks postpartum with reduced depressive symptoms during pregnancy however there were no lasting effects at 3 months postpartum. Perhaps the negative side of violence in relationships outweighed the positive aspects of perceived received social support.

The prevention of PPD also was assessed by Ugarriza, Brown, and Chang-Martinez (2007) who conducted 20 interviews with women who had babies within the past year. These women identified the following social support measures as being protective: "some degree of social seclusion, rest, assistance with tasks, and social recognition of their new social status as a mother" (p.1). Letourneau et al. (2007) determined from their qualitative interviews with women survivors of PPD that these women preferred one to one support *initially* upon detection of PPD from peer PPD

survivors or healthcare providers who were nonjudgmental, caring, and knowledgeable about treatment options. Once the PPD mother felt better, group interaction with other PPD mothers was noted as desirable. These identified protective measures and desires of treatment format provide guidance for additional research and possible intervention design.

Segre, O'Hara, Arndt, and Beck (2010) provided some evidence in their research as to the preferred provider of mental health interventions. In their research of women's views for PPD counseling, it was noted that between 70-80% of postpartum women (with and without PPD) agreed or strongly agreed that "I would be more likely to obtain help from a nurse than another type of mental health professional" (p.283). This study revealed that nurses are viewed positively as healthcare providers and that postpartum women trust nurses to help them with their mental health needs. Letourneau et al. (2011) concluded similar results from a home-based peer support intervention which noted depressive symptoms and social support scores that favored the control group. The researchers concluded that the support invention may have been received more satisfactorily by professional nurses as opposed to peers.

Social support from network members.

The unique role of fathers. Fathers are potentially in a unique position to provide support and identify PPD in their partner in the weeks after having a baby. Garfield and Issaco (2009) explored an urban sample of 31 fathers to determine whether these fathers could identify symptoms of depression based on DSM-IV criteria and whether they provided support to their partner in the postpartum period. Twenty-three

percent of fathers described symptoms related to DSM-IV criteria and 48% reported

providing emotional, instrumental, and stability support.

Father support, specifically support related to childcare, financial assistance,

transportation, and care of the baby was measured by the Life History Interview (Smith

& Howard, 2008). These researchers assessed 582 women six times in the first two years

of their child's life and determined through latent growth curve modeling that mothers

with more paternal support had fewer depressive symptoms and that PPD lessened over

time.

Letourneau, Duffett-Leger, Dennis, Stewart, and Tryphonopoulos (2011)

conducted a qualitative study to determine the support needs of fathers affected by PPD.

Approximately 25% of the fathers experienced depression themselves and the most

frequently reported barrier these fathers faced for themselves and their partner was lack

of informational support regarding PPD in terms of both formal and informal support

resources.

The postpartum couple. Castle, Slade, Barranco-Wadlow, and Rogers (2008)

conducted a study of couples to examine the relationship between perceived social

support in the antenatal and postpartum period as well as investigate the relationship

between attitudes to emotional expression and determine if there was a link to perceived

social support. Couples who reported higher levels of perceived social support in the

antenatal period were less likely to report postpartum distress in the postpartum period. In

addition, those couples who had more positive attitudes to emotional expression reported

higher levels of perceived functional social support as measured by the affective and

confidant subscales of the DUKE-UNC Functional Social Support Questionnaire.

Mao, Zhu, and Su (2011) compared PPD and perceived social support among first time parents and noted no significant differences in rates of PPD for mothers (14.9%) and fathers (12.5%) yet fathers reported less perceived social support than mothers (t=5.40, p<.001). Eighty-three postpartum couples from Taiwan were assessed for depression and 32% of the variance for depression in women was explained by the variables of social support and perceived stress whereas 43% of the variance for depression was explained by social support and self-esteem in men (Wang & Chen, 2006).

Family support. Family support in the postpartum period is not a frequently studied area in relation to PPD, however support received from parents and extended family may protect women from PPD (Hung, 2007). In a study by Kuscu et al. (2008) of 100 Turkish women, parental support and support from extended family had the most significant buffering effect related to emotional adjustment postpartum. Living in extended family households was also equally protective in decreasing PPD for women in the early postpartum.

Surkan, Peterson, Hughes, and Gottlieb (2006) assessed the role of social support and social networks in PPD with a multiethnic urban sample of 415 women. Twenty variables related to emotional, appraisal, and instrumental support as well as number of network members was assessed. Every 10 point increase in the social support survey score resulted in a 2.1 unit lower score on the Center for Epidemiologic Studies of Depression Scale (CES-D) (95% CI= -2.4, -1.7). In terms of social network members, compared to women with zero or one available person postpartum, having two or more family members or friends available postpartum resulted in a 13.6 point reduction in mean score on the CES-D (95% CI= −17.5, −9.6).

Latinas at high (CES-D≥16) versus low risk for depression had their perceived

social support from network members assessed both antenatally and in the postpartum

(Sheng, Le, & Perry, 2010). During pregnancy the high risk group perceived less social

support from a partner when compared to the low risk group however, in the postpartum

period, the high risk group was dissatisfied with perceived support in all areas assessed:

family, partner, global, and "others" support. These findings are confirmed by Dennis and

Letourneau (2007) who noted that women with "depressive symptomatology at 8 weeks

had significantly lower perceptions of both global and relationship-specific support at

1week postpartum" (p.389).

     Spiritual support. The relationship between spiritual support and PPD is not a

well explored area in PPD research, however two studies were noted for this review. In a

qualitative study of 45 women who had a history of PPD, Zittel-Palamara, Cercone, and

Rockmaker (2009) noted that 66% of the women stated that spiritual support and religion

assisted them in their recovery from PPD. Specifically "spiritual guidance, counseling

from the head of a religious organization, congregational support, spiritual-based support

groups, and prayer support" (p.213) were categories of support identified as important to

this group of women. A quantitative study by Mann, Mckeown, Bacon, Vesselinov, and

Bush (2008) revealed that organized religion appeared to have a protective effect against

PPD as women who partake in structured religious activities at least a couple of times

during a month were less likely to have high PPD symptom scores (*OR*= 0.18, 95% CI

[0.08, 0.42], *p*< 0.0001).

     Partner support. Partner support was also noted when examining social support

and PPD and is actually considered from a social network perspective. Positive emotional

support from a partner has been shown to buffer the negative effects of illness and stress (Dennis & Letourneau, 2007; Israel & Rounds, 1987; Satoh et al., 2009) as well as enhance the developmental success in children of postpartum depressed mothers (Letourneau, Duffett-Leger, & Salmani, 2009). The buffering effects of partner and social network support need not be limited to only emotional support and may include all of House's social support components (emotional, appraisal, instrumental, and informational support).

It is also important to critically examine the assumption that partnered people have more social support than single people. Tilden and Nelson considered that proposition as false, "an unhappy marriage tends to restrict access to other sources of social support and because unmarried people often have large networks of supportive friends" (1999). Given knowledge about the lack of equity in household work (Schwartz & Lindley, 2009) and the chronicity of domestic violence against married women (Williams, Ghandour, & Kub, 2008), this assumption that partnered status conveys greater support is additionally called into question, and, in fact, allows the possibility that the quality of the partner relationship is poor enough to result in negative social support or to be a health liability.

Negative social support. Negative social support as a liability was supported by Bilszta, et al. (2007) who revealed that EPDS scores were significantly higher for women with unsupportive partners than for women who were single/unpartnered. Lara, Le, Letechipia, and Hochhausen (2008) reported that Mexican women who scored ≥ 24 (indicating very high risk for major depression) on the CES-D and were unmarried but living with a partner were 7.25 times (95% CI= 1.11, 47.10) more likely to report

depressed symptoms than their married or single counterparts with a CES-D score <16.

Haslam, Pakenham, and Smith (2006) discovered, with some surprise, that their

regression analysis revealed that "partner support was unrelated to both maternal self-

efficacy and depressive symptomatology" (p. 286). Additionally, Hung (2007) reported

that women who utilized their mother-in-law as a "key postpartum helper" were .56 and

.55 times less likely to experience psychiatric morbidity when compared to women who

utilized their husband or other support person.

The Darker Side of Social Support- Conflict

Conflict is defined as "perceived discord or stress in relationships caused by

behaviors of others or the absence of behaviors of others, such as the withholding of

help" (Tilden, Nelson, & May, 1990, p. 338). Generally the emphasis in research is on

how positive—higher levels of "received"—social support affect outcomes. This may be

referred to as focusing on "the bright side" of social support. What is critical to note is

that there are instances when levels of received social support are not only lower (i.e.,

lacking), but when the potential for received social support extracts a "cost" (i.e., is

negative). This may be referred to, using Tilden and Galyen's term, "the dark side" of

social support (Tilden & Galyen, 1987). House's conceptualization of social support

does not fully capture the idea that social support is not always helpful or beneficial to the

recipient. Negative behavior is not considered "support" in the social support research

and must be examined from a social networks perspective. Examples of problematic

behavior from network members may include "persons who invaded privacy, broke

promises, took advantage, or caused feelings of anger and conflict" (Tilden & Galyen,

1987, p. 11).

Furthermore, per Cobb's definition (1976), there is an assumption of "mutual obligation." The notion of mutual obligation was highlighted in Tilden and Galyen's (1987) paper which was instrumental in examining the negative aspects of social support. The authors consider costs, *conflict*, reciprocity, and equity as additional factors to add into social support and social network "equations" and acknowledged that social support and social network assets may contain elements of liability if the network members have more needs than the individual whose social support is being measured. (Figure 1.2 below for diagram of the costs (Tilden and Galyen's variables) and benefits (House's variables) of social support).

Cost: "The Darker Side"	Benefit: "The Brighter Side"
❖Cost ❖Conflict ❖Reciprocity ❖Equity	❖Emotional ❖Instrumental ❖Informational ❖Appraisal
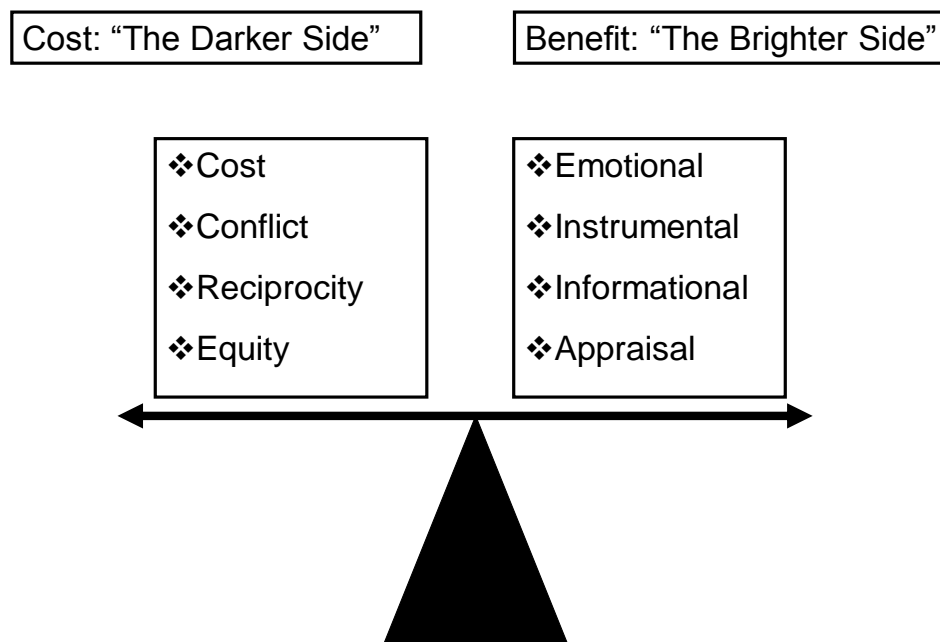
Figure 1.2. The balance of social support costs and benefits.

The notion that social support is not only received but also given and exacts a price is gaining influence, especially in women's health research. Theories to account for health disparities such as "Sojourner Syndrome" (Mullings, 2005) posited that the costs

of giving support to others in one's social network may be higher for women and for African American women in particular.

A few additional researchers have examined the concept of conflict in regards to PPD in recent years. A psychodynamic theory of PPD had been proposed by Blum (2007) in which the researcher suggested PPD was composed of a triad of emotional conflicts including dependency, anger, and motherhood conflicts. Dependency conflict was related to the notion that a woman needs to feel taken care of after the birth of a baby. It was proposed that if the mother was able to meet the dependency needs of her baby and that the mother's dependency needs were met, than it would be very unusual that PPD would occur. Anger conflicts related to a mother having difficulty handling anger in the postpartum whereas motherhood conflicts included difficult mother-daughter relationships. A strained relationship may have resulted from many factors however, a history of physical or mental abuse or the new mother feeling that her mother did not enjoy caring for her are some examples noted with women with PPD (Blum, 2007).

Dennis and Ross (2006) examined women's perceptions of relationship conflict in the development of PPD in 396 mothers at 1, 4, and 8 weeks postpartum and noted that relationship conflict was significantly higher in women with depressive symptoms at 8 weeks when compared with women who were not depressed [$t(394)=-3.44$, $p=0.001$]. In addition, mothers experiencing depressive symptoms were more apt to report having a partner who "made them angry [$t(394)=-2.94$, $p=0.004$], tried to change them [$t(394)=-2.66$, $p=0.008$], was critical of them [$t(394)=-3.04$, $p=0.002$], and made them work hard to avoid conflict [$t(394)=-3.19$, $p=0.002$]" (Dennis & Ross, 2006, p. 593). Page and Wilhelm (2007) reported similar findings and noted that arguments with family members

and partner relationship depth were significant predictors of postpartum symptoms. Unhappy marriage and physical abuse during pregnancy and postpartum were also significant predictors of PPD in South Indian women (Savarimuthu et al., 2010) and Latinas in the U.S. (Valentine, Rodriguez, Lapeyrouse, and Zhang, 2011).

Hipwell, Murray, Ducournau, and Stein (2005) followed 94 women for 5 years postpartum and noted that 44.4% of postpartum depressed women as opposed to 12.5% of women in the control group experienced conflict with their child's father 5 years postpartum. The women with PPD were also more likely to display depressive symptoms as compared to the control group of women at this same time point (24.1% and 7.5% respectively). Postnatal depression in women and parental conflict appeared to be related to conflict and aggressive behavior in children. "Parental conflict mediated the effects of postnatal depression on active aggression during play, and was also associated with displays of autonomy and intense conflict" (Hipwell et al., 2005, p. 11).

Sense of Belonging

Sense of belonging is a concept that has received increasing attention in the mental health literature but, no attention in the PPD literature was found. Maslow (1954) recognized belonging as a basic human need and ranked it just above basic physiological and safety and security needs. Anant (1966), also acknowledged the importance of belonging in terms of mental well-being stating belonging was a key concept in unlocking mental health and illness issues and stated that there was a "positive relationship between the sense of belonging and mental health" (Anant, 1967, p. 395). In the past two decades, Hagerty and colleagues have defined this concept as "the experience of personal involvement in a system or environment so that persons feel

themselves to be an integral part of that system or environment" (Hagerty, Lynch-Sauer, Patusky, Bouwsema, & Collier, 1992, p. 172). The sentiment of being valued by a person, system or environment and actually "fitting in" with other people, systems, and environments are essential concepts comprising sense of belonging.

Hagerty and Williams (1999) examined the relationship of sense of belonging, perceived social support, conflict, and loneliness on a depressed clinical sample and 379 community college students. Sense of belonging was the strongest predictor of depression in their population, explaining 52% of the variance on depression. McLaren (2006) reported that lesbians with little sense of belonging suffered higher rates of depression when compared with their heterosexual counterparts and also reported similar findings with depressed homosexual males (McLaren, Jude, & McLachlan, 2007). Sense of belonging appeared to have a protective role in male farmers at risk for depression (McLaren & Challis, 2009) and Sargent et al. (2002) noted that sense of belonging had a buffering effect against depressive symptoms among Navy recruits with a family history of alcohol abuse.

In terms of PPD women, it is speculated that sense of belonging may be an important variable to consider. Women in the postpartum period may not be participating in activities (ex. work, school, clubs, organizations, etc.) that they had previously and may have a complete disruption in their normal routine. This may result in feeling a lack of "fit" in terms of sense of belonging. In addition, women may not feel "valued" in their new motherhood role especially if the new mother chooses to be a "stay at home mom". The new mother may have felt valued at her place of employment but not recognized for the critical job she is doing related to care for her infant.

Loneliness

Loneliness is the "unpleasant experience that occurs when a person's network of social relations is deficient in some important way, either quantitatively or qualitatively" and occurs as an emotional response to a "discrepancy between desired and achieved levels of social contact" (Peplau & Perlman, 1982, p. 4 - 5). When examining the concept of loneliness, there was a scant amount of research exploring this concept in the PPD literature with empirical designs that were exclusively exploratory. Beck (1992) conducted a phenomenological study to determine the lived experience of women experiencing PPD and revealed that one of the major themes expressed by women was a sense of loneliness. Similar results were noted in studies by Nahas and Amasheh (1999a&b) with Jordanian and Middle Eastern migrant women living in Australia. Loneliness was also a theme revealed in a metasynthesis of 18 qualitative studies analyzed by Beck (2002a) and a systematic review of 15 studies by Leahy-Warren & McCarthy (2007).

Loneliness was a prominent concept in depression research with empirics grounded in relational designs. Hagerty et al. (1992) stated loneliness was related to sense of belonging and depression however, loneliness is a unique concept. In various models of depression, loneliness has a range of correlations from .23 (Hagerty & Williams, 1999) to .52 (Russell, 1996) depending on populations assessed and measurement instruments utilized. The overlap between loneliness and depression may be explained by Young (1982, p. 382) who stated, "When individuals attribute deficiencies in their social relationship to unchangeable personal faults, they are more likely to feel both lonely and depressed".

Loneliness was also speculated to have an important role in PPD. For example, for many women in the United States, women are enveloped with attention in the first few weeks postpartum because family and friends are interested in seeing the new baby. However, much of this attention and enacted social support quickly dissipates. This may have an immense impact on the new mother in terms of her sense of loneliness especially if the new mother has taken a maternity leave or is a "stay at home mom" and her partner is at work for much of the day. Loneliness may also impact women who live apart from their social network of family and friends such as immigrant women, women who have partners in the military, or women who were impacted by job loss from the current recession and forced to move. These women may have little or no contact with people from the "outside world" during the day with the exception of the new baby.

A Relational Postpartum Depression Model

Based on the review of literature, the Hagerty and Williams (1999) theoretical model for depression has been modified as noted in Figure 1.3.
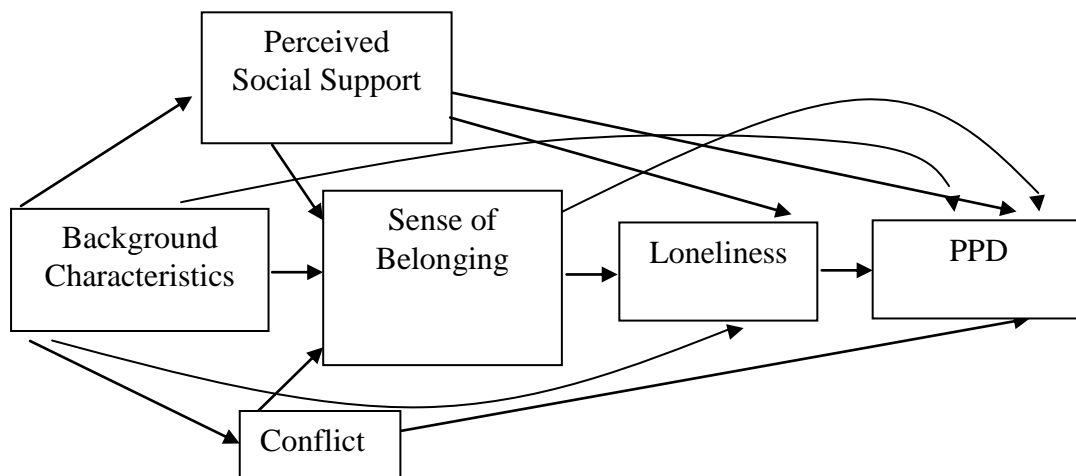
Figure 1.3. The adapted theoretical model of PPD.

In the relational PPD model, social support will be measured using The *Support Behavior Inventory* (SBI) by Brown (1986), as opposed to the *Interpersonal Relations Inventory*

(IRI) which was used in Hagerty and Williams' research. The rationale for this is that the SBI was designed to assess social support in pregnant (and postpartum) women. Half of the 46 items relate to pregnancy and half relate to any population *and* assesses all four components of House's social support conceptualization. This tool also measures degree of satisfaction with perceived social support received from a potential partner as well as social support received from others. Zimet, Dahlem, Zimet, and Farley (1988) favored measuring *perceived* social support as classic social support theorists had discovered that perceived social support was a better predictor of psychological status as opposed to enacted support especially when examining the relationship between social support and depression. Therefore, perceived social support was included in the proposed model.

The remaining variables: conflict, sense of belonging, and loneliness will be measured using the instruments utilized by Hagerty and Williams (1999) and include the *Interpersonal Relationships Inventory* to measure conflict in relationships (Tilden, Nelson, & May, 1990), *Sense of Belonging Instrument* (Hagerty & Patusky, 1995), and *Revised UCLA Loneliness Scale* (Russell, 1996) respectively. All instruments are considered reliable and valid tools with alpha coefficients ranging from .79 to .95 depending on the instrument (Tilden, Nelson, & May, 1990; Hagerty & Patusky, 1995; and Russell, 1996).

It is also important to note, the proposed paths in the proposed model. These direct and indirect paths are supported by the Hagerty and Williams (1999) research study as well as the review of literature.

Discussion

When examining the variables in the Hagerty and Williams (1999) model for depression, clear conceptual definitions assist in the understanding of the model. For example, social support in this review was described using House's conceptualization including the variables of emotional, appraisal, informational, and instrumental support. A few researchers in this review of literature were not clear about their definition of social support and considering social support is such a broad concept, this appears essential. Also, most researchers did not identify which framework (perceived or enacted support) they were operating within.

In addition, some researchers in this review developed their own instrument to measure social support, however they did not define social support for the research participant. For example, when a participant is asked a question, "Are you satisfied with the social support you receive?" It may be difficult for the participant to answer this question because she does not know the type of social support referred to nor who is the giver of support.

Additionally, when discussing social support, it is important to acknowledge that this broad concept may overlap with other concepts. For example, when examining the concept of appraisal support, it appears there may be some overlap with the concept of sense of belonging. Appraisal support builds self-confidence and self-esteem. A new mother with PPD may obtain this type of support through a network of other mothers experiencing depressive symptoms. Appraisal support may be received through the internet or face to face with support groups. However the support is received is not relevant. What is important to note is that this support is perceived and helpful. Perceived

appraisal support from others may create for the woman with PPD a sense of belonging. This exemplar provides some evidence that there may be an overlap in the concepts of appraisal support and sense of belonging which is important to consider when designing a research study.

There were a few researchers (Phillips et al., 2010; Leigh & Milgrom, 2008; Dennis & Letourneau, 2007; and Dennis & Ross, 2006) in this review who utilized the Social Provisions Scale by Cutrona and Russell (1987) to measure social support. What is noteworthy about this instrument was that the measure contained 24 items related to social support with a "social integration" subscale. Social integration appears to be a concept that could also be closely related to sense of belonging.

Blum (2007) discussed a theory of PPD that motherhood conflicts included difficult mother-daughter relationships as one of the triad of factors related to PPD. This "blame the victim" approach assumes that a mother is "flawed" because of a poor mother-daughter relationship. Also, difficulty controlling anger was another piece of the triad. It seems as if difficulty controlling anger and poor mother-daughter relationships may be part of the kindling effect for PPD however not major predictors of PPD. Blum's third piece of the triad, dependency conflict, was a concept that appeared to be related to instrumental support which was revealed in this review of literature.

A final thought is that there were several researchers who assessed PPD at 2 weeks postpartum (Xie et al., 2009; Kuscu et al., 2008; and Stewart et al., 2008) and it is important to note that the researchers may have actually been measuring the "baby blues" instead of PPD. This is significant as the "baby blues" may have spontaneously resolved in these women yet they were categorized as having PPD.

36

Future Directions

Testing the Model

In terms of future directions related to this background, significance, and review of literature, this writer is at a cross road. The relational model for PPD could be tested by designing a study and testing the model in postpartum depressed and non-depressed women. Another possibility is to conduct a secondary data analysis using data from a longitudinal study of postpartum women.

One point that is important to mention is that the SBI is the instrument this writer will use in future research (if designing a study versus conducting a secondary data analysis) to assess social support. As stated in the aforementioned examplar, sense of belonging may have some overlap with appraisal support. When examining the SBI, it appears that there are five items that assess appraisal support. When examining the concept of sense of belonging, Hagerty and colleagues conceptualization was that a person feels valued and "fits in" with other people, systems, and environments (Hagerty et al., 1992). Therefore, when using this conceptualization of sense of belonging, the SBI only assesses one portion of sense of belonging which includes a person feeling valued. Thus, the concept of sense of belonging is not entirely captured with the SBI.

Attachment Theory

The relational model for PPD was conceptualized in terms of the mother yet obviously the infant plays an important role in the symbiotic relationship the mother-infant dyad. Therefore, attachment theory would provide a useful framework to examine this relationship. Attachment, according to Bowlby, is "the propensity of human beings to make strong affectional bonds to particular others" (Warme, Bowlby, Crowcroft, Rae-

Grant, 1980, p. 367). Bowlby also defined attachment in regards to mothers and infants as a long-term deep emotional bond that may also exist between one or more caregivers (Main, 1996). Additional concepts related to attachment theory included the notion that an attachment relationship contains components of security, safety, and satisfaction and that the loss of this relationship causes distress (Goldberg, Muir, Kerr, 1995). In a review of literature related to the effects of maternal psychopathology and mother-infant attachment Wan and Green (2009) described a number of studies, mostly of women with PPD, where an association was noted between mothers with severe psychopathology and infants who displayed insecure or disorganized attachments with their mothers.

The overall literature foundation related to mother-infant attachment was quite extensive therefore, after testing of the proposed model, consideration for the baby in a revised model will be contemplated however this is beyond the scope of this literature review.

Conclusion

The variables of perceived social support, conflict, sense of belonging, and loneliness emerge as important variables to explore in women with PPD. If the model variables are factors that assist in explaining PPD, future public health interventions may be tailored around these concepts. Therefore, further exploration of the relational postpartum depression model is warranted**.**

CHAPTER 2

CONSIDERING A RELATIONAL MODEL FOR DEPRESSION IN FEMALE

NAVY RECRUITS

Abstract

The purpose of this research study was to examine adult attachment (secure and insecure), perceived social support, sense of belonging, conflict in relationships, and loneliness for their relationships in a relational model for depression with females in a stressful training program. This theory-testing secondary analysis study was part of a larger cross-sectional cohort study that examined the factors associated with depression in Navy recruits, which included recruits with depressive symptoms (n=226, 51%) and those without (n=217, 49%). The sample for this study included 114 women who were in basic training at the Navy Recruit Training Command located in Great Lakes, Illinois. The participants were administered a battery of instruments to assess adult attachment, perceived social support, sense of belonging, conflict, loneliness, and depression. Structural equation modeling was used to test the "fit" of the theoretical model as well as determine significance of direct and indirect paths. The proposed model explained 53% of the variance in depressive symptoms with loneliness and sense of belonging as the strongest indicators of depression. Perceived social support indirectly impacted depression as well. The Navy should consider interventions that increase perceived social support and sense of belonging in high risk for depression recruits to decrease loneliness and depression and circumvent recruits not completing basic training. The assumption that recruits are in close quarters and contact with other people and therefore are not lonely and receive adequate social support is not supported. This paper contributes to advancing the science of women's mental health in relation to depression by considering predictors that may be amenable to intervention.

The proposed model for female Navy recruits explained 53% of the variance in

depressive symptoms with loneliness and sense of belonging as the strongest.

Introduction

Depression is a common phenomenon that affects greater than 14% of women of reproductive age (aged 18- 44years) (Farr et al., 2010). Stress and major life events are considered predicators noted to trigger depression and there are subpopulations in the U.S. that appear especially susceptible to developing psychiatric symptoms. These subpopulations include: postpartum women, immigrants, individuals with significant medical conditions, individuals who have been subjected to traumatic events, and military personnel (Sajatovic et al., 2010).

Women comprise 14% (197,900) of the population of active duty military personnel in the armed forces (U.S. Department of Defense, 2010) with prevalence rates for depression ranging from 8.3%-16.0% post-deployment (Thomas et al., 2010). Gender appeared to have a moderating role between combat exposure and depression with female soldiers who reported higher severity of depressive symptoms compared to male soldiers post-deployment (Luxton et al., 2010).

Depression has a financial and resource impact on society and for the military. In a 2008 report, it was estimated that of the estimated 16.5 million people in the U.S. suffering from depression, including women with depression, the overall cost to society was as high as $83 billion in direct treatment and lost wages (Centers for Disease Control and Prevention, 2008). This cost also has a financial and resources impact for the military as recruits who have depression may necessitate a longer period of time to complete initial training or may leave the military all together thus imposing a direct monetary cost.

Predictors of depression for women may be extensive as well as influence adult attachment style and include: family history of depression, loss of a parent before age 10, loss of a social support system, low perceived social support, conflict in relationships, persistent psychosocial stressors, perceived stress, abuse, and lack of a sense of belonging (Bhatia & Bhatia, 1999; Hagerty & Williams, 1999; Sangon, 2004; Warme et al., 1980). Predictor variables specific to military women which may contribute to depression include separation stress, deployment stress, sexual harassment, and/or assault in addition to the variables previously mentioned (Groer & Burns, 2009).

The exact etiology of depression has not been established and no biological or hormonal markers have been identified. (Baker, Mancuso, Montenegro, & Lyons, 2002; Mallikarjun & Oyebode, 2005). Depression appears to be a complex and multifaceted mood disorder comprised of internal and external factors (Mallikarjun & Oyebode, 2005). Attention to the internal and external relational factors associated with depression including perceived social support, sense of belonging, conflict in relationships, and loneliness was the focus of this study as Hagerty and Williams (1999) have demonstrated that 64% of the variance in depression in a depressed clinical sample and college students was explained by the aforementioned four variables.

The purpose of this research study was to extend the Hagerty and Williams theory for depression to include adult attachment style (secure and insecure), perceived social support, sense of belonging, conflict, and loneliness for their associations in a relational model for depression with female Navy recruits (Figure 2.1).

The specific aims for this study were to: (1) determine baseline demographics of program participants including rates and degree of depressive symptoms as well as means

43

and standard deviations for all model variables; (2) test whether there were differences in mean total scale scores of model variables in relationship to sociodemographic (SDD) disadvantage (sum of being from a non-dominant racial/ethnic group, a teen, income ≤$15,000, and a high school education or less) among those with less SDD (zero or one risk factor) with those participants with more SDD risk (two or more risk factors); and (3) test the relationships in the theoretical model for direct and indirect paths for depression.

The following hypothesis was tested in relation to Aim 2:

There will be a statistically significant difference in mean total scale scores for depression in women with less SDD risk versus women with more SDD risk. Specifically, women with more SDD risk will have more depressive symptoms compared with woman with less SDD risk.

The following hypotheses were tested in relation to Aim 3:

1. Perceived social support and sense of belonging will have a direct negative effect on depression whereas conflict in relationships and loneliness will have a direct positive effect on depression.

2. Secure attachment, perceived social support, and sense of belonging will have a direct negative effect on loneliness whereas conflict in relationships will have a direct positive effect on loneliness.

3. Secure attachment and perceived social support will have a direct positive effect on sense of belonging whereas insecure attachment and conflict in relationships will have a direct negative effect on sense of belonging.

4. Secure attachment will have a direct positive effect on perceived social support and a direct negative effect on conflict whereas insecure attachment will have a direct positive effect on conflict.

5. Secure attachment and social support will have negative indirect effects on depression and insecure attachment will have a positive indirect effect on depression.
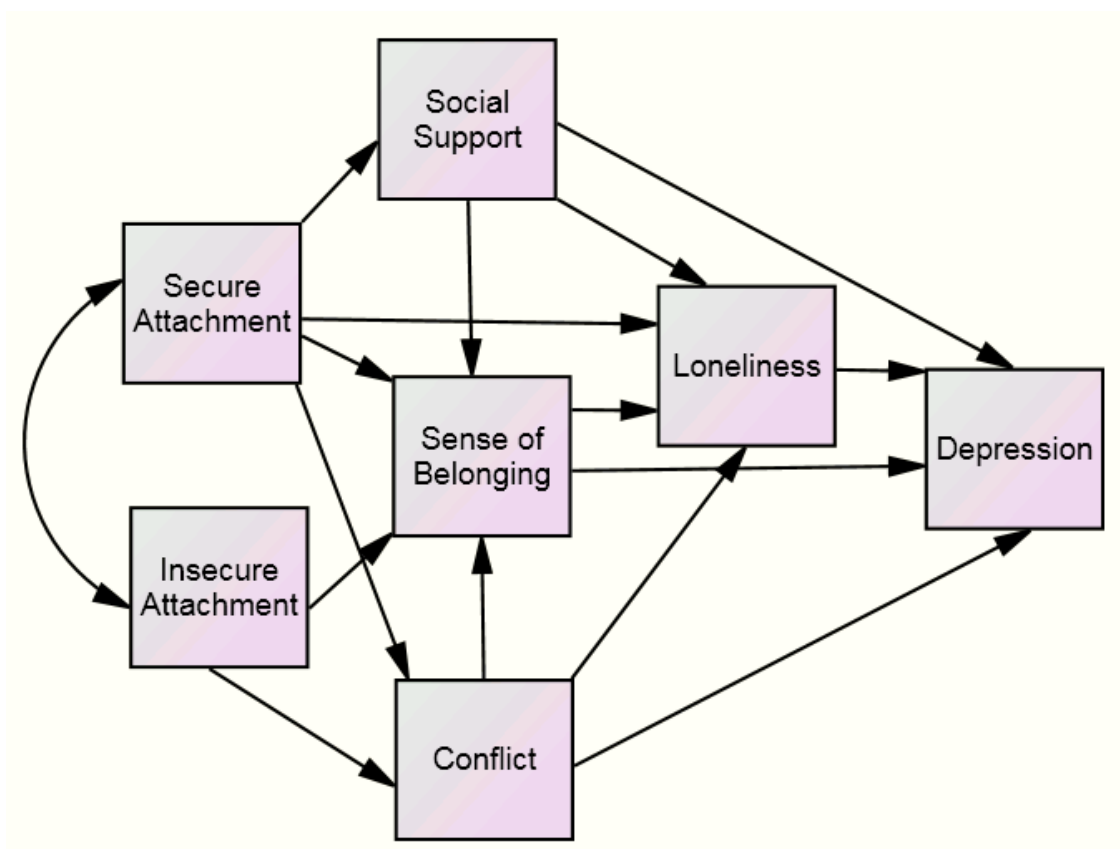
Figure 2.1. The adapted theoretical model of depression in female Navy recruits.

Review of the Literature Based on Model Paths

Attachment

Attachment, according to Bowlby, is "the propensity of human beings to make strong affectional bonds to particular others" (Warme et al., 1980, p. 367). Bowlby also defined attachment in regards to mothers and infants as a long-term deep emotional bond that may exist between one or more caregivers (Main, 1996). Additional concepts related

to attachment theory include the notions that an attachment relationship contains components of security, safety, and satisfaction and that the loss of this relationship causes distress (Goldberg, Muir, & Kerr, 1995).

Attachment and perceived social support have a relationship in which for individuals who have a secure attachment, there is a perception of high levels of social support whereas for insecure attached individuals, there is a perception of low levels of social support or support is not sought in times of need (Cloitre, Stovall-McClough, Zorbas, & Charuvastra, 2008; Kafetsios & Sideridis, 2006; Maunder & Hunter, 2009; Merz & Consedine, 2009). In addition, the literature supported the mediating role that perceived social support has between attachment and psychological well-being (Cloitre et al., 2008; Kafetsios & Sideridis, 2006; Maunder & Hunter, 2009; Merz & Consedine, 2009).

Williams et al. (2004) explored the relationship between sense of belonging and attachment in at risk for depression Navy recruits and discovered a positive linear relationship between the two variables. A cognitive behavioral intervention increased recruits sense of belonging which in turn, increased secure attachment. A strong sense of belonging was also noted with secure attachment among ethnic and sexual minority individuals (Ghavami, Fingerhut, Peplau, Grant, & Wittig, 2011; Wiles et al., 2009) and "older" people in New Zealand (Wiles et al., 2009).

"Since the goal of attachment behaviour is to maintain an affective bond, any situation that seems to be endangering the bond elicits action designed to preserve it; and the greater the danger of loss appears to be the more intense and varied are the actions elicited to prevent it" (Bowlby, 1980, p.42). Therefore, conflict situations that jeopardize

46

the affective bond result in behaviors that attempt to regain the attachment bond. An individual's working model of attachment (secure or insecure) will determine how a person reacts to a situation as for some individuals conflict will present as a great hazard to the attachment bond whereas for others conflict may provide an opportunity for relationship growth resulting in greater intimacy (Pietromonaco, Greenwood, & Barrett, 2006).

Attachment and loneliness have a positive linear relationship. It appears that individuals who had insecure attachments had increased loneliness whereas individuals who had secure attachments experienced less loneliness (Gentzler, Oberhauser, Westerman, & Nadorff, 2011; Kafetsios & Sideridis, 2006). Wildschut, Sedikides, Routledge, Arndt, and Cordaro (2010) reported that individuals who are in a state of loneliness reported increased feelings of nostalgia for significant others and that nostalgia strengthened social bonds.

Perceived Social Support

House and Kahn (1985) described the most widely accepted components of perceived social support which includes emotional, appraisal, informational, and instrumental support. Emotional support includes trust, concern, love, and listening. Appraisal support is feedback that builds self-confidence and self-esteem. Informational support is advice, suggestions, and directions. Finally, instrumental support includes labor, money, time, services, and tangible aid.

Generally the emphasis in research is on how positive—higher levels of "received"—social support affect outcomes. This may be referred to as focusing on "the bright side" of social support. What is critical to note is that there are instances when

47

levels of received social support are not only lower (i.e., lacking), but when the potential

for received social support extracts a "cost" (i.e., is negative). This may be referred to,

using Tilden and Galyen's term, "the dark side" of social support (Tilden & Gaylen,

1987). Negative behavior is not considered "support" in the social support research.

Tilden and Galyen's 1987 paper called the "Darker Side of Social Support" was

instrumental in examining the negative aspects of social support. The authors considered

costs, *conflict*, reciprocity, and equity as additional factors to add into the social support

"equation" and acknowledged that the social support assets contained elements of

liability if the network members had more needs than the individual whose social support

was being measured. (Figure 2.2 for diagram of the costs (Tilden and Galyen's variables)

and benefits (House's variables) of social support).
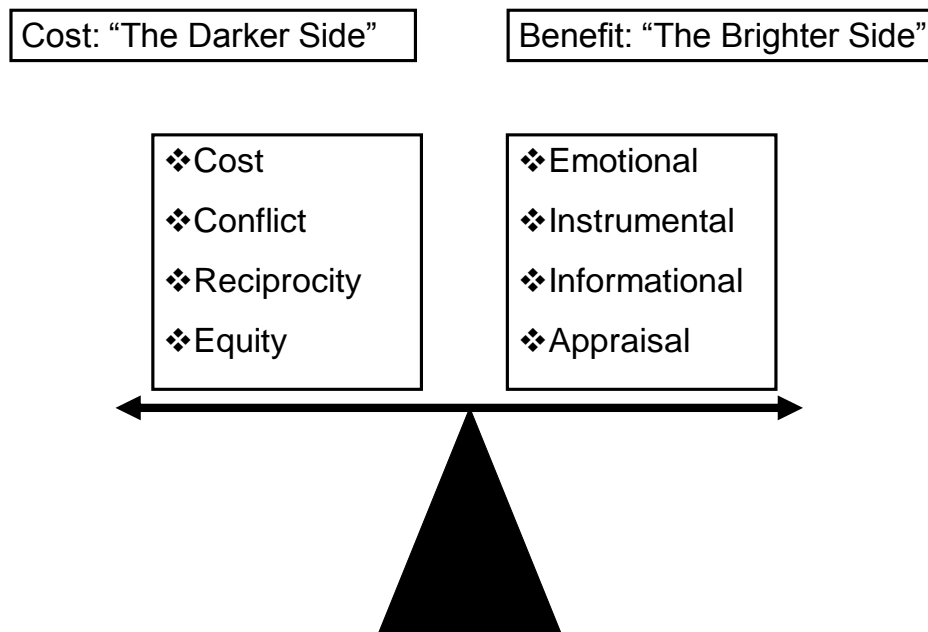
Figure 2.2. The balance of social support costs and benefits.

Positive, moderate correlations had been noted between perceived social support and sense of belonging indicating that a greater sense of belonging resulted in greater perceived social support (Hagerty, Williams, Coyne, & Early, 1996; McLaren & Challis, 2009; Vanderhorst & McLaren, 2005). The path model for depression proposed by Hagerty and Williams (1999) resulted in social support displaying an indirect path to depression and operated through sense of belonging suggesting that sense of belonging served as a buffer between low social support and depression. Choenarom, Williams, and Hagerty (2005) reported that *both* sense of belonging and social support were mediators between stress and depression.

Perceived social support and loneliness have an inverse relationship where low perceived social support resulted in increased feelings of loneliness and vice versa (Shaw & Gant, 2002). In addition, Wildschut et al. (2010) reported that "loneliness increased nostalgia, and nostalgia, in turn, increased perceptions of social support" (p. 574). Loneliness had a mediating role between social support and depression in a path model presented by Hagerty and Williams (1999).

Social support and its relationship to positive health outcomes has been a subject of study for many years. The relationship between social support and depression is well documented in the literature and a significant moderate to strong negative correlation was consistently demonstrated between depression and various types of perceived social support (Banti et al., 2009; Kafetsios & Sideridis, 2006; Kuscu et al., 2008; McLaren & Challis, 2009; Vanderhorst & McLaren, 2005). In addition, social support was a mediator variable to depression suggesting positive perceived social support was a buffer for depression (Choenarom, Williams, & Hagerty, 2005; Cloitre et al., 2008; Dennis &

49

Letourneau, 2007; Howell, Mora, DiBonaventura, & Leventhal, 2009; Israel & Rounds, 1987; Kuscu et al., 2008).

Sense of Belonging

Hagerty and colleagues defined sense of belonging as "the experience of personal involvement in a system or environment so that persons feel themselves to be an integral part of that system or environment" (Hagerty, Lynch-Sauer, Patusky, Bouwsema, & Collier, 1992, p. 172). The sentiment of being valued by a person, system or environment and actually "fitting in" with other people, systems, and environments are essential concepts comprising sense of belonging.

Sense of belonging and loneliness had an inverse relationship in that when sense of belonging is high, loneliness is low (Hagerty et al., 1996; Williams et al., 2004; Williams et al., 2002). Loneliness had a mediating role in the relationship between sense of belonging and depression in a path analysis by Hagerty and Williams (1999)

Hagerty and Williams (1999) examined the relationship of sense of belonging and depression on a depressed clinical sample and 379 community college students. Sense of belonging was the strongest predictor of depression in their population. McLaren (2006) reported that lesbians with little sense of belonging suffered higher rates of depression when compared with their heterosexual counterparts and also reported similar findings with depressed homosexual males (McLaren, Jude, & McLachlan, 2007). Sense of belonging appeared to have a protective role in male farmers at risk for depression (McLaren & Challis, 2009) and Sargent et al. (2002) noted that sense of belonging had a buffering effect against depressive symptoms among Navy recruits with a family history of alcohol abuse.

Conflict

Conflict is defined as "perceived discord or stress in relationships caused by behaviors of others or the absence of behaviors of others, such as the withholding of help" (Tilden, Nelson, & May, 1990, p. 338).

Conflict and sense of belonging had a moderate and negative linear relationship with each other (Hagerty et al., 1996; Sangon, 2004). In a path model related to the effects on depression, Hagerty and Williams (1999) noted that conflict had the strongest direct effect on sense of belonging and it was also noted that high relational conflict was associated with sense of belonging.

The relationship between conflict and loneliness was reciprocal in that higher levels of conflict resulted in higher levels of loneliness (Gentzler et al., 2011). Attachment and loneliness were mediated by conflict behavior (Feeney, Noller, & Hanrahan, 1994) and Wiklund (2008) stated that people with altered mental well-being must work through conflict in relations in order to experience a sense of connectedness to people and communities and decrease loneliness.

Dennis and Ross (2006) examined women's perceptions of relationship conflict in the development of postpartum depression (PPD) in mothers and noted that relationship conflict was significantly higher in women with depressive symptoms when compared with women who were not depressed [t(394)=-3.44, p=0.001]. Page and Wilhelm (2007) reported similar findings and noted that arguments with family members and partner relationship depth were significant predictors of postpartum depressive symptoms. Conflict as a predictor for depression was noted in several studies in which

higher conflict scores resulted in the display of higher depressive symptoms (Hagerty & Williams, 1999; Sangon, 2004; Williams, Hagerty, Yousha, Hoyle, & Oe, 2002).

Loneliness

Loneliness is the "unpleasant experience that occurs when a person's network of social relations is deficient in some important way, either quantitatively or qualitatively" and occurs as an emotional response to a "discrepancy between desired and achieved levels of social contact" (Paloutzian & Ellison, 1982, p. 4-5).

Loneliness is a prominent concept in depression research with empirics grounded in relational designs. Hagerty et al. (1992) stated loneliness is related to sense of belonging and depression however, loneliness is a unique concept. In various models of depression, loneliness has a range of correlations from .23 (Hagerty & Williams, 1999) to .52 (Russell, 1996) depending on populations assessed and measurement instruments utilized. The overlap between loneliness and depression may be explained by Young (1982, p. 382) who stated, "When individuals attribute deficiencies in their social relationship to unchangeable personal faults, they are more likely to feel both lonely and depressed".

<div align="center">

Materials and Methods

</div>

Design

This research study was a secondary data analysis of previously collected data. The design was correlational using path analysis and Structural Equation Modeling (SEM). The rationale for designing a correlation study was to "establish definitively the strength and direction of the relationship between two or more variables based on the findings from previous research" (Wood & Kerr, 2011, p. 122) with path analysis to "test

causal models developed on the basis of theory" (Beck & Polit, 2004, p. 198). SEM may also be used to test causal models however, SEM is more powerful than path analysis because measurement error is accounted for and removed from the relationship between the variables allowing for a more accurate test of the hypothesized model (Norris, 2012). SEM may also be used to assess how well a hypothesized model "fits" for different subgroups as well as determine which paths may differ between two groups.

Sample

This research study was part of a larger cross-sectional cohort study that examined the factors associated with depression in both male and female (n=443) Navy recruits. The sample for this study were women in basic training at the Navy Recruit Training Command located in Great Lakes, Illinois (*n*=114). Recruits were invited to participate in the study from a few different sources including recruits who were active in basic training, recruits who were temporarily removed from training due to a medical injury or condition, and recruits who displayed depressive symptoms and received treatment from an in-patient unit. The comparison group was matched with the depressed participants on age, sex, and ethnic/racial background resulting in no significance differences between the groups in terms of demographics. There were no significant differences regarding the study variables in the two comparison groups (Williams et al., 2002).

Sample Size

To determine the sample size required to test the proposed model, a power analysis was conducted utilizing guidelines proposed by Cohen (1988) and verified by University of Michigan PhD statisticians located at the School of Nursing and the Center

for Statistical Consultation and Research. A medium effect size was accounted for in the power analysis for a conservative approach despite the fact that Hagerty and Williams (1999) had mostly large R^2s in their model (sense of belonging $R^2=.52$, loneliness $R^2=.68$, and depression $R^2=.64$). The number of women needed to detect a medium effect size for multiple and multiple partial correlation for 13 independent variables at an alpha level of .05 requires $n=131$ participants (Cohen, 1988; Hintze, 2008). For the path analysis in SEM, Kline (1998) recommended at least 10 participants for every parameter in the model to ensure an adequate sample size. In addition, Kenny (2011) and Tomarken and Waller (2005) recommend a sample size of at least 200 as a goal for adequate statistical power for data analysis in SEM as most fit indices overestimate goodness of fit for small sample sizes of less than 200.

Measures

Attachment Style Questionnaire (ASQ). The *ASQ* is a 40 item questionnaire that measured secure and insecure adult attachment and was based on adult attachment theory conceptualized by Bowlby, Ainsworth, Hazan and Shaver, and Bartholomew. There are five subscales that included: Confidence [secure], Discomfort, Need for Approval, Preoccupation with Relationships, and Relationships as Secondary [insecure]. Coefficient alphas for the five scales ranged from .76-.80 (Feeney et al., 1994). In the current study, the overall reliability of the entire questionnaire was .81. A Cronbach alpha for the confidence scale was .89 and insecure attachment (the remaining 4 subscales) was .91.

Beck Depression Inventory, second edition (BDI-II). The BDI-II is a 21 item, self report instrument that measured the symptoms and severity of depression and was

based on criteria from the DSM-IV. The alpha coefficient for college students was .93 and for outpatients was .92 (Beck, Steer, & Brown, 1996). In the current study, the Cronbach alpha was .92.

Interpersonal Relationships Inventory (IRI). The *IRI* is composed of three distinct scales which measured perceived social support, reciprocity, and conflict in relationships with each scale containing 13 items. The internal consistency reliability of the instrument measured by Cronbach's alpha was .92 for the social support and .91 for the conflict subscales (Tilden et al., 1990). Four years after their 1990 study, 19 studies were reviewed by Tilden et al. with documented Cronbach alpha internal consistency reliabilities ranging from .79 to .95 for the social support subscale and .70 to .92 for the conflict subscale (Tilden, Hirsch, & Nelson, 1994). In the current study, the Cronbach alpha was .91 for the social support scale and .88 for the conflict scale.

Revised UCLA Loneliness Scale (RULS). The *RULS* is a 20 item self report scale which assessed individual loneliness. The instrument contained a four point Likert-type scale with a range of 1=never and 4=always. Scoring of the instrument involved summing the items with higher scores indicating greater amounts of loneliness. The reliability of the instrument ranged from alpha coefficients of .89 to .94. Convergent validity with other loneliness scales and construct validity have been noted (Russell, 1996). Hagerty and Williams (1999) report the coefficient alpha was .93 in their path analysis study. The Cronbach alpha was .95 in the current study.

Sense of Belonging Inventory (SOBI). The *SOBI* is an 18 item self report instrument used to measure the psychological state of sense of belonging in adults including whether individuals feel "valued" and "fit" within a system or environment.

The reliability of the psychological state scale ranged from alpha coefficients of .91 to .93 when tested in college students, depressed patients, and Catholic nuns. Construct validity was supported through testing of the instrument with the aforementioned contrasted groups and correlation was tested with similar construct measures (Hagerty & Patusky, 1995). In the current study, the Cronbach alpha was .97.

Procedure

Approval for the original larger study was obtained from the Institutional Review Board from the University of the Primary Investigator and the U.S. Navy. Naval staff members were informed of the study and provided support in the recruitment of participants. Research team members received training on how to administer the Structured Clinical Interview for DSM Disorders (SCID) and survey instruments as well as the procedures required of the study (Williams et al., 2002).

After informed consent was obtained from participants, researchers reviewed the recruits' charts to obtain baseline demographic information. Participants were considered ineligible for the study if they had a considerable drug and/or alcohol abuse history or had a psychotic disorder. The result was that no recruits were excluded from the study and there was less than a one percent refusal to participate rate (Williams et al., 2002).

As previously stated, the comparison group was matched to the depressed group on age, sex, cultural/racial demographics. These recruits completed either the full-version of the SCID or the screening version of the SCID as determined by the time constraints of the recruits' hectic basic training schedule. Those recruits who screened positive for a psychiatric disorder were excluded from the study, however if they screened positive for depression, they were then placed in the depressed group (Williams et al., 2002).

Data Analysis

All data were analyzed using the Statistical Package for the Social Sciences (SPSS) 17.0. All independent variables and the dependent variable had the following baseline analysis: Frequency counts and total scale scores for all instruments, basic descriptive statistics, assessment of missing data with imputation as appropriate, and plots of the distribution. Internal consistency coefficients were calculated to determine reliability of each measure. Independent samples t-test was utilized to examine any significant mean differences in designated groups. The significance level for all analyses was set a priori at $\leq .05$. Further analysis of data was based on the aims of the study.

Aim 1: *determine baseline demographics of program participants including rates and degree of depressive symptoms as well as means and standard deviations for all model variables.* Rates and degree of depressive symptoms were determined by examination of the BDI-II cut-off scores of participants and it was determined how many participants scored in the minimal, mild, moderate, and severe depressive symptom categories. Means and standard deviations were obtained for all model variables.

Aim 2: *test whether there was a difference in mean total scale scores of model variables in relationship to sociodemographic (SDD) disadvantage (sum of being from a non-dominant racial/ethnic group, a teen, income ≤$15,000, and high school education or less) among those with less SDD (zero or one risk factor) with those participants with more SDD risk (two or more risk factors).* A less and more SDD risk variable was created and t-tests were conducted on all of the model variables in relation to less and more SDD risk.

Aim 3: *test the relationships in the theoretical model for direct and indirect paths for depression.* A correlation matrix was constructed to assess significant relationships among the independent variables. Path analysis was conducted to test the presumed causal relationship among variables in the proposed recursive model to assist in prediction of the direct and indirect effect one variable had on another (Klem, 1995; Tabachnick & Fidell, 2007). Each of the endogenous variables in the proposed model (perceived social support, sense of belonging, conflict, loneliness, and depression) required one regression analysis to obtain the path coefficients.

Amos[TM] 19 was used to test a SEM model to determine the best model to explain the model variables. SEM is based on principles related to regression and path analysis (Byrne, 2010) as described above however, SEM allows one to test more complicated path models with intervening variables connecting the independent and dependant variables (Ullman, 2007).

The fit indices described below are the most conventional used by researchers and were used in the SEM analysis (Hooper, Couglan, & Mullen, 2008). One method of determining overall model "fit" is model chi-square (χ^2) where an insignificant result at >0.05 equates to a good model fit (Ullman, 2007). The root mean square error of approximation (RMSEA) is another fit index with a threshold of <.06. The RMSEA compares lack of "fit" in a proposed model with a "perfect" saturated model (Hu & Bentler, 1999). The Normed Fit Index (NFI) is an index which has a recommended cut-off of ≥0.95 and the test compares the chi-square value of the null hypothesis model (all variables are uncorrelated) with the chi-square of the proposed model (Hooper, Couglan, & Mullen, 2008). Finally, a modification of the NFI is the Comparative Fit Index (CFI)

which also has a recommended cut off value of ≥0.95 and employs a noncentral chi-square distribution. CFI is one model fit indices least affected by sample size (Hu & Bentler, 1999).

Direct and indirect effects in the path model were calculated. Regression coefficients in the path diagram display the direct effects whereas to determine indirect effects, the coefficients for each indirect pathway were multiplied and then added together to conclude a total indirect effect. Variables with path coefficients that influenced the indirect route were confirmed as mediator variables. The sum total of the effects of a variable included calculating the direct and indirect effects. The residual path coefficient ($\sqrt{1-R^2}$) included the unexplained model variance (Klem, 1995). The bootstrap method in Amos^{TM} calculated the standard error, confidence intervals, and *p*-values of the paths coefficients (both direct and indirect).

Results

The demographics of the program participants (*N*=114) are discussed with consideration of the dependent variable, depression (Table 2.1) and meet the requirement for Aim 1.

Table 2.1

Demographics by Depressive Symptoms using BDI-II Cutoffs: Chi-Square Test for Independence for Female Navy recruits (N=114)

Characteristic	No DS (cutoff 0-13) n (%)	Mild DS (cutoff 14-19) n (%)	Moderate DS (cutoff 20-28) n (%)	Severe DS (cutoff 29-63) n (%)	Total N (%) 114 (100)	$\chi^2(3)$	p
Race/Ethnicity							
African Americans	12 (42.9)	8 (28.6)	6 (21.4)	2 (7.1)	28 (24.6)	1.63	.65
American Indians	2 (28.6)	2 (28.6)	1 (14.2)	2 (28.6)	7 (6.1)	3.17	.41
Asians	2 (66.7)	0 (0.0)	1 (33.3)	0 (0.0)	3 (2.6)	1.57	.67
Caucasians	35 (52.2)	13 (19.4)	11 (16.4)	8 (12.0)	67 (58.8)	1.46	.69
Hispanics	5 (62.5)	1 (12.5)	2 (25.0)	0 (0.0)	8 (7.0)	1.77	.60
Other race/ethnicity	0 (0.0)	1 (100)	0 (0.0)	0 (0.0)	1 (0.9)	3.59	.32
Marital Status							
Never Married	43 (47.3)	21 (23.1)	18 (19.8)	9 (9.8)	91 (79.8)	1.22	.75
Engaged or Living with SO	7 (53.8)	2 (15.4)	2 (15.4)	2 (15.4)	13 (11.4)	.76	.86
Divorced	1 (100)	0 (0.0)	0 (0.0)	0 (0.0)	1 (0.9)	1.05	.80
Teens (17-20)	45 (51.1)	20 (22.7)	15 (17.0)	8 (9.2)	88 (77.2)	1.58	.66
Income ≤$15,000	31 (46.3)	13 (19.4)	15 (22.4)	8 (11.9)	67 (58.8)	2.44	.49
High School or less	39 (47.6)	18 (22.0)	14 (17.0)	11 (13.4)	82 (71.9)	2.75	.43
Living with Parents or Relative	40 (46.5)	21 (24.4)	17 (19.8)	8 (9.3)	86 (75.4)	2.32	.51
More SDD Risk	47 (49.5)	21 (22.1)	16 (16.8)	11 (11.6)	95 (83.3)	1.39	.71
Mean Number of SDDs (*SD*)	2.3 (1.0)	2.4 (1.2)	2.4 (1.0)	2.4 (0.8)	2.3 (1.0)		.48
Mean Age (*SD*)	19.6 (3.0)	19.8 (3.3)	19.5 (1.7)	20.0 (2.0)	19.7 (2.8)		.57

Note. DS=Depressive Symptoms, SO=Significant Other, *SD*=Standard Deviation, SDD= Sociodemographic disadvantage, which is a sum of being from a non-dominant racial/ethnic group, a teen, with low income, and a high school education or less, and More SDD Risk= Two or more SDD risk factors.

Program participants were rather homogeneous in terms of several factors (age:

M=19.7, *SD*=2.8; never married= 79.8%; income < $15,000=60.2%; living with parents

or a relative prior to Navy=75.0%; education: high school or less=72.2%). There was

however heterogeneity noted among racial/ethnic groups.

Table 2.2 displays means with confidence intervals and standard deviations for all

model variables.

Table 2.2

Descriptive Statistics and Distributions of the Model Variables for Female Navy Recruits (N=114)

Variable	*M*	95% CI	*SD*	Theoretical Range	Observed Range
Attachment					
Secure	35.0	33.4-36.6	8.6	8-48	10-48
Insecure	105.5	100.9-110.0	24.6	32-192	52-160
Social Support	53.6	51.8-55.3	9.5	13-65	22-65
Conflict	35.4	33.6-37.1	9.5	13-65	13-53
Sense of Belonging	56.1	53.5-58.6	13.5	18-72	21-72
Loneliness	40.1	37.7-42.5	12.7	20-80	20-69
Depression	15.0	13.6-17.6	10.5	0-63	0-52

Note. CI=confidence interval.

The dependent variable of depression is worth noting as the mean for participants was

15.0 (*SD*=10.5) which is above the BDI-II cut-off of 13 (Beck, 1996) and indicated some

degree of depressive symptoms (mild, moderate, or severe) for the "average" participant.

In terms of the independent variables most female recruits answered: in the more neutral

categories for attachment (secure and insecure), had higher than the neutral category for

social support and sense of belonging, and had less than the neutral category for

loneliness and conflict.

Several of the interval-level variables in this analysis were skewed (perceived

social support and sense of belonging: left skewed; depression: right skewed) with

significant Kolmogorov-Smirnov statistics indicating non-normality however the shape of the histograms appeared to be reasonably normally distributed and is supported by inspection of the Normal Q-Q Plot and Detrended Normal Q-Q Plot. The attachment variables (confidence and insecure attachment), conflict and loneliness were normally distributed as evidenced by non-significant Kolmogorov-Smirnov statistics and a Normal Histogram distribution supported by a Normal Q-Q plot and Detrended Normal Q-Q Plot. Regression residuals of all dependent variables were normally distributed, as required to meet the assumptions for regression modeling (Lewis-Beck 1980).

Missing data appeared to be random with no patterns noted. This resulted in 20 single items in which data were imputed using individual participants mean score for that survey instrument to replace the missing item.

Aim 2 involved conducting t-tests to determine if there were differences in mean scores related to all model variables for female participants in terms of low and more sociodemographic disadvantage. Researchers have noted that not any one risk factor alone but more sociodemographic disadvantage increases risk for poor mental health outcomes such as depression (Sameroff & Rosenblum, 2006). As noted in Table 2.3 below, there are no statistically significant differences in the model variable in relation to less and more SDD.

Table 2.3

Differences Between More SDD and Less SDD in Female Navy Recruits (N=114)

Variable	More SDD		Less SDD		*df*	*t*	*p*	Cohen's *d*
	M	*SD*	*M*	*SD*				
Attachment								
Secure	35.33	8.42	33.42	9.69	112	-0.88	0.38	0.21
Insecure	104.73	22.23	109.16	34.94	112	0.71	0.48	0.15
Social Support	54.15	8.94	50.68	11.82	112	-1.46	0.15	0.33
Conflict	35.78	9.13	33.32	11.35	112	-1.03	0.31	0.24
Sense of Belonging	56.86	13.06	52.89	15.20	112	-1.18	0.24	0.28
Loneliness	39.47	12.63	43.26	13.14	112	1.19	0.24	0.29
Depression	15.49	10.61	14.84	9.25	112	-0.25	0.80	0.07

Therefore, the model was not extended to include less and more SDD.

The correlation matrix (Table 2.4) displays the significant relationships among the model variables with moderate to strong correlations noted between all model variables. The relationship between loneliness and sense of belonging resulted in the strongest correlation and the relationship between conflict and BDI the weakest. All relationships were in the expected direction.

Table 2.4

Zero-Order Correlations for Study Variables in Female Navy Recruits

	Secure Attachment	Insecure Attachment	Social Support	Sense of Belonging	Conflict	Loneliness	BDI
Secure Attachment	−						
Insecure Attachment	-.615**	−					
Social Support	.740**	-.543**	−				
Sense of Belonging	.844**	-.736**	.717**	−			
Conflict	-.537**	.637**	-.528**	-.579**	−		
Loneliness	-.807**	.721**	-.760**	-.883**	.582**	−	
BDI	-.578**	.525**	-.525**	-.713**	.479**	.705**	−

Note: BDI=Beck Depression Inventory
**Correlation is significant at the 0.01 level (2-tailed).

The SEM path model (Figure 2.3) displays the paths in the proposed model with the path coefficients and R^2 results displayed using AMOS^{TM} 19. Each endogenous variable in the model required one regression analysis to obtain the path coefficients and paths were not trimmed in this SEM analysis as the original theoretical framework included the variables and paths displayed in the figure. R^2 values which are located near the upper right hand corner of each variable box indicate that 53% of the variance in depressive symptoms may be explained by the model variables with sense of belonging and loneliness explaining the most variance.
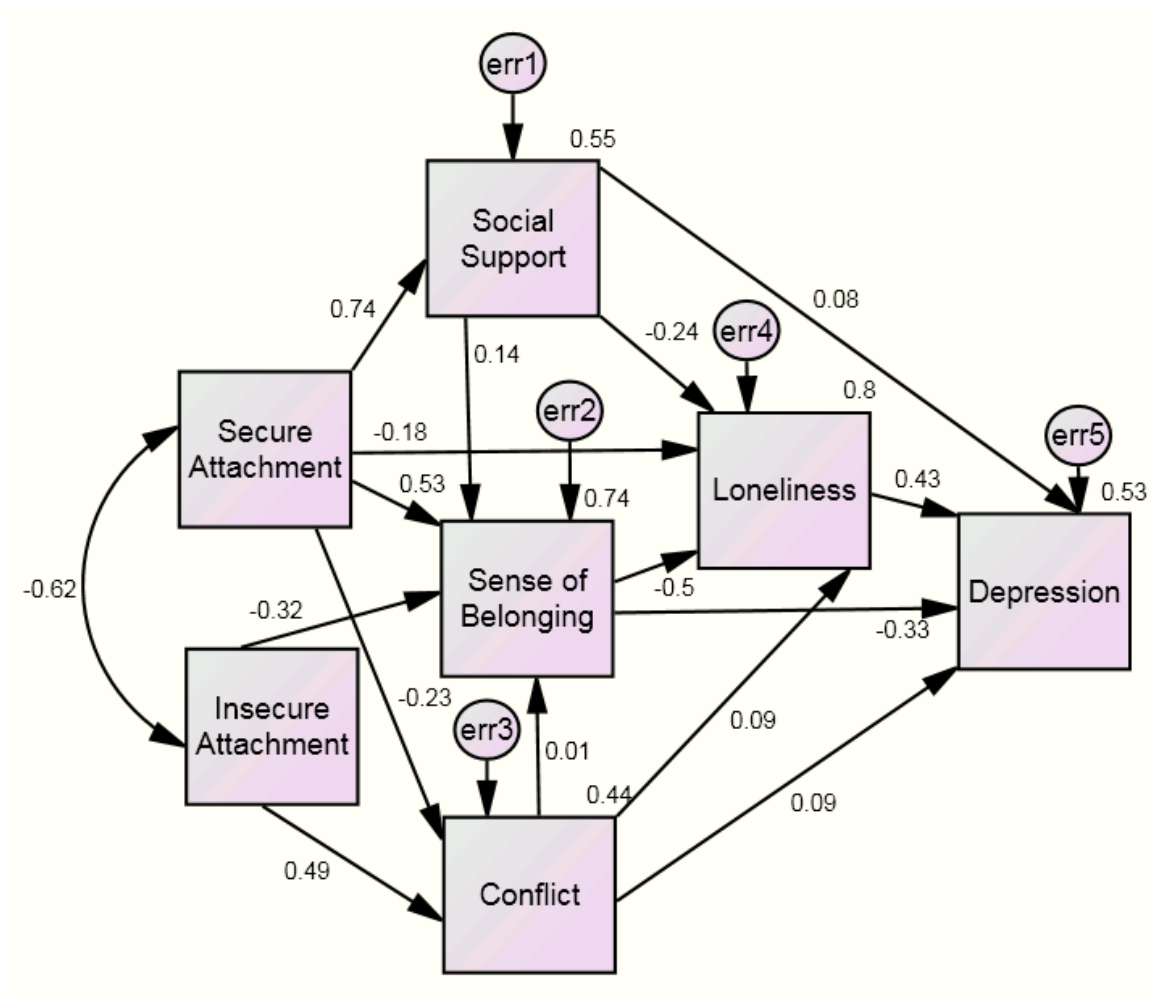
Figure 2.3. The adapted theoretical model of depression in female Navy recruits. Observed variable are represented by squares.

In terms of model fit, the NFI=0.98 and CFI=0.98 indicated respectable levels of model fit whereas χ^2=16.02, df=5, p=0.01 and RMSEA=0.14 indicated less support of model fit.

Finally, Aim 3 included the calculation of the SEM path coefficients. Table 2.5 includes the standardized direct and indirect path coefficients as well as standard errors.

It is noteworthy to state is that not all of the paths displayed in the tables were significant. The paths that were insignificant in the model included the paths from: conflict to sense of belonging, conflict to loneliness, conflict to depression, and social support to depression.

Table 2.5

SEM Effects of the Causal Variables on the Endogenous Variables in Female Navy Recruits

Causal Variables	Endogenous Variables											
	Insecure		Secure		Conflict		Social Support		Sense of belonging		Loneliness	
	Std.	SE	Std.	SE	Std.	SE	Std.	SE	Std.	SE	Std.	SE
Conflict												
Direct Effect	0.49***	0.08	-0.23**	0.09	-	-	-	-	-	-	-	-
Indirect Effect	-	-	-	-	-	-	-	-	-	-	-	-
Total Effect	0.49***	0.08	-0.23**	0.09	-	-	-	-	-	-	-	-
Social Support												
Direct Effect	-	-	0.74***	0.04	-	-	-	-	-	-	-	-
Indirect Effect	-	-	-	-	-	-	-	-	-	-	-	-
Total Effect	-	-	0.74***	0.04	-	-	-	-	-	-	-	-
Sense of belonging												
Direct Effect	-0.32***	0.07	0.53***	0.08	0.01	0.07	0.14	0.08	-		-	-
Indirect Effect	0.01	0.03	0.10*	0.06	-	-	-	-	-		-	-
Total Effect	-0.31***	0.10	0.63***	0.14	0.01	0.07	0.14*	0.08	-		-	-
Loneliness												
Direct Effect	-	-	-0.18**	0.08	0.09	0.05	-0.24***	0.07	-0.50***	0.08	-	-
Indirect Effect	0.20***	0.05	-0.51***	0.06	0.00	0.03	-0.07*	0.04	-		-	-
Total Effect	0.20***	0.05	-0.69***	0.14	0.09	0.06	-0.31***	0.07	-0.50***	0.08	-	-
BDI												
Direct Effect	-	-	-	-	0.09	0.08	0.08	0.10	-0.33**	0.13	0.43**	0.14
Indirect Effect	0.23***	0.06	-0.47***	0.06	0.03	0.04	-0.18**	0.06	-0.21**	0.08	-	-
Total Effect	0.23***	0.06	-0.47***	0.06	0.12	0.12	-0.10	0.16	-0.54***	0.21	0.43**	0.14

Notes: Std.=Standardized; SE=Standard Error; BDI=Beck Depression Inventory
*p<.10; **p<.01; ***p<.001

Discussion

This study was designed to understand the impact of relational variables on depression. The key findings are outlined below and are discussed in relation to the study aims and hypotheses. Study limitations and strengths as well as future directions are also discussed.

The hypothesis related to Aim 2 was rejected. There were no statistically significant differences noted in depressive symptoms for women with less versus more SDD. At first glance, this finding may seem surprising as many researchers have demonstrated that cumulative risk is a greater measure of explaining mental health outcomes than by using a single risk factor alone (Garmezy, Masten, & Tellegen, 1984; Luthar, Cicchetti, & Becker, 2000; Sameroff & Rosenblum , 2006; Seng, Kohn-Wood, McPherson, & Sperlich (2011); Seng et al., 2010). In this study however, there was a small amount of variance noted in this population of women in terms of less versus more SDD as most of the women (83.3%, *n*=95) were in the more SDD category (two or more factors) of (sum of being from a non-dominant racial/ethnic group, a teen, income ≤$15,000, and high school education or less).

The next hypotheses were related to Aim 3 of the female Navy recruits. It appeared from the path analysis results, that of the 15 direct paths all but four were significant. The insignificant paths include: perceived social support to depression, conflict to depression, conflict to loneliness, and conflict to sense of belonging. In fact, conflict as a "causal" variable could be completely eliminated from the model.

Conflict in relationships has been noted to be a predicator of depression by researchers (Hagerty & Williams, 1999; Page & Wilhelm, 2007; Sangon, 2004; Williams,

Hagerty, Yousha, Hoyle, & Oe, 2002) and this literature base is more extensive than

research that suggests greater conflict results in more loneliness (Wiklund, 2008) and less

sense of belonging (Hagerty & Williams, 1999). Therefore, the surprising result was that

conflict did not have a direct effect on depression. When examining the IRI instrument

(the conflict measurement tool for this study) it appeared that conflict in relationships

was measured interpersonally. Therefore, the female Navy recruits in this study may have

had conflict in their lives and may have conflict in relationships however; this conflict

may be with people that they do not have an intimate relationship with (e.g. other

recruits, commanding officers) as opposed to people that "they care about". Additionally,

these women very well may not have a lot of conflict in their lives as these are young

women who do not have to concern themselves about meeting basic needs (food,

clothing, and shelter issues), they are in a structured environment, they receive a

paycheck, and most are not in a partnered relationship (81%). It is also important to note

that the direct effect conflict has been noted to have on depression may be because

researchers included violence items in their conflict measures which is not addressed in

this study.

The final path that was insignificant was the *direct* link of social support to

depression. There are many studies that demonstrated a link between depression and

various types of perceived social support (Banti et al., 2009; Kafetsios & Sideridis, 2006;

Kuscu et al., 2008; McLaren & Challis, 2009; Vanderhorst & McLaren, 2005) however

social support serving as a mediator has been noted by others (Hagerty & Williams,

1999; Choenarom, Williams, and Hagerty, 2005). Finally, social support having no effect

on depression has also been noted by others (Bina, 2008; Callister, Beckstrand, & Corett,

2010; Kirpinar, Gözüm, & Pasinlioğlu, 2010; Roman, 2009; Zelkowitz et al., 2008).

Inconsistencies related to the direct link between perceived social support and mental

health outcomes (e.g. depression) may be related to the fact that social support is poorly

defined or measured in addition to social network characteristics that vary according to

relationship roles, social status, and stage of life (Lin & Peek, 1999).

The hypotheses related to Aim 3 for female Navy recruits resulted in support of

11 of the 15 direct paths. Four of the paths in the SEM that were insignificant included

the three path previously mentioned (perceived social support to depression, conflict to

depression, and conflict to loneliness) and discussed previously. Another path that is

interesting to note is the path between conflict and sense of belonging as the path was

significant however, not in the expect direction. It was expected that more conflict would

equate to less sense of belonging however the reverse was true meaning that more

conflict in relationships equated to more of a sense of belonging. A possible explanation

could be that conflict in some relationships may produce alliances with others thus

increasing sense of belonging.

The hypothesis related to the indirect paths resulted in support for all indirect path

results. Perceived social support does appear to effect depression indirectly through

loneliness. In addition, both secure and insecure attachment have highly significant

indirect effects on depression through loneliness as well. As insecure adult attachment is

greatly influenced by childhood maltreatment, it is not surprising that these predicators

have an indirect effect on depression. Therefore, interventions directed at the root cause

of loneliness in women may assist in treating depression. Despite the fact that these

women are in close quarters and contact with other people, does not necessarily mean

70

they are not lonely. As previously stated, some of these young women have never lived without their parents or family members and may feel homesick and lonely for their families.

The results from this model indicate that securely attached women have a greater sense of belonging and experience less conflict in relationships as compared to women who are insecurely attached. Therefore, in a military setting, more efforts may be needed for insecurely attached women to increase their sense of belonging. Additionally, insecurely attached women experience twice as much conflict in relationships as opposed to securely attached women. Therefore, training or workshops related to conflict management may be beneficial for these women.

There are a few more secondary results that are worth mentioning. In terms of model chi-square (χ^2), it may have been noted in this analysis that the model had a *p*-value <0.05 and a good model fit results in an insignificant result at >0.05. However, it is important to note that chi-square is influenced by sample size and insufficient power from a small sample size may result in a model where good or poor fit cannot be properly determined (Hooper, Couglan, & Mullen, 2008; Ullman, 2007). Therefore, model chi-square was given attention but not a lot of merit. Also, the RMSEA was 0.14 with an overall conclusion of a less supportive fit yet RMSEA penalizes lack of parsimony (Hooper, Couglan, & Mullen, 2008). Therefore, the model should not be completely rejected as it was so underpowered that it is hard to say that this model is not true. Future studies would include a larger sample size of women to adequately test the model.

There are some limitations to this study. This study was a study of a very specific population, Navy recruits; therefore, the findings may not generalize to the non-military

71

population. The sample size in women alone was too small to adequately conduct a full SEM. Therefore, a future direction would be to conduct a larger scale study involving more women recruits. Conflict and social support could have been measured differently allowing for a more global measure of conflict, and social support could have been measured utilizing the framework by House so one would know what specific type of support is lacking (e.g. emotional, appraisal, informational or instrumental). Knowledge of what specific type of social support is lacking would be useful for practitioners to know where to intervene with depressed individuals and also how to help prevent depression.

Despite the limitations, there were some major strengths of this research which includes a strong theoretical model to ground the analysis. This study provides evidence that the model proposed explains 52% of the variance of depressive symptoms in female Navy recruits. There was evidence that sense of belonging and loneliness are major predicators of depression with standardized regression weights of (-0.33) and (0.43). Also, another strength of the study was that it was novel in that the variables in the model were never analyzed using SEM.

<div align="center">**Conclusion**</div>

Overall, the proposed model for depression gives insight into the key variables that influence this common mental health issue. It would be prudent for future research to focus on sense of belonging and loneliness (the major influencing variables in this study) to determine if these variables are influencing variables in a non-military population. In addition, future research should examine how the proposed model works with larger samples of both women and men. Understanding the influence key variables have on

depression is very powerful as this knowledge allows practitioners have insight into the

causes of depression and assists with treatment making decisions as well as focusing on

prevention efforts.

CHAPTER 3

CONSIDERING A RELATIONAL MODEL FOR DEPRESSION IN WOMEN

WITH POSTPARTUM DEPRESSION

Abstract

The purpose of this secondary analysis of a cohort study was to extend testing of a theory that decreased sense of belonging, bonding, and loneliness are salient risk factors for depression in women by studying them in relation to postpartum depression. The model took additional known predictors into account, including parenting sense of competence, perceived social support, and conflict. Data for this theory-testing analysis came from a larger prospective longitudinal cohort study that examined the impact of trauma exposure and posttraumatic stress disorder on obstetric, neonatal, and maternal mental health and bonding outcomes in a diverse community sample of women enrolled in prenatal care. The sample for this secondary analysis included the women who were retained to the end of the study at the 6 week postpartum interview (n=564). Data from "wave 1" (<28 weeks gestation), "wave 2" (28-35 weeks gestation), and "wave 3" (6 weeks postpartum) were analyzed in a predictive model. Structural equation modeling was used to test the "fit" of the theoretical model as well as determine significance of direct and indirect paths. The proposed model explained 35% of the variance in depression with impaired bonding and loneliness as the strongest indicators. Sense of belonging, perceived social support from a healthcare practitioner and a partner, and parenting sense of competence were additional indicators. Findings from this study challenge current thinking about the relationship between impaired bonding and PPD as this study raises the possibility that impaired bonding is a risk for PPD as opposed to the reverse relationship. Additionally, the study provided evidence of the importance of healthcare practitioners' alliance with patients especially for women who were sociodemographically disadvantaged as the healthcare relationship influenced PPD more

than family or a partner. This paper contributes to advancing the science of women's

mental health in relation to depression by considering additional predictors which might

be acquiescent to intervention.

Introduction

Postpartum depression (PPD) is a serious and complex mood disorder affecting

approximately one out of eight (Beck & Watson-Driscoll, 2006; Kendall-Tackett, 2010;

Mancini, Carlson, & Albers, 2007) of the more than four million women who give birth

in the United States every year (Centers for Disease Control and Prevention, 2010). This

common health issue impacts not only the mental well-being of the mother, causing poor

postpartum physical health (Beck & Watson-Driscoll, 2006; Kendall-Tackett, 2010) and

bonding problems (McMahon, Barnett, Kowalenko, & Tennant, 2006; Moehler, Brunner,

Wiebel, Reck, & Resch, 2006; Wilkinson & Mulcahy, 2010), but also may have negative

effects on the infant including dysregulation patterns that make the infant prone to

depression in the future. The long term effects of PPD in children includes the display of

overanxious and depressed symptoms as well as behaviors related to defiance,

aggression, and conduct problems (Ashman et al., 2008; Hay et al., 2003; Murray et al.,

2006).

PPD symptoms may begin within the first 4 weeks postpartum and linger for up to

a year and include symptoms noted from major depressive episode (depressed mood most

of the day-every day, insomnia or hypersomnia, feelings of worthlessness, recurrent

suicidal thoughts, and an overall sense of loss of control over thoughts, emotions, and

actions) (Beck & Watson-Driscoll, 2006; Kendall-Tackett, 2010; Mancini et al., 2007).

There are characteristics however, that are unique to postpartum women. A postpartum

depressed mother may experience loss of self, difficulty transitioning to the motherhood

role, worrisome thoughts about the ability to be a good mother, and "incongruity between expectations and reality of motherhood" (Beck & Watson-Driscoll, 2006, p. 79).

Evidence has accrued showing that significant predictors of PPD include low social support, life stress, depression history, prenatal anxiety, marital dissatisfaction, infant temperament, maternal childhood maltreatment, PTSD in pregnancy, dissociation in labor, and lower overall quality of life in pregnancy. (Beck, 2002b; Beck & Watson-Driscoll, 2006; Beck, 2001; O'Hara & Swain, 1996, Seng et al., in press). The work of Hagerty and Williams (1999) on "sense of belonging" in relation to depression has been overlooked in the PPD literature, but seems worthy of consideration, especially in light of the extent to which women's social situation is subject to change during the post-birth recovery and early parenting time period. Hagerty and Williams examined the relationship of perceived social support, sense of belonging, conflict, and loneliness on depressive symptoms in a depressed clinical sample and in college students and noted social support had only a small, indirect effect on depressive symptoms. It appears from this model that all the aforementioned variables explained 64% of the variance of depressive symptoms with sense of belonging explaining the most variance (R^2=.52) making it the strongest predictor of depressive symptoms (Hagerty & Williams, 1999). The impact of sense of belonging on depression had been noted by others as well (Anant, 1967; McLaren & Challis, 2009; Sargent, Williams, Hagerty, Lynch-Sauer, & Hoyle, 2002).

Although changes in hormone levels is a widely accepted view as to why women experience the "baby blues" immediately postpartum, the exact etiology of PPD has not been established and no biological or hormonal cause has been identified (Baker et al.,

2002; Mallikarjun & Oyebode, 2005). PPD appears to be a complex mood disorder comprised of internal and external factors. It is theoretically possible that psychological and psychosocial interventions may prevent or decrease PPD symptoms (Mallikarjun & Oyebode, 2005). Considering the limited evidence regarding the use of pharmacological interventions in the treatment of PPD and the concern of the possible effects on newborns, attention to internal and external factors associated with depression including perceived social support, sense of belonging, conflict in relationships, parenting sense of competence, bonding, and loneliness was the focus of this study.

The purpose of this research study was to examine the multiple variables of perceived social support, sense of belonging, conflict in relationships, parenting sense of competence, bonding, and loneliness for their associations in a relational model for depression with women experiencing postpartum depression (Figure 3.1).
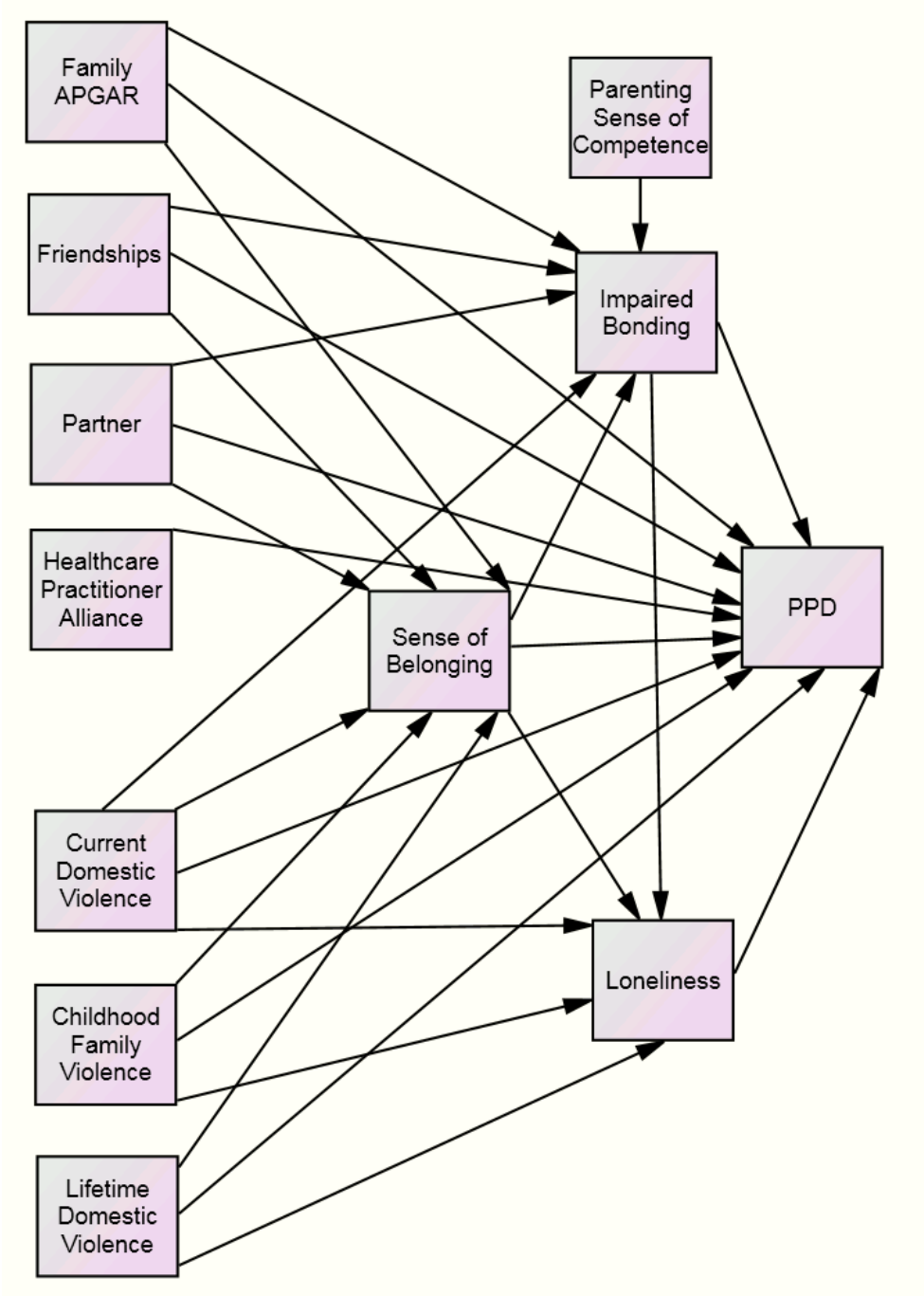
Figure 3.1. The adapted theoretical model of PPD.

The specific aims for this study were to: (1) determine baseline demographics of postpartum women including rates and degree of depressive symptoms as well as means and standard deviations for all model variables; (2) test whether there was a difference in

mean total scale scores of model variables in relationship to sociodemographic (SDD) disadvantage (sum of being from a nondominant racial/ethnic group, a teen, income ≤$15,000, and a high school education or less) among those with less SDD (zero or one risk factor) with those participants with more SDD risk (two or more risk factors); (3) test the relationships in the theoretical model for direct and indirect paths for depression; and (4) assess the extent to which the theoretical model may perform differently among women at high risk for depression due to sociodemographic disadvantage.

The following hypothesis was tested in relation to Aim 1:

Rates of postpartum depression will be higher than the national average of 10-20% of all postpartum women because of the high risk sample.

The following hypotheses were tested in relation to Aim 2:

There will be a statistically significant difference in mean total scale scores for women with less SDD risk versus women with more SDD risk.

a. Women with more SDD will have lower perceived social support (from family, friends, a partner, and from their healthcare practitioner), sense of belonging, and parenting sense of competence.

b. Women with more SDD will have more conflict in relationships, impaired boding, loneliness, and depressive symptoms.

The following hypotheses were tested in relation to Aim 3:

1. The independent variables of sense of belonging, impaired bonding, and loneliness will have the greatest impact on depression.

2. Perceived social support from family, friends, a partner, a healthcare practitioner as well as sense of belonging will have a direct negative effect on PPD whereas

current domestic violence, childhood family violence, lifetime domestic violence history, impaired bonding, and loneliness will have a direct positive effect on PPD.

3. Perceived social support from family, friends, and a partner as well as sense of belonging and parenting sense of competence will have a direct negative effect on impaired bonding and current domestic violence will have a direct positive effect on impaired bonding.

4. Perceived social support from family, friends, and a partner will have a direct positive effect on sense of belonging whereas current domestic violence, childhood family violence, lifetime domestic violence history will have a direct negative effect on sense of belonging.

5. Sense of belonging will have a direct negative effect on loneliness whereas current domestic violence, childhood family violence, lifetime domestic violence history, and impaired bonding will have a direct positive effect on loneliness.

6. Childhood family violence will have an indirect positive effect on PPD whereas parenting sense of competence will have an indirect negative effect on PPD.

Review of the Literature Based on Model Paths

Perceived Social Support

The concept "social support" has been defined in many different ways however, the most commonly accepted components of social support includes emotional, appraisal, informational, and instrumental support as conceptualized by House and Kahn (1985). Trust, concern, love, and listening are components of emotional support. Feedback that builds self-assurance and self-worth comprise appraisal support. Informational support

82

includes suggestions, advice, information, directions, instructions, and tips whereas instrumental support includes financial resources, tangible aid, manual labor, services, and time.

Perceived social support is a board framework of social support that exists in social support research. Cohen (1992) defined perceived social support as "the function of social relationships—the perception that social relationships will (if necessary) provide resources such as emotional support or information" (p. 109). Perceived social support consists of the "availability and adequacy" of supportive assistance from social network members (Barrera, 1986).

Researchers tend to emphasize how positive received social support affects health outcomes and tend to focus on the "the bright side" of social support. There are however, occasions when levels of received social support are lacking or contain "costs" that are negative. Negative behavior is not viewed as a type of "support" in social support research and Tilden and Galyen referred to negative support as "the dark side" of social support (Tilden & Gaylen, 1987). Tilden and Galyen's conceptualization consisted of costs, *conflict*, reciprocity, and equity as other factors to consider when assessing social support. It appears there is a balance in the social support "equation" in which social support may contain elements of liability if the network members have more needs than the individual whose social support is being measured. (Figure 3.2 for diagram of the costs (Tilden and Galyen's variables) and benefits (House's variables) of social support).

| Cost: "The Darker Side" | Benefit: "The Brighter Side" |

❖Cost
❖Conflict
❖Reciprocity
❖Equity

❖Emotional
❖Instrumental
❖Informational
❖Appraisal
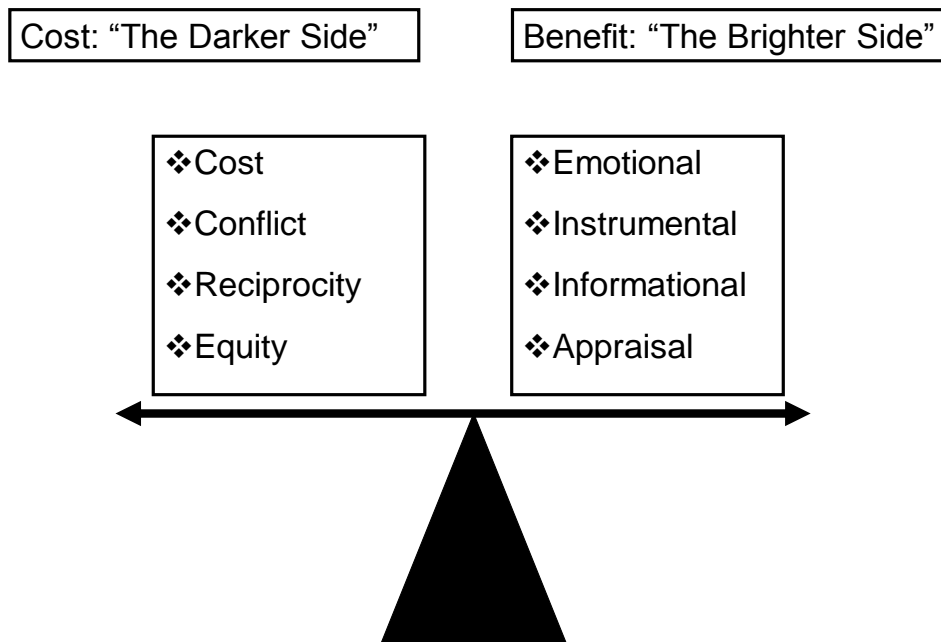
Figure 3.2. The balance of social support costs and benefits.

Wilkinson and Mulcahy (2010) conducted a cross-sectional study of 115 women and examined interpersonal relationships and attachment (bonding) in postpartum depression. "Irrespective of diagnostic status, attachment styles characterised by a negative model of self were associated with higher depression and lower quality of relationship with baby and spouse and the perception of less social support" (Wilkinson & Mulcahy, 2010, p. 252).

Perceived social support and sense of belonging had a positive, moderate correlation in which a consequence of greater sense of belonging resulted in greater perceived social support (Hagerty et al., 1996; McLaren & Challis, 2009; Vanderhorst & McLaren, 2005). In addition, sense of belonging appeared to serve as a buffer between low social support and depression in the path model for depression proposed by Hagerty and Williams (1999). Dennis and Letourneau (2007) examined global perceptions of

support in postpartum depressed women and noted that "sense of belonging" with other women and children was a major predictor of perceived global support.

Banti et al. (2009) conducted a review of the literature related to perinatal mood disorders and anxiety and noted that inadequate social support was almost the strongest predicator of PPD and had a strong-moderate effect size. The only predicator that was stronger was a history of depression in the prenatal or antenatal period.

Family support in the postpartum period is not a frequently studied area in relation to PPD, however support received from parents and extended family may protect women from PPD (Hung, 2007). Parental support and support from extended family as well as living in extended family households had the most significant buffering effects related to PPD in the early postpartum in a study of 100 Turkish women (Kuscu et al., 2008).

The role of social support and social networks in PPD was assessed with a multiethnic urban sample of 415 women and twenty variables were used related to emotional, appraisal, and instrumental support as well as size of social networks (Surkan, Peterson, Hughes, & Gottlieb, 2006). A 10 point increase in the social support survey score resulted in a 2.1 unit lower score on the Center for Epidemiologic Studies of Depression Scale (CES-D) (95% CI= -2.4, -1.7). In terms of size of a woman's social network, women with two or more family members or friends available postpartum resulted in a 13.6 point reduction in mean score on the CES-D (95% CI= −17.5, −9.6) as compared to women with zero or one available person. In addition, women who were from the non-dominant population, had a high school education or less, had unstable housing, and an income of <$20,000 had the highest rates of depression.

Partner support was also examined in the social support research in relation to PPD and is regarded from a social network perspective. Positive emotional support from a partner had been shown to buffer the negative effects of illness and stress (Dennis & Letourneau, 2007; Israel & Rounds, 1987; Satoh et al., 2009) as well as enhance the developmental success in children of postpartum depressed mothers (Letourneau, Duffett-Leger, & Salmani, 2009).

The assumption that partnered people have more social support than single people has been regarded as false. Tilden and Nelson state "an unhappy marriage tends to restrict access to other sources of social support because unmarried people often have large networks of supportive friends" (Tilden & Nelson, 1999). The assumption that partnered status conveys greater support has been questioned (Kruse, Low, & Seng, in press) given knowledge about the lack of equity in household work (Schwartz & Lindley, 2009) and the chronicity of domestic violence against married women (Williams, Ghandour, & Kub, 2008). The possibility that the quality of the partner relationship is poor resulting in negative social support may be considered a health liability.

Sense of Belonging

Sense of belonging is a concept that has received increasing attention in the mental health literature but, no attention in the PPD literature. Maslow (1954) recognized belonging as a basic human need and ranked it just above basic physiological and safety and security needs. Anant (1966), also acknowledged the importance of belonging in terms of mental well-being and stated that belonging was a key concept in unlocking mental health and illness issues and stated there was a "positive relationship between the sense of belonging and mental health" (Anant, 1966, p. 395). Sense of belonging had

been defined as "the experience of personal involvement in a system or environment so that persons feel themselves to be an integral part of that system or environment" (Hagerty et al., 1992, p. 172). "Fitting in" with other individuals, systems, and/or environments and feeling valued and are important concepts related to sense of belonging.

A positive linear relationship appears to exist between sense of belonging and attachment. Sense of belonging appeared to have been enhanced with a cognitive behavioral intervention for at risk for depression Navy recruits as these recruits in turn, increased their sense of secure attachment (Williams et al., 2004). Securely attached ethnic and sexual minority individuals were noted to have a strong sense of belonging (Ghavami et al., 2011) as well as "older" adults in New Zealand (Wiles et al., 2009).

Sense of belonging and loneliness appear to have an inverse relationship. When sense of belonging was high, loneliness was low (Hagerty et al., 1996; Williams et al., 2004; Williams et al., 2002). Loneliness also appeared to have a mediating role in the relationship between sense of belonging and depression in a path model by Hagerty and Williams (1999).

The relationship between sense of belonging and depression was researched by Hagerty and Williams (1999) who assessed 379 community college students and a depressed clinical sample. The strongest predictor of depression in their study populations was sense of belonging which explained 52% of the variance on depression. The relationship between sense of belonging and depression has been noted by others as well.

Lesbians (McLaren, 2006) and homosexual males (McLaren et al., 2007) with little sense of belonging experienced a greater incidence of depression when compared with their heterosexual counterparts. Sense of belonging as a buffer to depression was noted in Navy recruits with a family history of alcohol abuse (Sargent et al., 2002) as well as male farmers at risk for depression (McLaren & Challis, 2009).

Conflict and Violence

Conflict is defined as "perceived discord or stress in relationships caused by behaviors of others or the absence of behaviors of others, such as the withholding of help" (Tilden et al., 1990, p. 338). One extreme of form of conflict is intimate partner violence which has been defined as physical force or the intent of physical harm against someone by current or former husbands, unmarried male or female domestic partners, or other persons where an intimate relationship is shared (Golding, 1999; Koss et al., 1994; Straus, 1991).

"Since the goal of attachment behaviour is to maintain an affective bond, any situation that seems to be endangering the bond elicits action designed to preserve it; and the greater the danger of loss appears to be the more intense and varied are the actions elicited to prevent it" (Bowlby, 1980, p.42). An affective bond that is placed in jeopardy due to conflict in relationships generally results in actions that attempt to regain the attachment bond. A person's internal working model of attachment either secure or insecure will determine how a person reacts to conflict in relationships. Relationship growth resulting in greater intimacy may be a result of conflict however, for some individuals conflict will present as a great hazard to the attachment bond (Pietromonaco, Greenwood, & Barrett, 2006).

A moderate and negative linear relationship appeared to exist between conflict and sense of belonging (Hagerty et al., 1996; Sangon, 2004). Hagerty and Williams (1999) noted that conflict had the most direct effect on sense of belonging in a path model of depression. High relational conflict was also linked with sense of belonging in this same study.

Conflict and loneliness displayed a reciprocal relationship where elevated levels of conflict resulted in greater levels of loneliness (Gentzler et al., 2011). A sense of connectedness to people and communities may be restored in people with altered mental well-being when resolution of conflict occurred, which in turn decreased loneliness (Wiklund, 2008). A phenomenological study involving pregnant women revealed the theme that conflict in relationships was associated with feelings of lack of social support and isolation causing stress in these women (Mann, Abercrombie, DeJoseph, Norbeck, & Smith, 1999).

Dennis and Ross (2006) examined women's perceptions of relationship conflict in the development of PPD in 396 mothers at 1, 4, and 8 weeks postpartum and noted relationship conflict was significantly higher in women with depressive symptoms at 8 weeks when compared with women who were not depressed. In addition, mothers who experienced depressive symptoms were more apt to report having a partner who "made them angry, tried to change them, was critical of them, and made them work hard to avoid conflict" (Dennis & Ross, 2006, p. 593). Masmoudi et al. (2010), Page and Wilhelm (2007), and Savarimuthu et al. (2010) reported similar findings and noted that arguments with family members and partner relationship depth were significant predictors of postpartum symptoms. Higher relational conflict resulted in more

depressive symptoms in several studies that reported conflict was a predictor variable for depressive symptoms (Hagerty & Williams, 1999; Sangon, 2004; Williams et al., 2002).

Parenting Sense of Competence

Parenting sense of competence is the degree to which parents feel confident and self-efficacious in their role as a parent (Gilmore & Cuskelly, 2008; Mildon, Wade, & Matthews, 2008). High levels of parenting sense of competence are associated with responsive and nutritive behaviors that result in better maternal-child attachment (Ngai, Chan, & Ip, 2010). It is also postulated that increased parental sense of competence results in greater sense of belonging although there was not research noted that measured these concepts directly. There was research however that supported the notion that parenting sense of competence was associated with maternal-child well-being (Ngai & Chan, 2011; Eisengart et al., 2006) and that well-being had a moderate negative correlation with unmet belongingness need (Mellor, Stokes, Firth, Hayashi, & Cummin, 2008).

The Attachment Bond

Attachment is described as an everlasting emotional bond that exists between an infant and one or more caregivers (Main, 1996). Bowlby further conceptualizes attachment as "the propensity of human beings to make strong affectional bonds to particular others" (Warme et al., 1980, p. 367). Attachment theory also includes the notion that security, safety, and satisfaction compose the attachment relationship and termination of this relationship causes distress (Goldberg et al., 1995). Therefore, attachment may be viewed as a characteristic of a relationship between a caregiver and child where the child feels safe, protected, and secure whereas bonding may be viewed as

a process that occurs after birth where a mother has an affectionate attachment to her infant (Myers, 1984).

A positive linear relationship exists between attachment and loneliness. Individuals who had secure attachments experienced less loneliness than those individuals who had an insecure attachment (Gentzler et al., 2011; Kafetsios & Sideridis, 2006). It also appeared that lonely individuals experience greater feelings of nostalgia for important people in their lives and this nostalgia fortified social bonds (Wildschut, Sedikides, Routledge, Arndt, & Cordaro, 2010). Forced separation on incarcerated postpartum mothers disrupted the mother-infant bonding experience and resulted in the theme of "feeling empty and missing a part of me" (Chambers, 2009, p. 204).

Mother-infant bonding disorders occur in 29% of mothers who have been diagnosed with PPD (Brockington et al., 2001). Moehler et al. (2006) noted a strong association of decreased quality of maternal-infant bonding in women with PPD at 2 weeks, 6 weeks, and 4 months postpartum in a sample of 101 mother-infant pairs. In this same sample of women, even mild and unapparent symptoms of depression resulted in significant lower bonding development. Similar finding were reported by Wilkinson and Mulcahy (2010) who noted less secure attachment and more fearful and preoccupied attachment in women who were clinically depressed.

Loneliness

Loneliness is the "unpleasant experience that occurs when a person's network of social relations is deficient in some important way, either quantitatively or qualitatively" and occurs as an emotional response to a "discrepancy between desired and achieved levels of social contact" (Paloutzian & Ellison, 1982, p. 4-5).

The relationship between loneliness and depression has been well established over the years with research grounded in relational designs. Multiple phenomenological research studies revealed loneliness as a major theme in PPD. Women revealed in these studies feelings of loneliness and isolation with no one to talk to (Beck, 1992, Nahas & Amasheh, 1999a&b, Ugarriza, 2002).

Loneliness had been described as being associated with sense of belonging and depression however loneliness is a distinct concept (Hagerty et al., 1992). Depending on the populations assessed and measurement instruments used, loneliness had a range of correlations from .23 (Hagerty & Williams, 1999) to .52 (Russell, 1996) in a range of depression models. Young (1982) described the overlap between loneliness and depression by stating, "When individuals attribute deficiencies in their social relationship to unchangeable personal faults, they are more likely to feel both lonely and depressed" (p. 382).

Additional Depression Risks

The aforementioned variables all have an influence on depression however there are additional risk factors for depression worth noting. Women in general have higher rates of depression than men (10.2% versus 8.0%). In addition, 18-24 years olds have depression rates of 11.1% which is greater than any other childbearing age categories (25-34 years: 9.3% and 35-44 years: 8.7%) (CDC, 2010). Additional risk factors include: having an annual income of less than $15,000 (CDC, 2010), having a high school education or less (CDC, 2010), and living in high crime neighborhoods (Cutrona, Russell, & Brown, 2005; Galea et al., 2007; Latkin & Curry, 2003). These risk factors are important to note as research indicates that cumulative sociodemographic disadvantage

increases risk for poor mental health outcomes as opposed to any one risk factor alone (Sameroff & Rosenblum, 2006).

Materials and Methods

Design

The research design for the parent study was prospective and this secondary analysis study was prospective as well and considered the model variables in relationship to time. Data from "wave 1" (<28 weeks gestation), "wave 2" (28-35 weeks gestation), and "wave 3" (6 weeks postpartum) were analyzed in a predictive model using multiple regression, path analysis, structural equation modeling (SEM), and stratified approaches for Aims 1-4 respectively. A prospective design was choosen to "establish definitively the strength and direction of the relationship between two or more variables based on the findings from previous research" (Wood & Kerr, 2011, p. 128) and path analysis was used to "test causal models developed on the basis of theory" (Beck & Polit, 2004, p. 198). SEM is considered a powerful statistical method and is generally considered a more confirmatory rather than exploratory method which allows for the testing of causal models with consideration of multiple dependent variables. Measurement error is accounted for and removed from the relationship between the variables and allows for a more accurate test of the hypothesized model (Norris, 2012). SEM may also be used to test coefficients and model "fit" across multiple groups as well as determine path differences.

Sample

This study was part of a larger prospective longitudinal cohort study (Psychobiology of PTSD & Adverse Outcomes of Childbearing, NIH R01 NR008767).

The common name, "the STACY Project," is an acronym for "Stress, Trauma, Anxiety and the Childbearing Year". The STACY Project examined the effects of trauma exposure and PTSD on obstetric, neonatal, and maternal mental health and bonding in antenatal and postpartum women. The sample for this secondary analysis study included the 564 women who completed the postpartum wave of data collection. They had been recruited via prenatal care clinics in three health systems (one in a university town and two in an urban area) in the state of Michigan. All three health systems approved this research project through their respective institutional review boards. The STACY project timeline for recruitment was from August 2005 through May 2008. Eligible women were identified by the clinic nurses who conducted the new obstetric patient intake histories and were invited to participate in a study about "stressful things that happen to women, emotions, and pregnancy". Eligible research participants included women who were 28 weeks gestation or less, expecting their first born infant, could speak and understand English, and were at least 18 years of age. Detailed descriptions of recruitment and survey methods have been described elsewhere (Seng, Low, Sperlich, Ronis, & Liberzon, 2009, p. 840) and will be only are briefly summarized here as they apply to this secondary analysis.

Sample Size

Cohen's (1988) framework was utilized in the power analysis and confirmed by University of Michigan PhD statisticians and the Center for Statistical Consultation and Research to determine the sample size required to test the proposed model. Despite the fact that Hagerty and Williams' (1999) had mostly large R^2s in their model (sense of belonging $R^2=.52$, loneliness $R^2=.68$, and depression $R^2=.64$), a conservative approach

was used in the power analysis using a moderate effect size. The results of the power

analysis indicated 127 women were needed to detect a medium effect size for multiple

regression for 12 independent variables (including four variables that measure perceived

social support from family, friends, partner, and healthcare providers and three variables

that measure conflict in relationships: current domestic violence, history of family

violence, lifetime domestic violence) at an alpha level of .05 (Cohen, 1988; Hintze,

2008). Path analysis required a sample size of at least 10 participants for every variable in

the model according to guidelines proposed by Kline (1998). A sample size of at least

200 participants is recommended as a goal for SEM to ensure adequate statistical power

for data analysis as goodness of fit is overestimated with most fit indices for small sample

sizes of less than 200 (Kenny, 2011; Tomarken & Waller, 2005).

Procedure

Participants were invited to participate in the study from the obstetric nurse who

completed the initial intake questionnaire. Women who were interested and eligible for

the study (*n*=2,689) provided their contact information, were given a copy of the consent

form, and then contacted by a survey research organization who obtained informed

consent and completed the structured computer-assisted telephone interview (*n*=1,581)

(Seng et al., 2009). Parenting sense of competence, attachment and bonding, and PPD

were model variables that were measured directly in the parent study with established

measures for the concepts. The perceived social support variable was created from

established measures to measure family and healthcare provider support whereas support

received from friends and a partner were single items from the parent study. Finally, the

variables of sense of belonging, conflict, and loneliness were created as proxy variables

for this study with details outlined below. Data from "wave 1" (<28 weeks gestation), "wave 2" (28-35 weeks gestation), and "wave 3" (6 weeks postpartum) were analyzed and a description of the instruments and model variables are listed below.

Measures used in the Parent Study

Wave 1 Instruments

 Life Stressor Checklist (LSC). The life stressor checklist is a 30 item checklist of traumatic and stressful life events used to assess for events that would qualify as trauma exposures consistent with DSM-IV criteria such as abuse, miscarriage, abortion, domestic violence, and sexual assault. The event that had the greatest impact on the person was also assessed. Also, the instrument design was for use in women as many of the yes/no questions were tailored to ask about types of potentially traumatic events specific to women, such as miscarriage (Cusack, Falsetti, & de Arellano, 2002).

 National Women's Study PTSD Module (NWS-PTSD). The NWS-PTSD module measures all 17 symptoms of PTSD (current and lifetime PTSD) and was specifically designed as a structured telephone diagnostic interview for administration by lay personnel for the largest study of PTSD in women, the National Women's Study. Concurrent validity testing demonstrated Kappa coefficients of .71 for current and .77 for lifetime PTSD with sensitivities of .96 and .99 for current and lifetime PTSD respectively (Resnick, Kilpatrick, Dansky, Saunders, & Best, 1993).

 Perinatal Risk Assessment Monitoring System (PRAMS). The PRAMS is a perinatal surveillance system of the Centers for Disease Control and Prevention (CDC) and state health departments to monitor maternal/child health indicators such as health

risk behaviors before, during, and after pregnancy (CDC, 2011). The STACY Project's demographic data was collected using PRAMS items.

Symptom Checklist 90-R (SCL-90-R). The SCL 90-R is a 90 item checklist that is a screening tool used to measure psychological distress in individuals and contains nine dimensions including interpersonal sensitivity which was the dimension used in this research. The reliability of the instrument across the subscales included alpha coefficients ranging from .77 to .90 and test-retest reliability of r= .80 to r=.90 at 1 week (Derogatis, 1997). In the current study, the Cronbach alpha was .84.

Wave 2 Instruments

Experiences of Discrimination Scale (EDS). The EDS questionnaire is a nine item measure that assesses perceived discrimination related to gender, race/ethnicity, sexuality, and class. The researchers' noted that increased perceived daily and lifetime discrimination was associated with increased rates of major depression, anxiety, and distress. Face validity of the instrument was asserted because being "disadvantaged" in more than one category was associated with higher ratings of perceived daily discrimination. Predictive validity was based on association of higher EDS scores with poorer mental health outcomes in a dose-response pattern (Kessler, Mickelson, & Williams, 1999). In the current study, the Cronbach alpha was .83.

Family APGAR. The Family APGAR instrument is a five item measure that assesses family functioning by assessing individual family satisfaction with family relationships and assesses satisfaction with social support from network members. The five items measured family adaptability, partnership, growth, affection, and resolve. Reliability testing included Cronbach's alpha of .80 (Smilkstein, 1978) and .84 with scale

coefficients of .86 and .81 for self-filled and interviewer completed respectively (Bellon Saameno, Delgado Sanchez, Luna del Castillo, & Lardelli Claret, 1996). Validity testing included a correlation of .64 with clinician reports in a clinical sample and a .80 correlation with another family functioning instrument (Smilkstein, 1978). Cronbach's alpha of .87 was noted for this study.

Health Care Alliance Questionnaire (HCAQ). The HCAQ is a 16 item measure designed for use by women in relation to obstetric and gynecology as well as primary care settings to assess various aspects of the working relationship with the provider, such as satisfaction with care, trust in the provider, and sense of trust and ease during physically intimate aspects of care. Validity testing included face validity by a panel of experts as well as construct validity through factor analysis (Hiser, 2004). In the current study, the Cronbach alpha was .93.

Quality of Life Inventory (QOLI). The QOLI is an instrument that measures 17 domains of life that are considered important to the well-being and overall life satisfaction of an individual such as satisfaction with work, leisure time activities, love and family relationships, health, home, and neighborhood. Reliability testing included internal consistency coefficients of .77 to .89 in three clinical and nonclinical samples with test-retest coefficients from .80 to .91. Validity testing included comparing students and prisoner participants for divergent validity and comparing the QOLI with seven related measures of well-being for convergent validity (Frisch, Cornell, Villanueva, & Retzlaff, 1992). In the current study, the Cronbach alpha was .79.

Wave 3 Instruments

Parenting Sense of Competence Questionnaire-Modified (PSOC-M). This is an 11-item adapted form of the PSOC (Gibaud-Wallston & Wandersman, 2000). It was first modified (Mowbray, Bybee, Hollingsworth, Goodkind, & Oyserman, 2005) to decrease burden and reduce reading level. In the current study, the Cronbach alpha was .80.

Postpartum Bonding Questionnaire (PBQ). The PBQ is a 25 item screening questionnaire used to identify attachment disorder in mother-infant relationships including a range of problems from delayed attachment to severe rejection. The higher the PBQ score the greater the impaired bonding. The instrument had a sensitivity of .93 with a specificity of .85 (Brockington et al., 2001). In the current study, the Cronbach alpha was .82.

Postpartum Depression Screening Scale (PDSS). The PDSS is a 35 item screening tool that assesses "normal adjustment, significant symptoms of PPD, and a positive screen for major PPD" (Beck & Watson-Driscoll, 2006, p. 216). There are seven dimensions to the PDSS that were determined through confirmatory factor analysis to establish construct validity of the instrument. Further validation of the screening scale was conducted using the PDSS and the Structured Clinical Interview for DSM-IV to confirm major and minor depression. A cut-off score of 80 and above (sensitivity= 94%, specificity= 98%) indicates major depression whereas a cut-off score of 60-79 (sensitivity= 91%, specificity= 72%) indicates minor depression (Beck & Watson-Driscoll, 2006). Reliability testing in the current study included a Cronbach alpha of .95.

Variables Constructed to Operationalize Components of the Theory from the Measures used in the Parent Study

  Perceived social support. Perceived support from family, friendships, a partner, and healthcare providers were four variables used to operationalize perceived received social support from social network members. The Family APGAR instrument and the HCAQ are previously described and assess perceived support from family and healthcare providers respectively. Perceived social support from friends and a partner were measured using single items from the QOLI that asked, "How satisfied are you with the quality of your friendship relationships?" and "How satisfied are you with the quality of your love relationship?" (Frisch, Cornell, Villanueva, & Retzlaff, 1992).

  Sense of Belonging. The sense of belonging proxy variable was constructed using 13 select items from the NWS-PTSD, SCL-90-R, EDS, and QOLI and were selected based on the Hagerty definition of sense of belonging defined previously. These 13 items had an alpha reliability of .80 and were subjected to principal components analysis which resulted in a one factor solution. These 13 items were then taken to a group of experts for validity testing and the expert panel reduced the 13 items to 9. Again, reliability testing was performed with an alpha co-efficient of 0.78. Finally, nine items were taken to a final expert, who created the SOBI, and the nine items were reduced to three. These three items included "feeling others do not understand you or are unsympathetic", "you felt cut off from other people", and "feeling that people are unfriendly or dislike you" and had an alpha reliability of 0.61. The variable was created by standardizing all of the items and then adding them together.

Conflict. The "conflict in relationships" proxy was created using items from the LSC to operationalize three different conflict variables including childhood family violence before age 16 (six items), lifetime domestic violence (three items), and current domestic violence (six items). The childhood family violence items are related to physical neglect; witnessed violence between family members; and physical, emotional, and sexual abuse (sexual contact and penetration) whereas the current and lifetime domestic violence items are related to physical, emotional, and sexual abuse (sexual contact and penetration) and were answered in a yes/no format.

Loneliness. Loneliness was measured using a single item from the NWS-PTSD. "(In the past month) have you felt cut off from other people"? Feeling cut off from other people is asked at all three waves and the participant was asked if she had a history of ever feeling cut off from other people for a period of 1 month or more. T-tests were conducted on the "cut off" items over all of the time points with no significant differences noted among the groups in terms of feeling cut off. The cut-off time-point used in the model is in the postpartum period to follow the time sequence of the model.

Data Analysis

Data analysis was performed using the Statistical Package for the Social Sciences (SPSS) 17.0 with the following baseline analysis for the dependent variable and all independent variables: Basic descriptive statistics, frequency counts, assessment of missing data with imputation as appropriate, plots of the distribution, and total scale scores for all instruments. Internal consistency coefficients were calculated to determine reliability of each measure utilized in this analysis. Paired samples t-tests were utilized to examine any significant mean differences in participant response across time when

applicable as not all measures are assessed at all three waves. All analyses will show

actual p values, but for interpretation, $p < .05$ will be considered the threshold of

statistical significance. Additional data analysis was based on the aims of the study.

Aim 1: *determine baseline demographics of postpartum women including rates and*

degree of depressive symptoms as well as means and standard deviations for all model

variables. Rates and degree of depressive symptoms were determined by examining the

PDSS cut-off scores of participants and determining how many participants scored in the

not probable, mild, and severe depressive symptom categories. Means and standard

deviations were obtained for all model variables.

Aim 2: *test whether there were differences in mean total scale scores of model variables*

in relationship to sociodemographic (SDD) disadvantage (sum of being African

American, a teen, income ≤$15,000, and high school education or less) among those with

less SDD (zero or one risk factor) with those participants with more SDD risk (two or

more risk factors). A less and more SDD risk variable was created and t-tests conducted

on all of the model variables in relation to less and more SDD risk.

Aim 3: *test the relationships in the theoretical model for direct and indirect paths for*

depression. Amos^{TM} 19 was used to test a SEM to determine the best model to explain

the model variables. SEM is based on principles related to regression and path analysis

(Byrne, 2010) however, SEM allows one to test more complicated path models with

intervening variables connecting the independent and dependant variables (Ullman,

2007).

A correlation matrix was constructed to assess significant relationships among the

independent variables. Path analysis was conducted to test the presumed relationships

among variables in the proposed recursive model to assist in prediction of the direct and indirect effect one variable had on another (Klem, 1995; Tabachnick & Fidell, 2007). Each of the endogenous variables in the proposed model (sense of belonging, impaired bonding, loneliness, and depression) required one regression analysis to obtain the path coefficients.

The next step in the SEM analysis involved assessing for model "fit". There are many indices that may be used to assess for model "fit" with great discrepancy among researchers as to the best indices as well as what the cut-offs are (Hooper, Couglan, & Mullen, 2008) therefore only the mostly widely accepted indices and cut-offs were used to evaluate the proposed model. Model chi-square (χ^2) is an established method for evaluating overall model fit and measures error in the model. A good model fit results in an insignificant result at >0.05 (Ullman, 2007). Another fit indices is the root mean square error of approximation (RMSEA) which compares a "perfect" saturated model with lack of "fit" in a proposed model with a cut-off value of <.06 as suggested by Hu and Bentler (1999). The Normed Fit Index (NFI) is an index that compares the chi-square value of the proposed model with the chi-square of the null hypothesis model (which states that all variables are uncorrelated) with a recommended cut-off of ≥0.95 (Hooper, Couglan, & Mullen, 2008). Finally, the Comparative Fit Index (CFI) is a modification of the NFI and is one of the indices least affected by sample size and utilizes a noncentral chi-square distribution with a value of ≥0.95 as the threshold (Hu & Bentler, 1999).

Direct effects in the path model are displayed by the regression coefficients whereas to estimate the magnitude of the indirect effects of one variable on another, each indirect pathway was considered. The coefficients for each indirect pathway were

multiplied and then added together to determine a total indirect effect. The mediator

variables in the proposed model were verified by determining if the path coefficients

contributed causal influence along the indirect route. The total effect of a variable was

determined by the sum total of the direct and indirect effects. Unexplained variance in the

path model was explained by the residual path coefficient which was calculated as $\sqrt{1-R^2}$

(Klem, 1995). Amos^{TM} calculated these estimates and using the bootstrap method

determined the standard error, confidence intervals, and *p*-values of the paths.

<u>Aim 4:</u> *assess the extent to which the theoretical model may perform differently among*

women at high risk for depression due to sociodemographic disadvantage. Stratified

testing using the multi-group moderation test in Amos^{TM} was conducted to determine

whether the model "fits" equally well for postpartum women who had low or more

sociodemographic disadvantage and was performed by running two models. The first

model was an unconstrained model where separate parameter estimates were used for

each group whereas the second model was a constrained model where equality

constraints were placed on each path. A chi-square for each model was obtained and a

difference test performed to determine if the model "fits" differently between the SDD

groups of women (Hox & Bechger, 1998).

A Stats Tool Package (Gaskin, 2012) using group difference calculated the path

differences of the two groups by taking into consideration the critical ratio for differences

table which contained the z-score for the differences of the parameters in the model

compared against both groups as well as the estimated regression weights for both

groups.

<center>**Results**</center>

The results from this study are discussed in relation of the study aims.

<u>Aim 1:</u> *determine baseline demographics of postpartum women including rates and degree of depressive symptoms as well as means and standard deviations for all model variables.* The demographics of the program participants (*n*=564) will be discussed with consideration of the dependent variable, PPD (Table 3.1).

Of these 564 women, 202 (35.8%) had PDSS cut off scores of 60 or above indicating mild and or major depression and 121(21.5%) had PDSS cut off scores of 80 or above indicating major depression. Women who identified their race/cultural affiliation as "other" had the highest rates of major depressive symptoms followed by African American women, and European Americans whereas Hawaiians, Asians, American Indians, and African Americans had the highest rates of minor depressive symptoms however all of these groups minus European Americans are not large enough to obtain significance in the Chi-square model.

Teens (ages 18-20) also encountered minor PPD symptoms greater than that of the entire group (40.4% versus 35.8%) as well as women with an income <$15,000, an education of high school or less, and had an urban or high crime residence. Major PPD symptoms were greater for women with an income <$15,000, an education of high school or less, and had an urban or high crime residence. Participants in this study had age ranges from 18-47 years with a mean age of 27.1 (*SD*=5.4) which was similar to the mean age of women with major and minor PPD symptoms. Sociodemographic disadvantage (SDD) was a sum of being African American, pregnant as a teen, with low income, high school education or less, and seeking prenatal care in a central city clinic as a proxy for

<center>105</center>

urban or high crime residence. SDD was further dichotomized into "less SDD risk" which included zero or one SDD risk factor and "more SDD risk" which included two or more SDD risk factors. Participants with more SDD risk experienced symptoms of minor and major depressive symptoms greater than that of the overall group.

Table 3.2 displays means with confidence intervals and standard deviations for all model variables. In terms of the independent variables most women had higher than the neutral category for social support , sense of belonging, and parenting sense of competence and had less than the neutral category for impaired bonding and conflict.

Table 3.1

Demographics by Postpartum Depressive Symptoms: Chi-Square Test for Independence in Postpartum Women (N=564)

Characteristic	No PPD n (%) 241 (42.7)	Cut of score of 60- Minor PPD n (%) 202 (35.8)	Cut of score of 80- Major PPD n (%) 121 (21.5)	Total N (%) 564 (100)	$\chi^2(2)$	p
Race/Ethnicity[a]						
African Americans (n=170)	62 (36.5)	67 (39.4)	41 (24.1)	170 (30.1)	3.92	.141
Am Indian/Alaska Native (n=7)	3 (42.9)	3 (42.9)	1 (14.2)	7 (1.2)	.27	.875
Asians (n=46)	16 (34.8)	22 (47.8)	8 (17.4)	46 (8.2)	3.14	.208
European Americans (n= 324)	155 (47.8)	102 (31.5)	67 (20.7)	324 (57.4)	8.86	.012
Hawaiian/ Pacific Islander (n=3)	1 (33.3)	2 (66.7)	0 (0)	3 (0.5)	1.51	.470
Latinas (n=31)	17 (54.8)	10 (32.3)	4 (12.9)	31 (5.5)	4.58	.333
Middle Eastern (n=19)	5 (26.3)	8 (42.1)	6 (31.6)	19 (3.4)	5.94	.204
Other race/ethnicity (n=23)	8 (34.8)	9 (39.1)	6 (26.1)	23 (4.1)	.67	.716
Teens (18-20) (n=89)	39 (43.8)	36 (40.4)	14 (15.8)	89 (15.8)	2.28	.320
Income <$15,000 (n=85)	31 (36.5)	32 (37.6)	22 (25.9)	85 (15.1)	1.93	.382
High School or less (n=183)	74 (40.4)	68 (37.2)	41 (22.4)	183 (32.4)	.58	.747
Urban or High Crime Residence (n=187)	66 (35.3)	76 (40.6)	45 (24.1)	187 (33.2)	6.33	.042
More SDD Risk	70 (36.3)	76 (39.4)	47 (24.3)	193 (34.2)	5.06	.080
Mean number of SDDs (*SD*)	1.1 (1.6)	1.4 (1.7)	1.3 (1.7)	1.3 (1.7)		.491
Mean age (*SD*)	27.3 (5.4)	26.9 (5.7)	27.1 (5.1)	27.1 (5.4)		.455

Note.[a]Some demographics do not total to the full sample size of 564 due to small numbers of participants declining the question or due to women giving more than one race/ethnic identity. *SD*=Standard Deviation, SDD= Sociodemographic disadvantage, which is a sum of being African American, a teen, with low income, and a high school education or less, and More SDD Risk= Two or more SDD risk factors.

Table 3.2

Descriptive Statistics and Distributions of the Model Variables in Postpartum Women (N=564)

Variable	*M*	95% CI	*SD*	Theoretical Range	Observed Range
Perceived Social Support					
Family APGAR	22.0	21.6-22.3	3.6	5-25	5-25
Friendships	4.6	4.6-4.7	0.6	1-5	2-5
Partner Quality	3.6	3.6-3.7	0.6	1-5	1-5
Healthcare Alliance	60.9	60.3-61.5	6.5	16-80	34-79
Sense of Belonging					
Feeling cut off from other people (for 1 month or more)	Yes=24.1% (n=136)	No=75.9% (n=428)		0-1	0-1
Feeling others do not understand you or are unsympathetic	3.2	3.1-3.3	1.1	0-4	0-4
Feeling that people are unfriendly or dislike you	3.8	3.7-3.9	0.7	0-4	0-4
Conflict					
History of Family Violence (before age 16)	0.5	0.4-0.6	0.9	0-6	0-6
Lifetime Domestic Violence	1.1	0.9-1.2	1.7	0-3	0-3
Current Domestic Violence	0.1	0.0-0.1	0.2	0-6	0-2
Parenting Sense of Competence	53.3	53.0-53.5	2.9	11-55	35-55
Impaired Bonding	17.4	16.7-18.1	7.9	0-115	8-55
Loneliness (wave 3)	Yes=13.8% (n=78)	No=86.2% (n=486)	1	0-1	0 and 1
PPD	64.1	62.3-65.8	19.4	35-175	35-146

Note. CI=confidence interval.

Missing data emerged for a few reasons. Some participants did not answer items such as race/ethnicity. There were also 85 pregnant women who gave birth early and had missing data in wave 2 in relation to the abuse related items including physical abuse, sexual abuse contact, and sexual abuse penetration because labor had already occurred. This affected the "current domestic violence" and "lifetime domestic violence" items. Data were imputed for the abuse items and the decision tree for imputation of missing data may be found in Table 3.3. The women who were "early birthers" did, however,

complete items that were not time-critical, including the quality of life measure, health

care alliance questionnaire, and items included in the sense of belonging variable.

Table 3.3

Decision tree for imputing missing data

There are 5 total time points for ***abuse*** related questions:

If a participant has 4/5 time points (80%) than .8 rounds up to 1.

1. If a participant has 3/5 time points (60%) than .6 rounds up to 1.
2. If a participant has 2/5 time points (40%) than .4 rounds down to zero
   HOWEVER:
       a. if a woman has indicated abuse in wave1, she will receive a 1.
       b. if a woman has indicated abuse in wave3, she will receive a 1.
3. If a participant has 1/5 time points (20%) than .2 rounds down to zero.

    *1=yes abuse
    *0=no abuse

Several of the interval-level variables in this analysis (the perceived social support

items, sense of belonging variable, and parenting sense of competence) were left skewed

whereas the conflict items, impaired bonding variable, loneliness variable, and PDSS

score were more right skewed. Regression residuals of all dependent variables, however,

were normally distributed, as required to meet the assumptions for regression modeling

(Lewis-Beck 1980).

Aim 2 involved conducting t-tests to determine if there were differences in mean

scores related to all model variables for participants in terms of less and more SDD

(Table 3.4).

In terms of the hypotheses for this aim, all but two variables (perceived social

support from friends and loneliness) were statistically significant at the $p<0.05$ level

meaning the mean score difference for each of these variables were statistically significant for less versus more SDD. Additionally, the hypotheses were supported in the expected direction with the exception of parenting sense of competence and impaired bonding. It was expected that parenting sense of competence would be lower for women with more SDD and impaired bonding would be greater for more SDD women as compared to less SDD women however these propositions were false. In terms of the Cohen's *d* effect size, it appeared that perceived social support from family and healthcare practitioners, lifetime domestic violence, parenting sense of competence, and PPD had small effect sizes; perceived social support from a partner and sense of belonging had moderate effect sizes; and current domestic violence, childhood family violence, and impaired bonding had close to medium effect sizes.

The SEM path model (Figure 3.3) displays the paths in the proposed model with the path coefficients and R^2 results displayed using AMOS™ 19 and meets the requirements for Aim 3.

Table 3.4

Differences Between More SDD and Less SDD in Postpartum Women (N=564)

Variable	More SDD		Less SDD		df	t	p	Cohen's d	r
	M	*SD*	*M*	*SD*					
Social Support									
Family APGAR	21.34	4.52	22.38	2.91	276.92	2.90	0.00	0.27	0.14
Friends	4.60	0.70	4.67	0.55	319.34	1.34	0.18	0.11	0.06
Partner	4.47	0.95	4.85	0.50	248.44	5.18	0.00	0.50	0.24
Healthcare Alliance	59.74	7.40	61.94	5.99	562	3.83	0.00	0.33	0.16
Sense of Belonging	-0.54	2.62	0.72	1.56	264.32	6.12	0.00	0.58	0.28
Conflict									
Current Domestic Violence	0.13	0.41	0.00	0.05	195.19	-4.44	0.00	0.45	0.22
Childhood family violence	1.08	1.44	0.51	0.93	277.12	-5.04	0.00	0.47	0.23
Lifetime Domestic Violence	0.31	0.62	0.20	0.56	356.95	-2.01	0.05	0.19	0.09
Parenting Sense of Competence	53.7	3.10	53.00	3.00	372.24	-2.74	0.01	0.23	0.11
Impaired Bonding	15.06	6.16	18.66	8.33	497.42	5.81	0.00	0.49	0.24
Loneliness	0.15	0.35	0.13	0.34	562	-0.34	0.74	0.06	0.03
Depression	67.07	19.50	63.49	20.00	562	-2.04	0.04	0.18	0.09

Note. SDD=sociodemographic disadvantage

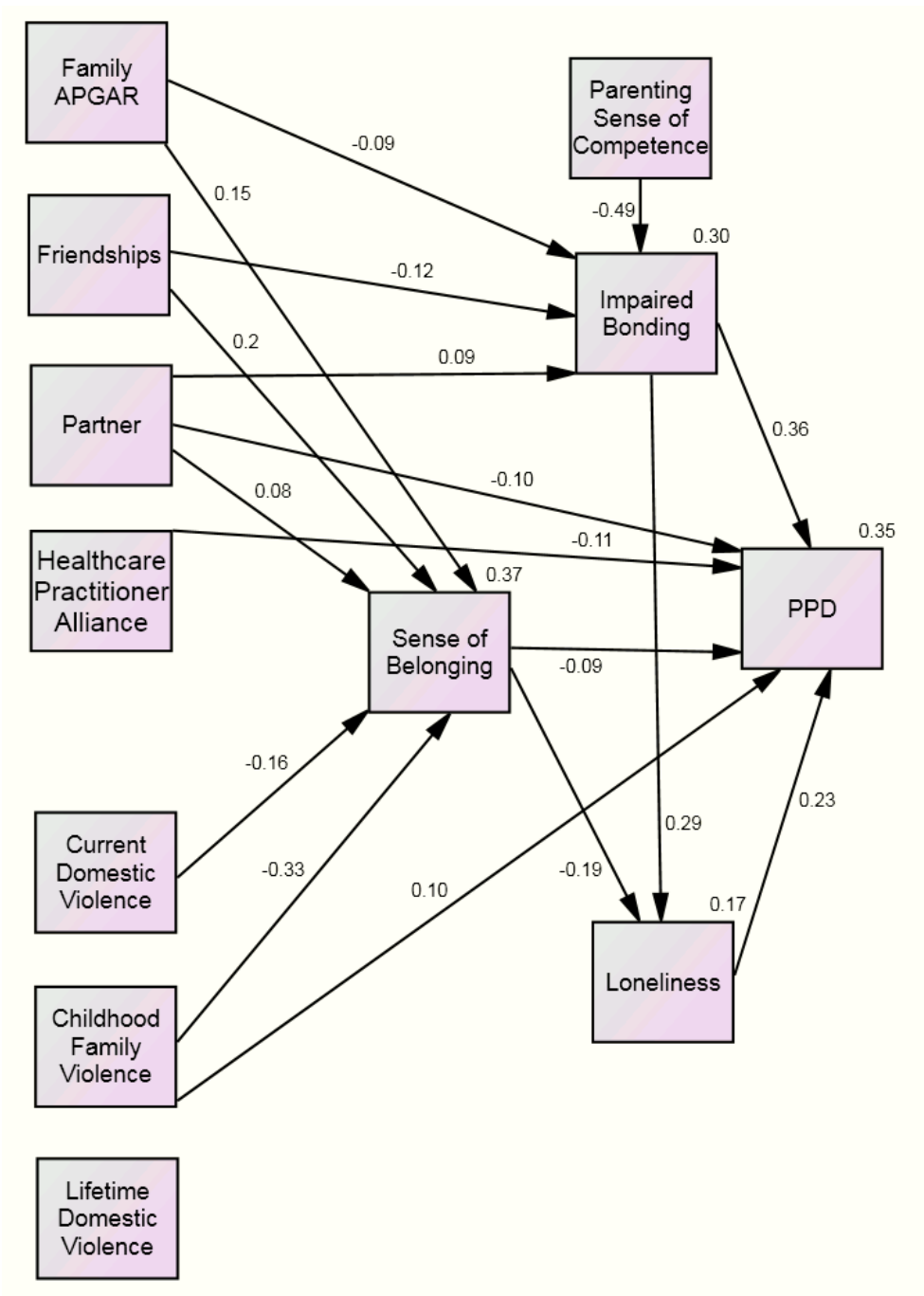*Figure 3.3.* The adapted theoretical model of PPD. Observed variables are represented by squares. Correlations of the endogenous variables were removed.

Each endogenous variable in the model required one regression analysis to obtain the

path coefficients. R^2 values which are located near the upper right hand corner of each

variable box indicate that 35% of the variance in PDD may be explained by the model

variables with impaired bonding and loneliness explaining the most variance. Sense of belonging as an endogenous variable had 37% of the variance explained by the model with family violence and perceived social support from friends explaining the most variance (regression estimates of -0.33 and 0.20 respectively). Thirty percent of the variance in impaired bonding was explained by the model with parenting sense of competence explaining the most variance with a regression estimate of -0.49. Finally, 17% of the variance in loneliness was explained by the model. Impaired bonding contributed more to loneliness (regression estimate of 0.29) than sense of belonging (regression estimate of -0.19). Childhood family violence had the greatest impact on sense of belonging and also significantly impacted PPD. Also more social support from a partner resulted in more impaired bonding (regression estimate of 0.09). Model fit statistics include the following: χ^2=10.52, df=14, p=0.72; RMSEA=0.000; NFI=0.99; and CFI=1.00.

Aim 3 also included the calculation of the SEM path coefficients. Table 3.5 includes the standardized direct and indirect path coefficients as well as standard errors. There were 27 direct paths tested in the model with 10 paths that were not significant. The paths that were insignificant in the model included the paths from: lifetime IPV to sense of belonging; sense of belonging to impaired bonding; current IPV to impaired bonding; all of the conflict items to loneliness; current IPV, social support from friends, social support from family, and lifetime IPV to depression.

Table 3.5

SEM Effects of the Causal Variables on the Endogenous Variables in Postpartum Women (N=564)

	Endogenous Variables							
	Sense of Belonging		Impaired Bonding		Loneliness		PDSS	
Causal Variables	Std.	SE	Std.	SE	Std.	SE	Std.	SE
Family Violence								
Direct Effect	-0.33***	0.04	-	-	0.06	0.04	0.11**	0.03
Indirect Effect	-	-	0.02	0.01	0.07***	0.01	0.06***	0.01
Total Effect	-0.33***	0.04	0.02	0.01	0.13**	0.05	0.17***	0.04
Lifetime IPV								
Direct Effect	-0.06	0.04	-	-	0.02	0.04	-0.02	0.03
Indirect Effect	-	-	-	-	0.01	0.01	0.02	0.01
Total Effect	-0.06	0.04	-	-	0.03	0.05	0.00	0.04
Current IPV								
Direct Effect	-0.16***	0.04	-0.05	0.04	0.05	0.04	-0.04	0.04
Indirect Effect	-		0.01		0.02		0.01	
Total Effect	-0.16***	0.04	-0.04	0.04	0.07	0.04	-0.03	0.04
Friends								
Direct Effect	0.19***	0.04	-0.12**	0.03	-	-	-0.01	0.03
Indirect Effect	-	-	-0.01	0.01	-0.08***	0.02	-0.08**	0.01
Total Effect	0.19***	0.04	-0.13**	0.04	-0.08***	0.02	-0.09*	0.04
Family								
Direct Effect	0.15***	0.04	-0.09*	0.03	-	-	-0.01	0.03
Indirect Effect	-	-	-0.01	0.01	-0.06***	0.02	-0.06***	0.01
Total Effect	0.15***	0.04	-0.10**	0.04	-0.06***	0.02	-0.07*	0.04
Partner								
Direct Effect	0.08*	0.03	0.09**	0.04	-	-	-0.10**	0.03
Indirect Effect	-	-	-	-	0.01	0.01	0.03*	0.01
Total Effect	0.08*	0.03	0.09**	0.04	0.01	0.01	-0.07*	0.04

Notes: Std.=Standardized; SE=Standard Error
*p<.10; **p<.01; ***p<.001

	Endogenous Variables							
	Sense of Belonging		Impaired Bonding		Loneliness		PDSS	
Causal Variables	Std.	SE	Std.	SE	Std.	SE	Std.	SE
Parenting SOC								
Direct Effect	-	-	-0.49**	0.03	-	-	-	-
Indirect Effect	-	-	-	-	-0.14***	0.02	-0.21***	0.02
Total Effect	-	-	-0.49**	0.03	-0.14***	0.02	-0.21***	0.02
Sense of Belonging								
Direct Effect	-	-	-0.05	0.04	-0.19***	0.04	-0.08*	0.04
Indirect Effect	-	-	-	-	-0.01	0.01	-0.07***	0.01
Total Effect	-	-	-0.05	0.04	-0.20***	0.05	-0.15**	0.05
Impaired Bonding								
Direct Effect	-	-	-	-	0.29***	0.04	0.36***	0.02
Indirect Effect	-	-	-	-	-	-	0.07***	0.01
Total Effect	-	-	-	-	0.29***	0.04	0.43***	0.03
Healthcare Alliance								
Direct Effect	-	-	-	-	-	-	-0.11***	0.04
Indirect Effect	-	-	-	-	-	-	-	-
Total Effect	-	-	-	-	-	-	-0.11***	0.04
Loneliness								
Direct Effect	-	-	-	-	-	-	0.23***	0.04
Indirect Effect	-	-	-	-	-	-	-	-
Total Effect	-	-	-	-	-	-	0.23***	0.04

Notes: Std.=Standardized; SE=Standard Error; SOC=sense of competence
*$p<.10$; **$p<.01$; ***$p<.001$

Aim 4 included analysis of the hypothesized model (Figure 3.1) using SEM multi-group moderation with both less and more SDD women. The hypothesized model examined the predictors of depression in these postpartum women with perceived social support, sense of belonging, conflict, impaired bonding, and loneliness having a direct effect on depression. Observed variables are represented by squares with lines connecting variables indicating a hypothesized direct effect.

The unconstrained model indicated a relatively good model fit as evidence by: $\chi^2=25.89$, *df*=22, *p*=0.26; RMSEA=0.02; NFI=0.98; and CFI=0.99. The next step was to

constrain the path model so differences in SDD could be examined and resulted in

χ^2=111.05, *df*=49, *p*<0.001; RMSEA=0.05; NFI=0.92; and CFI=0.95. The difference of

the two models resulted in a χ^2=85.16, *df*=27, *p*<0.001 which indicated that the model

explains depression differently in less versus more SDD women.

      To fulfill the final requirements of Aim 4, path estimates were compared to

determine if the various paths in the model were different for less versus more SDD

women (see Table 3.6). A Stats Tool Package (Gaskin, 2012) using group differences

was utilized for the calculations of the path differences.

Table 3.6

Path Estimates with Z-scores for Path Differences Between Less and More SDD Women
(N=564)

			Less SDD (*n*=371)		More SDD (*n*=193)		
			Estimate	*p*	Estimate	*p*	z-score
Sense of Belonging	<---	Lifetime IPV	-0.376	0.008	-0.071	0.824	0.870
Sense of Belonging	<---	Family APGAR	0.086	0.001	0.085	0.016	-0.012
Sense of Belonging	<---	Partner	0.043	0.773	0.217	0.180	0.796
Sense of Belonging	<---	Friends	0.630	0.000	0.733	0.001	0.393
Sense of Belonging	<---	Childhood family violence	-0.390	0.000	-0.695	<0.001	-2.029**
Sense of Belonging	<---	Current IPV	-2.302	0.095	-0.995	0.020	0.906
Impaired Bonding	<---	Partner	0.514	0.467	0.549	0.224	0.042
Impaired Bonding	<---	Family APGAR	-0.491	0.000	-0.087	0.380	2.549**
Impaired Bonding	<---	Friends	-0.970	0.134	-1.734	0.006	-0.843
Impaired Bonding	<---	Sense of Belonging	-0.492	0.036	-0.195	0.284	1.002

			Less SDD (n=371)		More SDD (n=193)		
			Estimate	p	Estimate	p	z-score
Impaired Bonding	<---	Current IPV	-1.565	0.809	0.295	0.780	0.283
Impaired Bonding	<---	Parenting SOC	-1.541	0.000	-0.518	<0.001	5.639***
Loneliness	<---	Sense of Belonging	-0.044	0.000	-0.022	0.040	1.448
Loneliness	<---	Lifetime IPV	0.062	0.059	-0.097	0.047	-2.704***
Loneliness	<---	Childhood family violence	-0.004	0.825	0.046	0.022	1.776*
Loneliness	<---	Current IPV	-0.521	0.100	0.155	0.019	2.088**
Loneliness	<---	Impaired Bonding	0.012	0.000	0.014	<0.001	0.468
PDSS	<---	Loneliness	15.089	0.000	9.836	0.011	-1.139
PDSS	<---	Partner	-3.887	0.018	-0.846	0.538	1.418
PDSS	<---	Current IPV	21.715	0.159	-4.321	0.237	-1.644
PDSS	<---	Friends	2.616	0.095	-4.667	0.016	-2.915***
PDSS	<---	Family APGAR	0.075	0.807	-0.079	0.794	-0.357
PDSS	<---	Lifetime IPV	-0.968	0.545	-1.217	0.652	-0.079
PDSS	<---	Childhood family violence	1.867	0.066	1.469	0.182	-0.265
PDSS	<---	Impaired Bonding	1.069	0.000	0.583	0.007	-2.025**
PDSS	<---	Sense of Belonging	-0.759	0.198	-0.545	0.368	0.253
PDSS	<---	Healthcare Alliance	-0.312	0.021	-0.386	0.026	-0.333

Notes: *** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10, IPV=intimate partner violence, Parenting SOC=parenting sense of competence

There are several significant differences noted between less and more SDD women in terms of path coefficients. The paths between childhood family violence and

sense of belonging and all of the conflict variables (current IPV, childhood family violence, and lifetime domestic violence) and loneliness had a greater effect on women with more SDD as opposed to less SDD. In addition, the path from social support from friends to PPD had a path difference that was greater for more versus less SDD women. The impact of impaired bonding on PPD, perceived social support from family on impaired bonding, and parenting sense of competence on impaired bonding was greater for women with less SDD when compared to women with more SDD.

Discussion

This study was designed to understand the impact of relational variables on depression. The key findings are outlined below and are discussed in relation to the study aims and hypotheses. Study limitations and strengths as well as future directions are also discussed.

The first hypothesis in relation to Aim 1 was accepted as the rate of PPD for this group of women (35.8% for minor and major depressive symptoms) was higher than that of the national average (12.5%). This rate of PPD is not surprising as 34.2% of the participants were at more SDD risk which places these women at greater risk for depressive symptoms. In addition, 42.8% of the study participants included women from the non-dominant culture who are at a greater risk for depression when compared to women from the dominant culture (CDC, 2010). Also, the sample of women was selected (in the parent study) because of a positive history of trauma (two-thirds of sample) and positive history for PTSD (one-third of sample) therefore, it is expected that this would place these women at high risk for PPD, which was advantageous for this theory testing study.

The next hypotheses are related to Aim 2 to determine if there were differences in mean scores related to all model variables in relation to SDD. Again, all but two variables (perceived social support from friends and loneliness) were statistically significant at the $p<0.05$. The rather surprising results were two variables that were significant but in the unexpected direction. It was expected that parenting sense of competence would be lower for women with more SDD. This yielded a significant result, however the mean for more SDD women was 53.7 and for less SDD women was 53.0. It is uncertain that a 0.7 mean

difference allows one to draw any major conclusions from this result however, maybe more SDD women have had to take on parental responsibilities at a young age especially if these women grew up in a low income, one-parent family where they were responsible for younger siblings or cousins. If more SDD women have more experience with children they may also have more realistic expectation regarding the motherhood role whereas low SDD women may idealize the motherhood role and if their reality does not meet their expectation, their parenting sense of competence may be low. The additional surprising result was of more SDD women having less impaired bonding than less SDD women (effect size almost moderate). Since women who had more SDD reported less perceived social support and more conflict in relationships (current, family history, and lifetime) it could be that these woman bonded with their babies because this was the most stable and predictable relationship they had. Since these women had more conflict and less perceived social support, they may have been more resilient to the stresses from stressful situations including the stressors noted with the role transition to motherhood.

The hypothesis specific to Aim 3 was only partially accepted as it was hypothesized that the variables that would have the greatest influence on PDD would be impaired bonding, sense of belonging, and loneliness and sense of belonging did not have as great as an impact as expected. There are a few reasons why this may be. First, the sense of belonging variable was a proxy and was not measured using the original instrument developed by Hagerty and Patusky (1995) however, the measure utilized was examined by an expert panel including Dr. Hagerty. Additionally, the reliability of this measure was only 0.61. Therefore, sense of belonging was captured however not as comprehensively as by Hagerty and Patusky. Despite this, sense of belonging reached

statistical significance at the 0.05 level. A post hoc analysis was performed to determine if two highly insignificant paths to depression (perceived social support from friends and family) were deleted from the model as it was hypothesized that these variables may be "stealing variance" from sense of belonging. The deletion of these two direct paths to depression resulted in the significance of sense of belonging increasing the p-value to 0.035 however the standardized beta weight did not increase drastically (from -0.85 to -0.88). It is important to note that if the total effects of sense of belonging are considered, this variable is relatively strong and ranks fifth in terms of its influence on PPD.

The next hypotheses are additional hypotheses related to Aim 3. There were 27 direct paths tested in the model with 10 paths that were not significant. The significant paths to sense of belonging were not surprising as there is research that supports these paths (Hagerty & Williams, 1999; McLaren et al., 2007; Sargent et al., 2002) and it also was not surprising that lifetime domestic violence did not impact sense of belonging as the examined research supports conflict in relationships (present) affecting sense of belonging as opposed to conflict in the past.

The next paths examined were the paths that led to impaired bonding. Perceived social support from family, friends, and a partner impacted the mother-infant dyad in terms of bonding however, the variable that had the greatest impact on impaired bonding was parenting sense of competence with a regression weight of -0.49. This is especially useful information as healthcare practitioners could easily assess for sense of competence prenatally and build competence to prevent impaired bonding in the postpartum. Two paths to impaired bonding that were not significant were sense of belonging and current IPV. The insignificant relationship between sense of belonging and bonding is

121

noteworthy because whether or not the new mother feels "valued" or "fits" with family, friends, and community does not have an impact on the relationship the mother has with her new infant. In terms of the path from conflict to impaired bonding research supports this path (Bowlby, 1980; Pietromonaco, Greenwood, & Barrett, 2006) however bonding is an intimate relationship between a mother and infant and therefore, in this group of women, current domestic violence does not appear to destroy or even influence the mother-infant bond.

All three of the conflict variable paths to loneliness were not significant. At first this was surprising as some research supports that conflict is related to loneliness (Gentzler et al., 2011; Hagerty & Williams, 1999) however, it appeared that what mattered was the woman's sense of belonging and her relationship with her baby (bonding). The standardized weights for these significant variables are -.19 and .29 respectively. There is also an indirect effect that impaired bonding has on depression that appears to go through loneliness to depression.

The final paths that were examined included the paths to PPD. All of the paths noted in the model are supported in the literature as having an effect on PPD however this path model demonstrated that perceived social support from friends and family had no direct impact on depression. It is important to state that both of these variables significantly affect PPD however this occurred along an indirect path. There were two perceived social support paths that had a direct effect on depression and included the quality of the love relationship (partner quality) path and the healthcare alliance path. There certainly was research that supported the notion that partner support (or lack of) affects PPD (described above) however the surprising direct path result was the strength

of the standardize regression estimate for healthcare alliance (-.11) as this variable was the third strongest predictor variable to PPD. This result should be as obvious as a neon sign to healthcare practitioners that their relationship with their patients matters and to the extent that postpartum women who share an alliance with their practitioner, have less depressive symptoms. This finding that a positive alliance with maternal care providers was protective against PPD has a parallel in the research. According to Seng et al. (in press) and Fisher (1994), a positive perception of the care received in labor also has a protective effect on postpartum mental health. The other two variables that were insignificant for PPD were current and lifetime IPV. The research supports these two paths as noted above however it appeared the conflict items had moderate Pearson's correlations with each other which were statistically significant (childhood family violence and lifetime IPV $r=0.5$; childhood family violence and current IPV $r=0.3$; and lifetime IPV and current IPV $r=0.4$). Therefore, these items competed with one another in the model and a variable such as current IPV had only 3.9% (n=22) of the women who reported current IPV which may not be a significant sample size to draw conclusion one way or the other whereas childhood family violence had the greatest variance (Table 3.2).

A path that was significant but not in the expected direction was the path from perceived partner support to impaired bonding. It was expected that more support from a partner would result in less impaired bonding however, the reverse was true with a path coefficient of .09 meaning the more perceived support from a partner, the more bonding was impaired. Women who had a strong partner relationship may have received positive emotional and appraisal support from their partner but did not share a strong connection

with their infant as these women may have had more fussy and discontent babies or are inexperienced with the realities of motherhood.

There are a few additional significant relationships that are important to highlight. In terms of variables that impact sense of belonging, the variable with the strongest relationship to sense of belonging is childhood family violence with a standardized regression weight of -.33. Therefore, in order in enhance sense of belonging, healthcare practitioners will need to explore ways to enhance a woman feeling "valued" and "fitting in" as it pertains to the childhood maltreatment the woman experienced in the past. Issues related to childhood family violence are important to address in pregnancy as it appears to impact loneliness (indirectly) and depression postpartum (directly). In fact, the total effect of childhood family violence on PPD was .17 and this variable had the fourth largest total impact on PPD.

Another significant relationship to note was that parenting sense of competence in the postpartum was the greatest predicator variable of impaired bonding and had almost five times the impact on impaired bonding compared to perceived support from family, friends, and a partner. This finding is noteworthy as healthcare practitioners may assess for parenting sense of competence in pregnancy and enhance those women with low perceived competence skills through informational and emotional support strategies (e.g. parenting education classes). Parenting sense of competence is important to enhance in women who perceive low competence skills as the path to impaired bonding has a standardized beta weight of -.49 and the path from parenting sense of competence to PPD .21 (indirect effect through bonding).

Other significant findings of this study were that loneliness in the postpartum period had a direct effect on PPD as well as impaired bonding. It is important to highlight that loneliness was measured after the birth of the baby and a possible explanation for the relationship between loneliness and PPD is that the mother may feel "cut off" from her "normal" routine and prior way of life. Impaired bonding had the greatest impact on PPD of all of the independent variables with a standardized regression weight of .36 for the direct effect. Impaired bonding also indirectly affected PPD through loneliness for a total effect of .43. Again, if healthcare practitioners assess for parenting sense of competence in pregnancy, this could stop the domino effect that leads to PPD.

There are a few other relationships worth mentioning in terms of the path differences in the model based on SDD and relate to Aim 4. There were several paths that had a greater impact for more SDD women as opposed to less SDD women. The childhood family violence to sense of belonging path had statistically different results for less versus more SDD where more SDD women were impacted more by childhood family violence in terms of their sense of belonging. More SDD women are disadvantaged in terms of age (teen), low income, high school education or less, African American, and living in a high crime area which may allow these women to feel less valued and that they do not "fit" in terms of their relationships with family, friends, and the community especially if they have a history of family violence. Additionally, more SDD women may have to focus more on survival and safety related issues and have less time and energy available for affiliation. Also, it is possible that the work they do is more alienating and/or underappreciated. All of the conflict paths to loneliness had a greater effect on women with more SDD as opposed to less SDD women and these results were

not surprising since more SDD women reported more conflict in relationships as compared to women with less SDD (Table 3.3). A surprising result for women with more SDD was the fact that the partner relationship did not have a significant impact on the dependent variables of impaired bonding, sense of belonging, and PPD and therefore did not impact the model at all. Initially it was believed that these women did not rely on a partner and instead social support from friends was what impacted impaired bonding, sense of belonging, and PPD however, a post hoc analysis revealed that 88.3% of more SDD women had no partner whereas 87.6% of less SDD women had a partner. Finally, the path from perceived social support from friends to PPD was different for more SDD women as opposed to less SDD women. Again, more SDD women in this study appeared to rely on friends more than a partner or even family and this perceived support from friendships (or lack of) was what had a direct impact on depression. It is also important to mention that the path from healthcare practitioner alliance to PPD affected both groups however for more SDD women the influence was 40% greater.

The paths that had more of an impact on less SDD women as opposed to more SDD women including the path from perceived social support from family to impaired bonding as this path was not even significant for women with more SDD. Therefore, less SDD mother-infant dyads benefitted from the social support received from family which resulted in less impaired bonding. The path from parenting sense of competence to bonding was a significant path for both groups of women however, women in the less SDD group had higher standardized coefficients when compared to more SDD women. Impaired bonding scores had a greater impact on PPD for less SDD women as compared

126

to more SDD women but again, for both groups the paths were significant however the path coefficients were larger for less SDD women.

The overall message that is important to note regarding women with more SDD is that the trajectory of violence for these women continues from their own birth until pregnancy as 11% of these women experience current IPV as compared to women with low SDD who essentially do not experience IPV at all (1 out of 371 women). In addition, many women with more SDD do not have partners which may be a healthy situation if these women severed an abusive relationship (Kruse, Low, and Seng, in press) which means they need to rely on others to meet their social support needs. The data from this analysis indicate that the primary support people that directly affect PPD for more SEE women include friends and the obstetric healthcare practitioner.

There are several limitations to this study. The findings from this study may not be generalizable to multigravid women, women who are not pregnant, and men. In addition, because this was a secondary analysis of data, there were several proxy variables that were created. This is not to say that these proxies were not reliable or valid, however, the variables of sense of belonging and loneliness in particular may have been more "true" to the concept had an established, reliable measure been used. That being said, feeling "cut off" is related to the DSM-IV criteria for PTSD of feeling detached from others and it was hypothesized that this description might be a more accurate reflection of a woman's situation immediately after birth. A woman may have family and friends visiting immediately after the birth of the infant and may receive social support from these individuals as well as a partner however, this new mother may feel cut-off

from her "normal" way of life and routines. Therefore, feeling "cut-off" as opposed to loneliness may be a more accurate descriptor of a woman's feelings postpartum.

Despite these limitations, there were some major strengths of this research. The proposed model provides evidence that 35% of the variance in depressive symptoms may be explained by the independent variables and that impaired bonding and loneliness explain the most variance with estimates of 0.36 and 0.23 respectively. The fact that impaired bonding was a predicator of depression is noteworthy as most researchers have examined depression as a predicator of impaired bonding. Therefore, the novel result is that impaired bonding might be a cause of PPD rather than an effect as the SEM provides strong evidence that the model data fit the model. Despite the fact that sense of belonging was not a major predicator of depression, does not mean that this variable does not impact depression as sense of belonging also influences depression almost equally through loneliness. Another major strength of this research was that social support was examined according to "type of helper". This was important because it was very clear in the analysis what type of helper had the most influence on each of the variables. A final strength of this research was that the study was longitudinal therefore the data for the model variables on the left side of the model were collected before the data on the right. Therefore, a more "cause" and "effect" relationship was tested.

Finally, another major strength of this research is that it has the potential to impact practice. For example, interpersonal psychotherapy (IPT) is one of the major psychotherapeutic treatments used for women with PPD with a focus on the four treatment areas of grief and loss, role transitions, interpersonal sensitivity, and interpersonal disputes (Weissman, Markowitz, & Klerman, 2007). Solving interpersonal

disputes is fairly superficial and does not get to the root of the problem related to women with a history of IPV and childhood maltreatment who are also dealing with PPD. Therefore, IPV would be enhanced for women with PPD with the proposed relational model if it had a more trauma informed theory as a basis.

Conclusion

The proposed model for PDD gives insight into the major influencing variables of PDD some of which are novel (sense of belonging and impaired bonding). Therefore, a future research direction would include examining these variables, with established reliable and valid instruments, to solidify the theory that sense of belonging and impaired bonding truly impact PPD. The results of this research give healthcare practitioners insight into the key variables for PPD and which allows for assessment during pregnancy to influence outcome of depression in the postpartum.

CHAPTER 4

OVERVIEW OF COMMONALITIES AND DIFFERENCES IN THE TWO

STUDIES

The results of the Navy recruit and STACY depression studies are detailed in the previous two chapters however this chapter is meant to provide an overview of the commonalities and differences noted in each of the studies as well as directions for future research.

The Navy recruit and STACY study frameworks were intentionally designed to be similar however, because the populations of women were different and the study design was a secondary data analysis, the models were represented slightly differently as the some of the variables were measured differently. The major premise that is common to both studies is that the studies included women of childbearing age who were involved in situations known to be stressful (basic training and new motherhood). A major theoretical difference in the STACY study versus the Navy recruit study is that the mother-infant dyad is at the core.

Diagrammatically, the models have almost all of the same variables included however, both are represented slightly differently. The Navy recruit study included the variable of adult attachment (secure and insecure) however, in the STACY study, attachment was examined in terms of mother-infant attachment and "bonding" was the concept actually measured. Bonding was specifically chosen as a variable to measure in the STACY study as it was conceptualized to affect PPD. In fact, in a first semester PhD course NUR 801 (a Faculty Directed Study in the Development of Nursing Science course) a model for depression was designed to include the relationship between bonding and PPD (Figure 4.1).
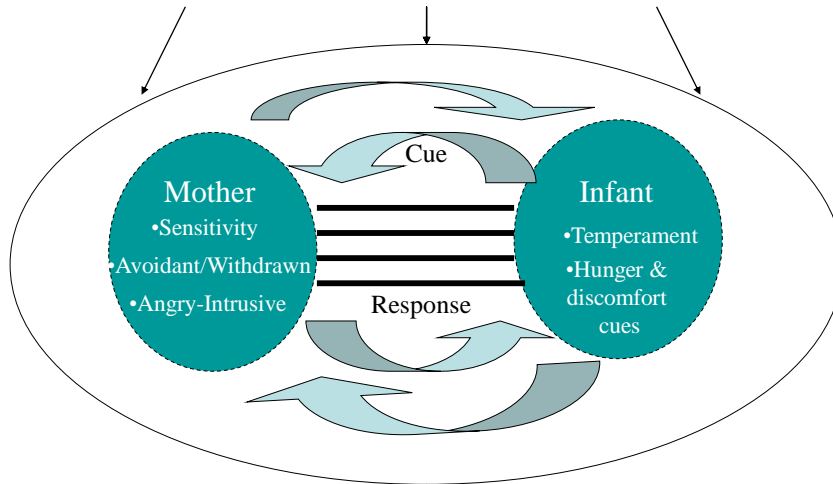
Social Support (safety net for mother & infant)

Figure 4.1. Maternal infant attachment in the presence of PPD among first time mothers and full-term normal infants. Infant signal with maternal response. Strength of bond is represented by black horizontal lines.

Adult attachment in the Navy recruit model was not represented as having a direct effect

on depressive symptoms as this was not strongly noted in the research.

In terms of the social support variables for the models, the Navy recruit model

used a well-established instrument developed by Tilden, the IRI, whereas for the STACY

study, proxy variables were created. The strength of the IRI was that all four components

of House's conceptualization of perceived social support were included in this one

variable. The downfall of this approach is that it was not known what specific type of

social support was a strength or deficient for these women in terms of the model. The

sample size of women for this study was only n=114 therefore, it was already pushing the

limits of SEM so it was decided to leave social support as originally represented by

Tilden as opposed to creating subscales. The strength of creating the proxy variable of

perceived social support for the STACY study, with a larger sample size of women (n=564), meant that perceived social support could be conceptualized according to type of helper. Therefore, perceived social support from family, friends, a partner, and healthcare practitioner was obtained and in the analysis, perceived social support was clearly delineated by "type of helper".

Sense of belonging, in the Navy recruit study, was represented as conceptualized by Hagerty and Patusky however a proxy variable was created for the STACY study. There were three sense of belonging variables originally created for the STACY study. The first variable contained 13 items and reliability testing included an alpha coefficient of 0.81. These 13 items were then taken to a group of experts for validity testing and the expert panel reduced the 13 items to nine. Again, reliability testing was performed with an alpha co-efficient of 0.78. Finally, nine items were taken to a final expert, who created the SOBI, and the nine items were reduced to three. These three items had an alpha reliability of 0.61 which would not be considered unusual for a three item instrument.

Conflict was represented differently in each study as well. The Navy recruit study used the IRI conflict scale by Tilden whereas proxy variables were created as previously described for the STACY study. Lifetime domestic violence was a variable that could have been left out of the model because it did not explain anything despite what the research indicated.

Parenting sense of competence is a variable that was in the STACY study that obviously was not included in the Navy recruit study. The rationale for including the Parenting Sense of Competence Questionnaire was that it seemed likely that this variable would influence mother infant bonding and it was data was collected by Dr. Seng in her

original study. The regression estimate was -0.49 for PSC on bonding with 30.3% of the variance explained by the predicator variables.

Loneliness was another variable in the models and for the NAVY recruit study the RULS was utilized and a proxy variable for the STACY study was created. This proxy variable was dichotomous and asked the women in wave three if they felt "cut off". It was hypothesized that impaired bonding would create for the woman an experience of feeling "cut off" from the infant and thus impact depression.

The final variable measured in the models was depression and both studies used highly reliable and valid instrument to measure depressive symptoms. The Navy recruit study included the BDI by A. T. Beck and in the STACY study the PDSS by C. T. Beck was used. The obvious difference in these measures is that the later instrument measured depressive symptoms specific to women in the postpartum period.

Analytically, there were several similarities and differences noted with the model results. In terms of explained variance, 52% and 35% of the variance in depressive symptoms was explained by the Navy recruit and STACY study respectively which is quite impressive. It was theorized though that if the STACY study used established reliable and valid measures (i.g. SOBI, RULS) versus the proxy variables that the amount of explained variance would increase.

There were many path similarities and differences noted in the two models. The paths from perceived social support to sense of belonging were significant in both models however, the path from perceived social support to depression, differences were noted. In the Navy recruit study, social support did not have a direct effect on depression yet indirectly influenced depression through loneliness. In the STACY study, two of the four

social support paths to depression were significant including the perceived social support from a partner and healthcare practitioner paths. Therefore, having a social support variable with the various components separated (as in the STACY study), allowed for the identification of where social support limitations and strengths were. Social support also had a significant direct effect on loneliness in the Navy recruit model whereas the STACY study focused on loneliness in the mother-infant dyad.

In terms of the endogenous variables in the model, sense of belonging had a significant path to depression in both models. Since this variable was not measured as intended, in future studies, the actual measure would be utilized with the expectation that the SOBI would outperform the three item proxy. Items that appeared to predict sense of belonging included secure and insecure attachment in the Navy recruit study, all the social support items tested in both models, and conflict (current IPV and childhood family violence). Conflict in the Navy recruit study was not a significant path nor was lifetime IPV in the STACY study.

Loneliness was the variable that had the greatest regression estimate for its effect on depression in the Navy recruit study and had the second greatest impact on PPD in the STACY study. The variables that had significant effects on loneliness in the two models included social support in the Navy recruit study, sense of belonging in both studies, and impaired bonding in the STACY study. The unusual finding was that conflict did not have an impact at all on loneliness in either study. The rationale for this perhaps relates to the notion that conflict and social support are at opposite ends of the spectrum and as previously modeled, "the bright side" of social support may outweigh the "the dark side"

135

of conflict. Therefore, perceived social support from others may serve as a buffer to loneliness.

The final endogenous variable common to both models includes depression. There were four direct paths to depression in the Navy recruit study and 10 direct paths to PPD in the STACY study. As previously stated, perceived social support did not have a direct path to depression in the Navy recruit study and only perceived support from a partner and healthcare practitioner were significant paths in the STACY study. Again, conflict did not have a direct path to depression in either study with the exception of childhood family violence in the STACY study. All other paths to depression were significant in each study.

A final note about the models relates to model "fit". In the Navy recruit study the "fit" statistics included: χ^2=16.02, *df*=5, *p*<0.01; RMSEA=0.14; NFI=0.98; CFI=0.98 indicating rather mixed results. This is not to say that the model should be completely rejected as it is so underpowered that it is hard to say that this model is not true. Future studies would include a larger sample size of women to adequately test the model as well as testing the model on both men and women Navy recruits. The STACY study on the other hand, had an adequate sample size with a χ^2=10.52, *df*=14, *p*=0.72; RMSEA=0.00; NFI=0.99; CFI=1.00 indicating an excellent model fit. Future studies related to this work would include testing the model using established, reliable and valid instruments instead of using proxy variables. In addition, the theory could be extended to be tested on multigravid women as well as fathers as PPD certainly effects these populations.

Significance

136

Mental health issues have been recognized since Hippocrates and the beginning of recorded history however, it was not until the late 1800's until depression was distinguished as a distinct condition and researched as such. Depression appears to be a complex and multifaceted condition (Bhatia & Bhatia, 1999) in which it is theoretically possible that psychological and psychosocial interventions may prevent or decrease symptoms (Mallikarjun & Oyebode, 2005).

The proposed theoretical models for depression in female Navy recruits and postpartum women explored additional predictors for this important health issue with the possibilities that these predictors may be responsive to intervention. Sense of belonging and loneliness were the strongest predicators of depression in Navy recruits with perceived social support having an indirect effect. Impaired postpartum bonding, loneliness, and poor healthcare alliance were the major predicators of depression in the STACY study. The study results provide evidence of the impact of these major predictors on depression which may be assessed for upon entry into the Navy and in the prenatal period for pregnant women and contributes to the science of women's mental health.

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