THE MEANING OF MISCARRIAGE: MEASUREMENT, REPRODUCTIVE
FACTORS AND TRAJECTORIES IN COUPLE DYADS

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ABSTRACT

CAROLYN SUSAN HUFFMAN: The Meaning Of Miscarriage: Measurement, Reproductive
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(Under the direction of Kristen M. Swanson, PHD, RN, FAAN)

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outcomes of coping. Lazarus and Folkman's (1984) stress and coping theory provides a

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In the first analysis, the Impact of Miscarriage Scale (Swanson, 1999) was refactored

resulting in the RIMS, a 3-factor, 16-item measure with sufficient reliability in both men

and women. Factors identified were *Isolation/guilt (I/G)*, *Devastating event (D/E)*, and *Loss

of baby (LB)*. The instrument demonstrated good test-retest reliability over the course of a

year and moderate correlations with grief and depression.

In the second analysis, reproductive and contextual factors were evaluated for their

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miscarriage history. However, as a couple, these gender differences were no longer apparent.

The third analysis used multi-level modeling with Bayesian inference to address whether *I/G*, *DE*, and *LB* were time variant phenomena and whether theory driven interventions affected *I/G*, *DE,* and *LB* in men and women.   There was a small decline over time in *I/G*, *DE*, and *LB* in women. There were no treatment effects on any of the subscales scores.   However, in women who were the most devastated or isolated/guilty, one nurse caring visit with self-directed sessions at home, experienced a significant decrease in *I/G* and *DE* compared to control.

This study's finding suggest the need for further research to capture the partner's experience more fully and the need to understand how the meaning of miscarriage relates to positive and negative trajectories not only individually but also within couple dyads.

To my family, Phil, Cameron, and Carly. I could not have done this without you. I love you all.

your willingness to work with me as I have attempted to enter the Bayesian world. I am not sure I would have gotten through this without your calm demeanor and encouragement to keep going even though at times I wanted to throw in the towel. Mary, thank you for giving me a firm foundation in statistics on which to build. I also appreciate your willingness to serve on my committee and your thoughtful critiques of my work. You have pushed me …thank you. Kristen, words cannot express my gratitude for taking me on as one of your students. Your guidance, knowledge, and belief in my work and me has been the key to my successful completion. I look forward to many years of collaboration as colleagues and friends.

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LIST OF ABBREVIATIONS

ANOVA   Analysis of Variance

BDI   Beck Depression Inventory

CES-D   Centers for Epidemiological Studies-Depression Scale

CFA   Confirmatory Factor Analysis

CMHP   Couple Miscarriage Healing Project

D&C   Dilatation & Curettage

DE   Devastating Event

EFA   Exploratory Factor Analysis

I/G   Isolation/Guilt

IMS   Impact of Miscarriage Scale

KMO   Kaiser-Meyer-Olkin

LB   Loss of Baby

MLE   Maximum Likelihood Estimation

MCMC   Markov Chain Monte Carlo

MC   Medical Consultation

MGI   Miscarriage Grief Inventory

MLM   Multilevel Modeling

MMM   Meaning of Miscarriage Model

MPC   Medical Consultation Plus Psychological Counseling

NHST   Null Hypothesis Significance Tests

PAF   Principal Axis Factoring

PBGS   The Perinatal Bereavement Grief Scale

PGS   The Perinatal Grief Scale

PCA   Principal Component Analysis

Pp   Posterior Probabilities

PS   Personal Significance

RIMS   Revised Impact of Miscarriage Scale

RMSEA   Root Mean Square of Error of Approximation

RPL   Repeated Pregnancy Loss

SEM   Structural Equation Modeling

TLI   Tucker Lewis Index

CHAPTER 1: THE IMPACT OF MISCARRIAGE

Background

Miscarriage is an emotionally difficult time for women and can have a major impact on their mental health (Bergner, Beyer, Klapp, & Rauchfuss, 2008; Blackmore et al., 2011; Brier, 2008; Klier, Geller, & Neugebauer, 2000; Lok & Neugebauer, 2007; Lok, Yip, Lee, Sahota, & Chung, 2010). The risk of miscarriage ranges from 7%-15% in women less than 30 to as high as 34-52% in women over the age of 40 (Hassold & Chiu, 1985; Maroulis, 1991; Stein, 1985; Warburton, Kline, Stein, & Strobino, 1986 as cited in Speroff & Fritz, 2005). Thus, miscarriage is a common experience, but one that is often dealt with privately (Adolfsson, Larsson, Wijma, & Bertero, 2004).   When miscarriage takes place within a couple relationship, both members are affected (Abboud & Liamputtong, 2003; Beutel, Willner, Deckhardt, Von Rad, & Weiner, 1996; Puddifoot & Johnson, 1997) as well as the relationship (Beutel et al, 1996; Serrano & Lima, 2006; Swanson, Karmali, Powell, & Pulvermakher, 2003). Stress and coping theory (e.g., Lazarus, 1999; Lazarus & Folkman, 1984) postulates that the personal meaning/significance of an event, such as miscarriage, is predictive of how one adapts. Assessment of this meaning may be useful in identifying those who may have more difficulty in dealing with miscarriage. Accurate identification of women and their partners for whom miscarriage may be especially

difficult is important to the development, provision, and evaluation of services intended to diminish any negative impact miscarriage may have on the health of women, their partners, and future pregnancies.

The Impact of Miscarriage Scale (IMS) (Swanson, 1999a) is one measure designed to capture the significance and meaning of miscarriage in women. It was used in men for the first time in the Couples Miscarriage Healing Project (Swanson, Chen, Graham, Wojnar, & Petras, 2009). This chapter provides a framework for understanding how miscarriage impacts the lives of women and their partners and the potential for studying this impact using the IMS. Included in this chapter is the current literature related to the psychological impact of miscarriage, gender differences, risk factors for psychological morbidity, measures to quantify emotional reaction to perinatal loss, and an overview of stress and coping theory as it relates to miscarriage (i.e., Lazarus & Folkman, 1984; Lazarus, 1999). Each of these bodies of literature lay the foundation for evaluating the Impact of Miscarriage Scale (Swanson, 1999a) and its potential in providing a greater understanding of the miscarriage experience.

For this review, miscarriage is considered to be the spontaneous loss of a pregnancy prior to 22 weeks; however, many studies do not make this distinction and may include any perinatal losses at later gestational age (stillbirth) along with miscarriages. In the ensuing literature review, studies which included both miscarriage and stillbirth, will be referred to more generically as perinatal or pregnancy loss.

Psychological and Relational Impact of Miscarriage

Pregnancy is a time of transition for both the expectant mother and partner (Klaus & Kennell, 1976; Lederman & Weis; 2009; Sandelowski, Black, Mercer, Bergum, & Stainton, 1994). Both expectant parents begin to imagine and fantasize about the child, their parenting,

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and begin the attachment process to their unborn child, although gender differences may exist to the extent and timing of this process (Brandon, Pitts, Denton, Stringer, & Evans, 2009). Loss of a pregnancy interrupts this psychological transition from individual to parent (Gerber-Epstein, Leichtentritt, & Benyamini, 2009). It has been suggested that miscarriage is particularly difficult due to the ambiguous nature of the loss and our culture's lack of accepted rituals in dealing with the loss (Bennett, Litz, Lee, & Maguen, 2005; Kevin, 2011; Letherby, 1993). For many women, the loss is not of a pregnancy but of a child, motherhood, and dreams of the future with the child (Adolfsson et al., 2004; Côté-Arsenault & Dombeck, 2001; Gerber-Epstein, et al., 2009; Swanson, 1999b; Wojnar, Swanson, & Adolfsson, 2011). Entwined within the loss of a fantasized child may also be the perceived loss of social status in pronatalist cultures or failure, if miscarriage is perceived as a failure of one's desired or culturally sanctioned gender role (Kersting & Wagner, 2012; Layne, 1990; Letherby, 1993; Reinharz, 1988).

Miscarriage may also represent the first time expectant parents are faced with realization that life is not always controllable— and in the case of physiological processes-- contradicts Western culture's belief in the omnipotent power of medicine over the body (Layne, 2003). Grief accompanying miscarriage may be a relatively new phenomenon (Layne, 1990; Letherby, 1993). Prior to the mid 20th century, reliable methods of birth control were not available. Pregnancy was not necessarily a planned event, but an inevitable and sometimes a stressful reality as couples were faced with additional mouths to feed and bodies to cloth. Due to higher infant and maternal mortality, attachment to an unborn child may have also been muted. The rise of modern medicine and the belief that the body could now be controlled made the planning of pregnancy possible and infant and maternal mortality a rare and seemingly impossible event. In addition, with the advent of birth control, the transition to parenthood may start as early as the

conscious and deliberate decision to get pregnant and stop practicing birth control. Consequently, miscarriage has become for many in western culture an unwanted and unexpected event that forces one to confront the realities of mortality and limited control over their childbearing goals (Cecil, 1994).

Miscarriage can represent a variety of losses and meanings not only for the woman but for her partner as well. For some, pregnancy loss is just that…pregnancy loss, not associated with the loss of an actual child (Puddifoot & Johnson, 1997; Swanson-Kaufman, 1983). Women may feel down for a few weeks, but not all women are overwhelmed by the experience (Conway & Russell, 2000; Letherby, 1993; Wong, Crawford, Gask, & Grinyer, 2003). Miscarriage can also be seen as an opportunity for growth (Letherby, 1993; Swanson, Connor, Jolley, Pettinato, & Wang, 2007; Wojnar, Swanson, & Aldofsson, 2011). This growth may be experienced as a pride in self for getting through a tragedy and realizing heretofore-unknown strength. However, for many, miscarriage is experienced as a deeply emotional event and for some may have long-term consequences.

Emotional Symptomatology

Grief. Grief in response to miscarriage and other forms of perinatal loss has been recognized as a true phenomenon for many decades (Peppers & Knapp 1980). The symptoms of grief following miscarriage are similar to those experienced by the other losses (i.e. intrusive thoughts, yearning, sadness, crying). The trajectory of grief has been shown to decrease significantly over time (Swanson, et al., 2009; Janssen, Cuisinier, de Graaw, & Hoogduin, 1997; Nikcevic, Tunkel, Kuczmierczyk, & Nicolaides, 1999); however, it may be prolonged in some women (Brier, 2008; Cumming et al., 2007; Klier, Geller, & Ritsher, 2002; Lok et al., 2010). Kersting and Wagner (2012) postulate that the self-blame and guilt often associated with

pregnancy loss may lead to a complicated grief, described as "…more disruptive, pervasive, and long-lasting..." (p. 188). The prevalence of complicated grief in women who have experienced miscarriage or other pregnancy losses is difficult to know, since there are no formal diagnostic criteria for complicated grief in the current *Diagnostic Manual and Statistical Manual of Mental Disorders* (American Psychiatric Association, 2013).

Anxiety. Anxiety has been found to be pronounced after miscarriage (Cumming et al., 2007; Nikcevic et al. 1999) and may appear in subsequent pregnancies (Bergner et al., 2008; Côté-Arsenault, 2007; Côté-Arsenault, Bidlack, & Humm, 2001; Geller, Klier, & Neugebauer, 2001). Cumming et al. (2007) found that 28.3% of their sample demonstrated anxiety levels at or above the clinical threshold for caseness (Hospital Anxiety and Depression Scale ≥ 11) in the immediate weeks after miscarriage compared to age-matched normative data (15% caseness). Although anxiety levels were lower at 6 and 13 months, the mean level remained above the clinical threshold at 13 months. Bergner et al. (2008) found state and pregnancy related anxiety were elevated in women following a miscarriage compared to pregnant women with no history of miscarriage.

Depression. High levels of depression have been documented in the weeks after miscarriage with a significant decline over the course of a year (Beutel, Deckardt, von Rad, & Weiner, 1995; Cumming et al, 2007; Lok, et. al. 2010; Swanson, 1999a, Swanson, et al., 2009). In a longitudinal study of 280 women with a history of miscarriage and 150 nonpregnant controls, 26.8% of the women who miscarried had elevated depression scores (≥ 12 on the Beck Depression Inventory [BDI])(Beck, Steer, & Garbin, 1988) in the immediate period after miscarriage (Lok et al., 2010). This was significantly higher than the comparison group in which only 8.7% had elevated depression scores. At 12 months, 9.3% were depressed, which was not

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significantly different from controls. However, those who had scored highest on the BDI (range

12-23) at time of miscarriage were significantly more likely to be elevated at one-year compared

to those with initial low scores (range 3-8). Compared to a community cohort, Neugebauer et al.

(1997) found that women who had experienced a miscarriage were more than twice as likely to

suffer either a new or recurrent major depressive episode within the following six months.

Other Responses

Guilt often accompanies the grief felt by many women after miscarriage. Guilt has been

attributed to multiple causes, including self-blame for the miscarriage because of either

something the woman feels she did to bring about the miscarriage, perceived past transgressions

(i.e., abortion; Aldofsson et al., 2004), or having experienced negative feelings toward the

pregnancy prior to loss (e.g., not wanted; Brier, 1999: Letherby, 1993).   Some men have

validated this guilt by blaming their partner for the miscarriage (Puddifoot & Johnson, 1997).

For example, in a qualitative study, Puddifoot and Johnson (1997) interviewed 20 men in the

United Kingdom and found that several blamed their partner's actions (e.g., not getting enough

rest) for the miscarriage. Nikcevic et al. (1999) found that self-blame (author derived scale) at 4

months post-loss was significantly less in women who had received a medical diagnosis for the

loss compared to those who did not.

Those suffering a miscarriage often feel isolated. When the social structure around the

individual does not assign the same meaning to the loss as the one who had the miscarriage, the

individual is left to struggle with the loss alone.   Some women have expressed frustration when

others frame the miscarriage within the context of pregnancy loss and consequently devoid of the

meanings they have assigned to the pregnancy (Kevin, 2011; Letherby, 1993). For women who

have miscarried, lack of perceived support by the partner, friends, and/or healthcare providers is

a common experience (Adolfsson et al., 2004; Bennett, et al., 2005; Letherby, 1993; Puddifoot & Johnson, 1997; Wong, Crawford, Gask, & Grinyer, 2003). Social support in grief has been linked to better adaptation (Toedter, Lasker, & Janssen, 2001).

Men's Response

Few studies have addressed the effect of miscarriage on men or partners. Men have often been "marginalized" in pregnancy (Jordan, 1990) and feelings of marginalization have been expressed in miscarriage as well (Johnson & Puddifoot, 1996; Khan, Drudy, Sheehan, Harrison, & Geary, 2004; Murphy, 1998; Puddifoot & Johnson, 1997). Like women, men have reported shock and disbelief early in the experience and later a sense of loss, frustration, guilt, and isolation (Murphy, 1998; Puddifoot & Johnson, 1997). Studies in male partners have shown heightened grief, anxiety and/or depression, albeit significantly less than their partners (Beutel, Willner, Deckardt, Von Rad, & Weiner, 1996; Cumming et al., 2007; Swanson et al., 2009). Johnson and Baker (2004) followed 332 male partners of pregnant women through the course of pregnancy (baseline) and subsequent outcome (miscarriage or birth). Sixty-eight men reported that their partner suffered a miscarriage. At miscarriage, when compared to their baseline score, men showed a significant increase in depression (BDI) and stress as measured by the Impact of Event Scale (Horowitz, Wilner, & Alvarez, 1979). Although men whose wives gave birth, also demonstrated increased depression scores at birth, their scores were not as high as those whose wives miscarried. One year later, men whose partners had miscarried remained significantly more depressed than those whose partners had given birth. Anxiety levels did not differ between the two groups at pregnancy outcome or one year later.

Men also appear to resolve their grief and depression more quickly than women (Cumming et al., 2007). Some have suggested that men are more likely to suppress grief in their

need to conform to accepted male attributes and to provide support for their female partner (Doka & Martin, 2011; Letherby, 1993; Murphy, 1998). It should be noted, however, that lesbian partners have voiced the need to suppress grief in an effort to support their partner who had miscarried (Wojnar, 2007). Men have also expressed the need to be acknowledged as fellow sufferers in the loss (Puddifoot & Johnson, 1997). In addition, men have reported feeling helpless in dealing with their partner (Murphy, 1998), more uncomfortable talking about their feelings or expressing less need to "talk" than their partners (Beutel et al., 1995; Murphy, 1998; Puddifoot & Johnson, 1997), and feeling that their job was to suppress their own suffering to support their partner (Murphy, 1998; Puddifoot & Johnson, 1997). Stroebe and Schut (2010) postulate that perceived differences in grieving between men and women may not be due to the amount of grief experienced, but men being more focused on "restoration oriented" coping versus "loss oriented" coping more typical of women. Doka and Martin (2010) argue that grieving styles should be seen as a continuum with some being more cognitive in their response ("instrumental grievers") and others being more emotive ("intuitive grievers"). They speculate the former style may be more common in men. The idea of restoration oriented grieving was supported by Beutel et al. (1996) with two-thirds of men in their sample ($n = 56$) reporting engagement in other activities in an effort to distract themselves from their grief.

Relationship

Although some women may report feeling closer to their partner after the miscarriage (Letherby, 1993; Swanson, et al., 2003; Wojnar, et al., 2011), some complain that their partners do not want to talk about the miscarriage, especially in the months following the loss (Beutel et al., 1996). Other women feel their expereince is different than their partner's (Cecil, 1994). Stinson, Lasker, Lohmann, and Toedter (1992) found that when compared to men, women felt

more loneliness and this persisted up to one-year post-loss. Swanson et al. (2007) found that 60% of women, who were actively grieving one-year post loss, felt "more distant" from their partners compared to 18.5% who stated they were "healing" *(p* = .001).   Sexual intimacy is also strained, with one study reporting 43% of women being classified as "more distant" in their sexual relationship at one year post miscarriage (Swanson et al. 2003). In a study of couples who were diagnosed with recurrent pregnancy loss ($\geq$ 3 miscarriages), Serrano and Lima (2006) found that 33% of women and 23% of men reported a decrease in sexual intimacy within the year since last miscarriage, with significantly more women reporting less desire to have sex than men.

Pregnancy Subsequent to Loss

Depression and anxiety/stress during pregnancy have been linked to a variety of adverse reproductive outcomes including preterm birth, low birth rate, and reduced conception (Fransson, Ortenstrand, & Hjelmstedt, 2011; Hobel, Goldstein, & Barrett, 2008; Louis et al., 2011) as well as behavioral or developmental disorders in children (Glover, 2014). Prior perinatal loss has been associated with elevated stress and anxiety in a subsequent pregnancy (Armstrong, 2007; Blackmore et al., 2011; Côté-Arsenault, 2007; Fertl, Bergner, Beyer, Klapp, & Rauchfuss, 2009; Woods-Giscombe, Lobel, & Crandell, 2010). Hutti, Armstrong, and Myers (2011) found that women who had experienced a perinatal loss in the previous pregnancy had an increased number of unscheduled visits to their healthcare provider and diagnostic procedures in the third trimester when compared to women with no previous loss history and those experiencing their first pregnancy. This increase in unscheduled visits continued into the first two months post-partum.

Risk Factors for Maladaptive Responses to Miscarriage

Knowing that some women have difficulty resolving their loss, researchers have assessed various risk factors that may predict complicated grief or depression. A history of mental illness (e.g., depression, anxiety) has been consistently associated with difficult emotional recovery subsequent to miscarriage (Beutel, et al., 1995; Brier, 2008; Friedman & Gath, 1989; Janssen et al., 1997; Mann, McKeown, Bacon, Vesselinov & Bush, 2008; Neugebauer et al., 1997). Lok et al. (2010) reported that general psychological distress in women suffering a miscarriage remained significantly elevated at 1 year compared to a nonpregnant comparison group even when controlling for a history of mental illness. Both neurotic personality traits (Janssen et al., 1997) and insecure attachment experiences (Scheidt et al, 2012) have been associated with higher depression, grief, and anxiety subsequent to miscarriage. Conflicting data exist as to whether an intention of pregnancy impacts psychological reaction to miscarriage or pregnancy loss. In a study of women who had undergone dilatation and curettage for spontaneous abortion, Thapar and Thapar (1992) found that loss of an unplanned pregnancy was associated with a significantly higher depression score (Hospital Anxiety and Depression Scale) compared to those women whose pregnancy was planned. However, Neugebauer et al. (1992), found there was no significant difference in depression scores after miscarriage between women who wanted the pregnancy and those who did not. Social and intimate support has been consistently linked with better psychological outcomes in women following miscarriage (Scheidt et al., 2012; Toedter et al., 2001).

Certain reproductive and demographic variables have been shown to effect the emotional recovery of women following miscarriage, including: previous loss history (Swanson, 2000; Thapar & Thapar, 1992), childlessness (Janssen et al., 1997; Neugebauer et al., 1997; Swanson,

2000), infertility (Cheung, Chan, & Ng, 2013; Freda, Devine, & Semelsberger, 2003), gestational age at loss (Franche, 2001; Janssen et al., 1997; Swanson, 2000), and age (Mann et al., 2008; Neugebauer, 2003; Swanson, 2000). However, these risk factors are not supported in all studies. In the case of age, results have shown increasing age to be protective (Mann et. al., 2008; Neugebauer, 2003) as well as potentially detrimental to psychological morbidity (Swanson, 2000). Neugebauer et al. (1992) compared depression levels using the Centers for Epidemiological Studies-Depression Scale (CES-D) in three groups of women: 1) those within four weeks of miscarriage, 2) pregnant women, and 3) a non-pregnant community cohort. Compared to non-pregnant and pregnant women with children, women who miscarried, who also had children, were less likely to be depressed. This same study found that as the gestational age at loss increased, depression scores went up in women who miscarried; conversely as gestational age increased in pregnant women, depression decreased. Prior reproductive loss did not appear to affect depression scores within any of the study cohorts nor did age. Using path analysis, Swanson (2000) studied the direct and indirect effect of childlessness, number of children, previous miscarriage history, maternal age, and gestational age at loss on depression at 4 months and 1 year after loss within the framework of Lazarus and Folkman's (1984) Stress and Coping Theory. While none of these variables had a direct impact on depression at 4 months, they did have an indirect effect through the personal significance women attributed to miscarrying. Personal significance as measured by the Impact of Miscarriage Scale (Swanson, 1999a) had a direct positive impact on depression. Having children appeared to decrease the personal significance assigned to the miscarriage at 4 months. Previous miscarriage history, maternal age, and gestational age at loss all demonstrated a positive impact on personal significance with higher personal significance being assigned in older women, those with a previous miscarriage,

and those who miscarried at later gestational age. Mann and colleagues (2008) prospectively

studied 404 pregnant women seeking prenatal care, 30 of whom went on to experience

pregnancy loss. They found that amongst those with a pregnancy loss (average gestation age at

loss ≈ 13 weeks) there was an inverse relationship of age with both depression and grief.

Infertility may increase the emotional burden of miscarriage due to the uncertainty

regarding future conception (Freda et. al, 2003).   In a recent report, Cheung et al. (2013)

compared 75 women with natural conception to 75 women with assisted conception and found

that the assisted reproductive group was more distressed at 4 and 12 weeks after a first-trimester

loss compared to those who conceived naturally. This difference was not evident one-week after

loss.   Others have also reported greater distress at 4 months post miscarriage in women who

conceived through assistive measures compared to those who conceived naturally (Nikcevic &

Nicolaides, 2013).

Intervention after Miscarriage

Women are often dissatisfied with follow-up care after a miscarriage (Cuisinier,

Kuijpers, Hoogduin, de Graaw, & Janssen, 1993; Callahan & Chabrol, 2010; Wong et al., 2003).

Geller et al. (2010) summarized the literature in regards to follow-up care and patient satisfaction

after miscarriage; their findings suggest that dissatisfaction with care resulted from: 1) perceived

lack of empathy from providers; 2) inadequate information in terms of miscarriage cause,

physical recovery, and future pregnancy prognosis; and 3) care that did not focus on their

emotional needs. Intervention studies have mainly focused on diminishing emotional

symptomatology or accelerating emotional recovery following miscarriage (Aldofsson, Bertero,

& Larsson, 2006; Nikcevic, Kuczmierczyk, & Nicolaides, 2007; Swanson, 1999a; Swanson, et

al., 2009; Lee, Slade, & Lygo, 1996). These studies have found mixed results in terms of diminishing grief, depression, or other psychological morbidity.

Nikcevic et al. (2007) compared the effects of two types of counseling in women diagnosed with a missed miscarriage between 10-14 weeks (diagnosed by ultrasound with no symptoms experienced by woman). Women in the medical consultation group (MC, $n = 33$) learned the results of diagnostic testing as to the cause of the miscarriage and were able to discuss plans for future pregnancy. Those in medical plus psychological counseling group (MPC), received the medical consultation as described above, plus a 50-minute psychological counseling session (MPC, $n = 33$). The outcomes of grief, worry, anxiety, depression, and self-blame were compared to a convenience sample of women ($n = 61$) who were also diagnosed with missed miscarriage between 10-14 weeks gestation, but were not offered any formal diagnostic or counseling services (control group).   Compared to the control group, the MC and MCP groups showed less self-blame. The MPC group also showed reduced grief and worry compared to both control and MC groups. Neither intervention had a significant impact on depression or anxiety. Adolfsson et al. (2006) randomized women 21-28 days after a miscarriage to either a 60-minute midwife visit based on Swanson's Meaning of Miscarriage model (Swanson, 1999b) or routine care (30-minute midwife visit focusing general health/symptoms after the miscarriage). Although it did not reach statistical significance, women randomized to the intervention group, had a 30% greater reduction in grief scores between 1 and 4 months post miscarriage than those in the routine care group.

A recent Cochrane Review (Murphy, Lipp, & Powles, 2012) concluded that there was little evidence to conclude that psychological counseling had a significant impact on measured outcomes based on six studies that met their criteria for review (Adolfsson, Bertero, & Larsson,

2006; Lok, 2006; Nikcevic, Kuczmierczyk, Nicolaides, 2007; Lee et al., 1996; Swanson, 1999, & Swanson et al., 2009).   However, only one of these studies included partners as part of the intervention (Swanson et al., 2009).   Swanson et al. (2009) found that a theoretically derived counseling intervention was beneficial in hastening women's and men's resolution of grief and depression. Given that intimate and social support has been linked with better emotional outcomes, partner involvement may be a key component in the care of women who have miscarried.

Theory of Stress and Coping

Lazarus and Folkman (1984) in their book Stress, Appraisal, and Coping state: "In order to understand variation among individuals under comparable conditions, we must take into account the cognitive processes that intervene between encounter and the reaction, and the factors that affect the nature of this mediation" (p. 22). These cognitive processes are termed primary and secondary appraisals and dictate if the event is viewed as irrelevant, benign-positive, or as stressful. Lazarus and Folkman go on to classify stress appraisals as being in three realms: 1) loss/harm –the event has already happened, 2) threat- the event has not yet taken place but may be imminent, and 3) challenge- the event is regarded as an opportunity for growth. It is within the primary and secondary appraisal process that individual differences in meaning and perceived ability to deal with stress are determined. Miscarriage can be experienced as both a loss and a threat, since not only is there loss of a current pregnancy but the experience may arouse concern over future pregnancies. The secondary appraisal involves the assessment of "…what might and can be done" to manage the situation and degree that they will be successful with such effort (Lazarus & Folkman, 1984, p. 34). The secondary appraisal may take the form of the individual's appraisal of their ability get through the loss, their support system, and their

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belief in their ability to obtain a successful subsequent pregnancy. The interaction of the primary and secondary appraisal determines the outcome (i.e., successful or unsuccessful adaptation) of miscarriage. Thus, the meanings and experiences of miscarriage are relevant to coping and whether it is adaptive or maladaptive. Instruments that measure the meaning/experience of miscarriage may have potential in broadening our understanding of miscarriage and identifying those who need supportive care.

Measures Used in the Measurement of Psychological Reaction to Miscarriage

Reaction to miscarriage has been assessed with various indices of depression (Beutel et al., 1996; Cumming et al., 2007; Kong, Chung, Lai, & Lok, 2010; Mann et al., 2008; Neugebauer et al., 1992; Swanson, 1999a, 2000; Swanson et al., 2009), anxiety (Beutel et al., 1996; Cumming et al., 2007), and grief (Beutel et al., 1996; Mann et al., 2008; Serrano & Lima, 2006; Swanson, 1999a ; Swanson et al., 2009). Many of the studies have used measures for depression and anxiety that are designed for a variety of populations. In the case of grief, many have employed measures that are more specific to the loss experienced by miscarriage.

Measures Specific to Perinatal Loss

The Perinatal Bereavement Scale (Theut et al., 1989), as stated by the authors, was developed to assess the bereavement and unresolved grief from a previous perinatal loss, defined by these authors as miscarriage < 20 weeks gestation, stillbirth > 20 weeks gestation, or neonatal death-within 3 days of birth, during a subsequent pregnancy. It is based partly on interviews of 7 women and 3 spouses who had experienced a perinatal loss and also items adapted from other's work including Peppers and Knapp (1980). The items index emotions of sadness, guilt, and intrusive thoughts pertaining to the lost baby. The instrument contains 26 items on a 4-point Likert scale with items ranging from "almost never" to "almost all the time" and was tested on

an all white sample of couples (N=25) whose female partner was in her 8th month of pregnancy subsequent to an early loss (< 20 weeks gestation) or late loss (> 20 weeks gestation– stillbirth and neonatal death). The authors report internal consistency (Cronbach's alphas between .83-.91) for the instrument measured separately in men and women during the prenatal and postnatal period of the subsequent pregnancy. Based on a three factor repeated analysis of variance their findings showed only main effects: 1) women grieved more than men ($p < 0.0005$) across both time points, 2) grief diminished after the birth of a viable infant across men and women ($p < 0.0001$), and 3) parents in the late loss group grieved more than couples in the early loss group ($p < 0.001$)

The Perinatal Bereavement Grief Scale (PBGS) (Ritsher & Neugebauer, 2002) is a 15-item, 4-point Likert format scale developed to measure grief after reproductive loss. The authors wanted a measure specific for grief as opposed to components of depression, as many grief scales index. The PBGS seeks to measure preoccupation or yearning for the lost baby. Items for the scale were developed based on literature related to perinatal grief counseling, clinical, research, and theoretical literature (Ritsher & Neugebauer, 2002). The PBGS was administered along with the CES-D, 2 weeks, 6 weeks, and 6 months after loss to 300 women who had miscarried (loss of pregnancy < 28 weeks gestation). Exploratory factor analysis with oblique rotation was done by combining the items of the CES-D and PBGS and specifying a 2-factor structure. The authors claim divergent validity of the two measures, since all CES-D items loaded on one factor and all PBGS items loaded on the second factor (loadings not reported). In a subsample of 133 women, 2 weeks after loss, having greater attachment to the pregnancy was positively related to scores on the PBGS. Desire for having a baby was weakly associated with scale scores ($r = .16$, $p < .05$).

The Perinatal Grief Scale (PGS) (Toedter et al., 1988) and the Perinatal Grief Scale-Short Form (Potvin, 1989) were designed to study factors affecting grief resolution after a variety of perinatal losses including miscarriage, stillbirth, neonatal death, and ectopic pregnancy. It is one of the most widely used and studied perinatal grief scales. The PGS was adapted from the Texas Grief Inventory (Zisook, Devaul, & Click, 1982), input of experts in the field of perinatal grief counseling and research, and on the authors' prior research in perinatal loss. The original scale has 84 items and the short version was reduced to 33 items. Both the original and short version of the PGS index three components of grief: 1) "active grief"- crying, missing the baby, 2) "difficulty coping"- how one is dealing with other people and normal activities, and 3) "despair" – feelings of worthlessness and hopelessness (Toedter et al., 2001). Both scales report excellent internal consistency for the three subscales in a variety of studies. One criticism that pertains to the PGS is that many of the items are synonymous with depression and not based on any particular theory per se that could guide intervention (Hutti & dePacheo., 1998). In addition, the instrument references the loss as "baby", which may be problematic in measuring grief subsequent to miscarriage.

The Perinatal Grief Intensity Scale (PGIS)(Hutti & dePacheo, 1998) was designed for the purpose of predicting the intensity of grief response in early pregnancy loss using Dougherty's Model of Cognitive Representation (1984) as the theoretical framework for the scale's development. Similar to stress and coping theory (Lazarus, 1999; Lazarus & Folkman, 1984), Dougherty's model predicts behavior following an event to be based on how the event is perceived. Hutti and dePacheo (1998) incorporated statements from qualitative interviews with 12 first time parents who had suffered a miscarriage. The resulting instrument included 36 items that were designed to measure three factors that Hutti (1992) theorized would account for grief

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intensity: 1) the reality of the pregnancy or baby within, 2) congruence between how the miscarriage was experienced versus how one thinks it should be experienced, and 3) the ability to advocate for oneself in dealing with incongruence between the experience of the miscarriage and how one thinks it should be.

Psychometrics of the PGIS were performed on a sample of 186 women (96.1% white) who had miscarried (gestational age < 16 weeks) 12-18 months prior to enrollment and were between the ages of 15 and 45 ($M = 29.28$) with 44.5% being gravida I or II. Most women (71.7%) had at least one living child and 56.5% reported the miscarriage as their first. The scale was subjected to principal factor analysis using oblique rotation and resulted in a 3-factor solution which reflected the author's theoretical constructs: 1) "Reality, 2) "Congruence", and 3) "Confront Others"- if the experience is not congruent with expectations of how it should be, the person is able confront others to bring about congruence. Reliabilities for the three subscales were reported to be: .89 for "Reality", .84 for "Congruence", and .71 for "Confront Others". Hutti and DePacheo (1998) reported that the scales correlated with grief intensity and duration; however, this is based on participants rating their grief response and intensity retrospectively. Psychometrics for this scale were performed on a relatively small sample of women. In addition, the qualitative study that produced many of the items included only couples experiencing their first pregnancy. Thus it does not necessarily index the experiences of those who have children or have had multiple miscarriages. Hutti, Armstrong, and Myers (2013) have recently reported on the scale's reliability and validity in identifying grief intensity in pregnancy subsequent to miscarriage, stillbirth, or neonatal death. They reported adequate reliability for all subscales (Cronbach's alpha's > .74) and found that the neonatal death group had greater grief

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intensity compared to both the stillbirth group and those whose previous pregnancy ended in miscarriage.

Except for the Perinatal Grief Intensity Scale, the above measures are designed to measure one component of miscarriage (grief) and may not index the experience or meaning of miscarriage as it relates to the appraisal of the event as a stressor. In regards to more general measures of psychological functioning (e.g., depression, anxiety) there is concern that measures not specific to the event or target population may not be sensitive in capturing the degree of morbidity (Côté-Arsenault & Marshall, 2000; Switzer, Wisniewski, Belle, Dew, & Schultz, 1999). Although the measures that have generally been employed have shown utility depending upon the reason for use, none fully index meaning of the miscarriage for the person and therefore may not fully capture the degree of impairment.

The Meaning of Miscarriage and the Impact of Miscarriage Scale

The experience of miscarriage is unique to each person. According to stress and coping theory, it is the meaning of this experience that informs how one responds and explains why one person is more distressed over another (Park & Folkman, 1997). As described earlier, this experience and meaning are part of primary appraisal process (Lazarus & Folkman, 1984; Lazarus, 1999). The personal significance of the event and if it is viewed as harmful determines if the event will be judged as a stressor. It is from this point that once viewed as a stressor, the secondary appraisal (ability to garner support and resources) is undertaken and coping measures are employed to manage the stress. Hamama, Rauch, Sperlich, Defever, and Seng (2010) found that the incidence of posttraumatic stress disorder (PTSD) or depression in pregnancy was not related to the previous spontaneous abortion or elective abortion per se, but to how that event was viewed by the individual i.e., whether or not it was viewed as a traumatic event. Measures

that capture the meaning inherent in the primary appraisal response and not just the clinical response may be of benefit in early detection of those for whom the miscarriage may be more problematic. Hinds, Chaves, and Cypress (1992) state that the "intent of health care professionals is to understand human beings and to help create conditions that promote health and meaningful life experience" (p. 31). Within this context, it is only after understanding the meaning of what the miscarriage represents that researchers and clinicians can move forward and help make sense of this meaning. Accurately measuring the meaning of the miscarriage event is an important first step in identifying women, partners, and couples who may benefit from intervention as well as developing interventions to assist in the resolution and/or transition through the event.

Swanson-Kaufman (1983) explored the meaning of miscarriage in her phenomenological study of 20 women who had suffered a miscarriage within four months of being interviewed. The women's ages ranged from 18-38, 12 of the 20 women had children (range 1-4), five had experienced a previous miscarriage, and six had a history of infertility. Through this work, the Meaning of Miscarriage Model (MMM) was developed which identified six common experiences: 1) "coming to know" - the realization of the loss in the face of hope for the pregnancy, 2) "losing and gaining"- identifying what was lost and gained in miscarriage, 3) "sharing the loss"- identifying who is and is not available for support and validation of the loss, 4) "going public"- entering the world again as a no longer expectant mother, 5) "getting through it" - recognition of personal progress in moving forward and 6) "trying again"- facing ongoing fears and uncertainty for future conception and pregnancy (Swanson, 1999b). These experiences were translated into the Impact of Miscarriage Scale (IMS) by focusing on what was lost and gained in the miscarriage.

Swanson (1999a) describes three phases of IMS development. In phase one, 105 emic statements were taken from the 20 interviews derived from the "losing and gaining" category. Phase two resulted in the 105 statements being converted to Likert or forced choice format and mailed along with demographic questions to 446 North American women within 10 years of miscarriage. Through evaluation of expert and user comments, item level variances, item-item, and item-to-total correlations, the 105 statements were reduced to 30 items with a Cronbach's alpha of 0.93. Construct validity was tested by analyzing the instrument's ability to distinguish between groups for which the meaning of miscarriage should vary, with significant differences found between women who were: fertile vs. infertile, childless vs. those with children, and experiencing their 1st or 2nd miscarriage vs. those experiencing their 3rd or greater miscarriage (medically referred to as repeated pregnancy loss). In phase three, the instrument was administered to 188 women who had experienced a loss within one year. The instrument was further reduced by 6 items due to low variance or poor item-to-item, and item-to-total correlations. The remaining 24 items were subjected to subscale determination through principal component factor analysis.

In its original form, the IMS is a 24-item scale that indexes four dimensions of the impact. The four dimensions or subscales as identified are: 1) "Personal Significance" (PS)- the meaning of the miscarriage for the person, 2) "Devastating Event" (DE)- the degree to which the event itself was viewed as a loss of hope or devastating, 3) "Loss of Baby" (LB)- the extent to which the person viewed the loss as a "loss of a baby" versus the loss of a pregnancy, and 4) Isolation-Guilt (IG), the degree to which the person feels alone and/or guilty over the miscarriage (Swanson, 1999a).   Utilizing stress and coping theory in a sample of 174 women who had miscarried, Swanson (2000) looked at the effect of several hypothesized constructs on the

symptoms of depression at one year (e.g., context, coping strategies, emotional strength, support) and found that the primary appraisal of meaning as measured by the PS subscale of the IMS had the strongest direct effect on depressive symptoms at 4 months and 1-year post loss.   This finding further lends support to the claim of construct validity of the IMS.

While the IMS was not developed to be used with male partners; in the Couples Miscarriage Healing Project (CMHP) (Swanson et al., 2009), the IMS was used with men for the first time. The CMHP was a randomized controlled trial designed to evaluate the effectiveness of three theory-based interventions relative to no treatment (control). All three interventions were based on Swanson's Theory of Caring and the Meaning of Miscarriage Model (Swanson 1999b) with method of delivery differing between the three interventions. Both members of the 341 heterosexual couples filled out the IMS at 4 times over a 13-month period. Swanson et al. (2009) reported the effects of three interventions on the trajectories of depression, grief, and grief related emotions but did not include the effect on miscarriage impact as measured by the IMS.

Measurement is paramount to the adequate analysis of phenomena. Whether physiologic or psychological states are measured, tools that accurately represent the state in question are needed.   Often there is interest in capturing individual meanings and experiences of a phenomenon (Fleury, 1993). Developing instruments that accurately measure these meanings can be difficult because qualitative data must be translated into quantitatively measured concepts (Fleury, 1993). Imle and Atwood (1988) reflect on this difficulty stating the importance of evaluating that "…the meaning inherent in qualitatively generated concepts has been retained in scales constructed for a quantitative instrument" (p. 62). When scales are extended beyond their intended target audience, there is an opportunity to evaluate the scale's utility in new populations and make recommendations for future refinement. Extending the use of the IMS to men may be

problematic, since it may not fully index the meaning of miscarriage for men. However,

concepts included in the IMS (personal significance, loss, guilt, hopelessness) have been

expressed by men in qualitative studies (Abboud & Liamputtong, 2003; Murphy, 1998;

Puddifoot & Johnson, 1997).

Outline of Dissertation

This dissertation, reported as three separate but related papers, involves secondary data

analyses from the Couples Miscarriage Healing Project (Swanson et al., 2009) and focuses on the

meaning of miscarriage as measured by the IMS.   This dissertation sought to: 1) revise the IMS

for use in men and women, 2) discern if there were differences in meaning based on certain

contextual and demographic variables as identified in the literature, and 3) determine if the

meaning of miscarriage is a time and/or treatment variant phenomena. Descriptions of the three

papers are presented focusing on the purposes of each paper and methods employed. In some

cases, concern over publication constraints required limiting method description and/or

theoretical underpinnings in the manuscript. In those cases, elaboration of methods employed

and/or rationale is presented.

Paper 1: Evaluation of the Psychometric Properties of the IMS (*Chapter 2: Measuring the Meaning of Miscarriage: Revision of the Impact of Miscarriage Scale*)

The purpose of paper one was to psychometrically evaluate the IMS for use in both men

and women. The first step was to confirm the original factor structure of the IMS using

confirmatory factor analysis. Since the factor structure was not confirmed, the analysis

proceeded as follows: refactoring of the IMS with both male and female baseline scores using

exploratory factor analysis, assessment of the reliability of the revised subscales in both men and

women, assessment of divergent-convergent validity by examining associations of the revised

subscales with depression and grief indices, and assessment of the test-retest reliability of the subscales over the course of 13 months.

Assessment of the original factor structure of the IMS was important in establishing structural construct validity (Harrington, 2009). Confirmatory factor analysis (CFA) is a method related to structural equation modeling (SEM) in that it tests for relationships between observed variables and latent variables (not measured), but unlike SEM it does not test for structural or causal pathways between latent variables (Harrington, 2009). CFA can be used to test a priori theoretical relationships between measured variables and unmeasured constructs or, as in this case, to confirm a prior identified factor structure. The original instrument was subjected to confirmatory factor analysis (CFA) using the baseline scores of women (n=341) from the CMHP. In the event that the original structure was confirmed, then male baseline scores would have also been subjected to CFA. However, the original factor structure was not confirmed in women and the analysis proceeded directly to exploratory factor analysis using baseline IMS data for both men and women.

There are several reasons that the original factor structure of the IMS may not have been valid. Originally, principal component analysis (PCA) was done on the 24-item IMS. This method is more of a data reduction tool and does not assume any theoretical structure in variables (DeCoster, 1998; Costello & Osborne, 2005). However, with the development of more powerful software and computers, principal axis factoring (PAF) has replaced PCA, since it isolates only shared variance and thus is more in line with the purpose of grouping the manifest variables (individual items) into dimensions (factors) of a construct. PAF is also preferred if the data violate assumptions of normality (Costello & Osborne, 2005). In addition, the original factor analysis used Varimax rotation. This is an orthogonal method that assumes no correlation

between factors. However, correlation of factors is likely, if not expected. In the case of correlated data, oblique rotations are preferred (Ferketich & Muller, 1990). The original factor analysis was performed with data from 188 women. This may not have been an adequate sample size with a 24-item instrument; 10-20 subjects per item have been recommended (Costello & Osborne, 2005). Using data with a known factor structure, Costello & Osborne (2005) found a ratio of 20 subjects to 1 item yielded the solution closest to the actual factor structure when compared to 2:1, 5:1, and 10:1 sample ratios. Samples with fewer subjects per item yielded higher error values on factor loadings. Although factor analysis is not an exact science, a higher N is considered to result in a factor structure that is more stable over time (MacCallum, Widaman, Zhang, & Hong, 1999). In the CMHP, the N for baseline data = 682, yielding a subject to item ratio of > 20:1.

Exploratory factor analysis was done using the total sample of baseline scores (N=682) with knowledge that dependency was an issue. The strength of this strategy was that the participant to item ratio was higher and in line with the recommendations of others (Costello & Osborne, 2005). This analysis resulted in the Revised Impact of Miscarriage Scale (RIMS) (Huffman, Swanson, & Lynn, 2014) which consists of 3 subscales.

Paper 2: Group Differences in the Impact of Miscarriage: (*Chapter 3: Couples and Miscarriage: The Influence of Gender, Age, Mental Health History, Infertility, Miscarriage History Children, and Gestational Age at Loss on the Impact of Miscarriage*)

The second paper evaluates if the impact of miscarriage as measured by the Revised Impact of Miscarriage Scale (RIMS) is affected by certain reproductive and contextual variables (i.e., gender, mental health treatment history, age, miscarriage history, children living, and gestational age at loss) that may theoretically influence the meaning assigned to miscarriage.

Knowledge of how contextual variables that are within the clinician's purview affect appraisal of miscarriage is important to both the researcher and clinician. In addition, the ability of an instrument to discern these differences provides support for the instrument's utility and construct validity.

Multi-factorial analysis of variance (ANOVA) was used to assess the effect of mental health history, gestational age at loss, number of children born living, infertility, female age, and gender on the impact of miscarriage as measured by the RIMS in men, women, and couples. These factors were selected since they are in the scope of assessment by health care providers and have been shown to impact emotional response to miscarriage. Although some of these factors are continuous in nature, grouping of these factors into clinically meaningful categories was performed. Initially the models were fitted to assess the effect of these variables in men and women separately and included all pairwise interactions and main effects. The models were then fitted to assess the impact of miscarriage in couples accounting for the correlation between the female and her partner's scores. These models reflect a statistical averaging of the partnered men and women's scores. The couple models included all pairwise interactions and all 3-way interactions involving gender. By taking into account the dependency within a couple, the interactions with gender can lend greater or lesser support to any differences identified in the gender specific models. For the couples' model the joint test of all interactions (Maxwell & Delaney, 2004), including those with gender, were evaluated by comparing the full model to the model including the main effects plus the interactions using chi-square tests. For the gender-specific models, comparable F-tests were used to compare the full model to the main effects model. In either scenario, if the joint test was found to be significant, indicating important

constituent interaction effects, a sequential backward selection approach was used until only significant constituent interaction terms were retained.

Paper Three: Time and Treatment Effects: (Chapter 3: *Appraisal of Miscarriage: A Bayesian Analysis in a Randomized Controlled Trial of Three Caring-Based Interventions)*

The third paper addresses the effect of time and treatment on the impact of miscarriage as measured by the RIMS. In addition, two covariates, age and mental health treatment history, were added to the models to discern if they had any impact over time. Age and mental health were selected as covariates due to their impact at baseline (high *F* statistic) in Paper 2.

Swanson et al. (2009) in the Couples Miscarriage Healing Project found that grief and depression were influenced by both time and intervention. Evaluation of either time or intervention's influence on the meaning assigned to miscarriage was not done. In a prior study, Swanson (1999) found that personal significance (PS) as measured by the IMS demonstrated a significant time-treatment interaction, with treated women showing a significant decrease in PS over time compared to controls. The Devastating Event subscale of the IMS also showed some change through treatment. The PS subscale is no longer a component of the RIMS, although several of the items were retained on other subscales. Thus, there is a need to reassess whether the RIMS subscales measure concepts that can be changed over time or through treatment. Understanding whether the meaning of miscarriage changes over time or can be reconstructed over time is important to better understanding the experience of miscarriage as well as the capacity of treatment to alter emotional regulation via event reappraisal. Moreover, knowing whether or not meaning is time and treatment invariant will lead to more effective and efficient use of the RIMS (i.e., screening tool vs. a measurement tool to assess intervention effectiveness).

Multilevel modeling (MLM) was used to ascertain the effects of time and treatment on the resolution of miscarriage impact as measured by the RIMS subscales. MLM is uniquely suited to this analysis since it can model change over time (trajectory) within correlated groups (women and partners) (Atkins, 2005; Raudenbush, Brennan, & Barnett, 1995). Modeling change over time must take into account several factors: 1) the central tendency and variability around repeated measures, 2) central tendency and variability around individuals, and 3) central tendency and variability around the couples (Atkins, 2005). Moderating variables can be included at either the individual or couple level. MLM also allows for missing data. In longitudinal studies, missing data are common and to be expected. Instead of removing participants from the analysis completely, participants with some missing data can be included in the analysis as long as the missing data conform to certain requirements (Atkins, 2005). Although MLM allows for the modeling of complex scenarios as presented by CMHP data, addition of levels and variables to the model increase the random parameters that must be estimated. This can compromise the solution. Thus, at every step, model selection was based on the principle of parsimony with the simplest model that best explains the data being used.

Multilevel modeling with Bayesian estimation was used to estimate the effect of time and intervention on subscale scores over a 13-month period for both men and women. Bayesian estimation is based on the probability theory attributed to Thomas Bayes and developed further by Pierre Simon LaPlace (McGrayne, 2011). Bayes theory states that probability of any future event can be estimated based on prior knowledge of the probability of the event and current data. In terms of hypothesis testing in scientific research, Bayes theorem can be summarized as follows:

$$p(H|D) = p(H)\, p(D|H)/p(D)$$

where p (H|D) is the posterior probability of the hypothesis, p(H) is the probability of the hypothesis before the data (prior), p(D|H) is the probability of the data under the hypothesis (likelihood) and p(D) is the marginal probability of the data, which serves as a normalizing constant to constrain the posterior probability between 0 and 1. For hierarchical models, such as repeated measures, Bayesian models allow for one to directly estimate the random effects within the model.

In typical null hypothesis significance tests (NHSTs), the statistical goal is to estimate a parameter and its standard error, from which a confidence interval may be formed. In Bayesian analysis, the goal is to characterize the distribution of a parameter. From this distribution, we can estimate the parameter using some measure of central tendency (often the mean or median), and we can obtain a credible interval for that estimate, specifying a range in which, e.g., 95% of the distribution lies. Unlike the confidence interval in NHST, the credible interval in Bayesian estimation allows probability statements about the true value of the parameter- i.e. one can say that there is a 95% chance that the value of the parameter falls within the specified interval. These types of statements violate the underlying assumptions of NHST. As with confidence intervals in NHST analysis, a crossing of 0 in the credible interval can be viewed as lack of evidence of an effect.

Bayesian modeling requires the researcher to specify his/her belief regarding the distribution of the parameter before knowing the data (prior distribution), and in the case of a normal distribution, this is done through specifying the mean and variance. In cases where there is sufficient knowledge from previous research regarding the distribution of the data, informative priors may be appropriate. The use of informative priors has been the subject of much debate with cynics concerned that too much bias may be introduced into the model. It is important to

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understand that as sample size increases, the influence of the prior becomes increasingly less. In addition, the use of an informative prior from sound previous studies allows one to update knowledge in a rigorous and efficient manner. In situations where little is known regarding the distribution, a non-informative or vague prior can be specified. In this circumstance, the data contribute the most weight to the posterior distribution.

The posterior distributions of a set of parameters can be determined using Bayes theorem. However, in many circumstances the computation of the normalizing constant is very difficult or impossible. Rather than characterize the posterior distributions with equations, we instead use algorithms that can repetitively sample from the target distributions, relying on the resulting large sample to describe the distribution. One class of these algorithms is Markov chain Monte Carlo (MCMC) in which each parameter is sampled in turn, conditional on the observed data and on the current values of all the other parameters in the model- this is called sampling from the full conditional distributions. The resulting samples then reflect the posterior distributions of interest, both jointly (across a set of parameters) and marginally (within a single parameter).

In the current project, we used a Gibbs Sampler, a type of MCMC algorithm in which the full conditional distributions can be obtained directly for all parameters. This sampling algorithm requires specification of a few components by the researcher including chain, burn-in, and thinning. A chain is the term given to the repetitive sampling of the multidimensional parameter space with its length (iterations) defined by the user to ensure adequate sampling of the space. This process has been described as a "walk" (Kruschke, 2011) with each step (iteration) representing a draw from the distribution of the parameter to be estimated, conditional on the latest value of the probability density for the other parameters. Each iteration involves drawing one value for each model parameter and thus each iteration can be used as an

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"observation" in later analysis. Movement to the next iteration is conditioned on the current state but not on previous states. As the chain or "walk" converges- that is, zeros in on the posterior distribution, the space covered by the walk becomes denser. When noninformative priors are used in the specification of a model, this walk in the parameter space must cover more territory and can be less efficient. However, when little is known regarding the prior distribution of the parameter space, a larger parameter space to sample from helps to ensure unbiased estimates. Convergence can be assessed by running two or more chains simultaneously, with convergence occurring as the ratio of between chain variance of the estimates to within chain variance of the estimates $(\widehat{R})$ approaches 1 (little variance between chains when compared to within chain variance). This convergence can be viewed as arrival of the two chains on the same posterior probability distribution and can be viewed visually through traceplots (Figure 1.1) as well as the $\widehat{R}$ statistic. Recommendation for acceptable convergence is < 1.1 (Gelman, Carlin, Stern, Rubin, 2004).

Trace of b[1]
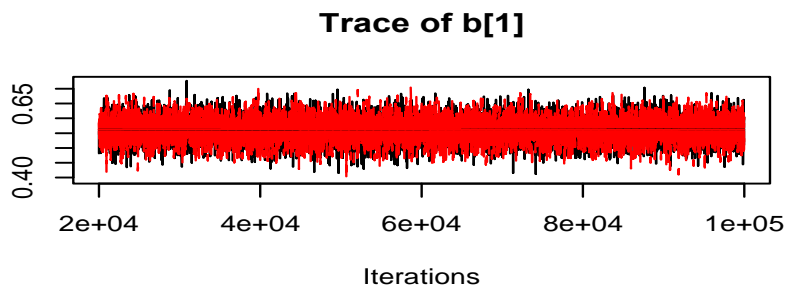
Figure 1.1 Example of traceplot in R with two chains showing convergence.

Burn-in refers to the number of iterations that are discarded from the beginning of the chain. There is greater parameter space covered in the beginning of chain and the estimates from the early iterations are further from the posterior distribution, thus discarding the beginning of the chain "burn-in" is helpful. Thinning refers to keeping every n^{th} iteration. Thinning helps

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promote independence of the samples from the posterior distribution, as the "random walk" sampling can produce significant autocorrelation of one iteration to the next. However, with a large number of samples after convergence, the effects of the autocorrelation become negligible, and thinning is unnecessary. Thinning can, however, lessen the computer memory required to store all the samples.

The end result of the MCMC algorithm is a large number of samples from the joint posterior distribution of all model parameters. These retained samples can be analyzed to obtain posterior probabilities characterizing the true parameter values. For example, the posterior probability of a certain parameter falling in a given range is simply the number of samples in which the parameter estimate is within the range divided by the total number of samples. Analysis of these posterior probabilities was done to discern the effect of baseline subscale scores, time, and intervention on the subscale scores over time. Random effects were included in the model to account for repeated measures of an individual as well as an individual's membership within a dyad. By accounting for couple membership in the model, we were able to calculate the average correlation of couples for each subscale.

Conclusion

Development of a measure that is reliable in capturing the meaning/significance of miscarriage and that can differentiate those for whom the meaning may be greater is important in the provision of services for those in greatest need. Understanding whether the significance of miscarriage can be reconstructed over time or through intervention is necessary for the proper employment of the measure. These steps, while providing a firm foundation for establishing the psychometric properties of the RIMS, also enhance our understanding of the impact of miscarriage in both men and women.

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CHAPTER 2: MEASURING THE MEANING OF MISCARRIAGE: REVISION OF THE IMACT OF MISCARRIAGE SCALE

Introduction

Although miscarriage is a fairly common event, the ways in which individuals and couples weather this early pregnancy loss are quite diverse. For some, miscarriage may be experienced as a relative "bump in the road" eliciting minor, if any adjustments, whereas for others it may seem a red light, impeding forward movement and calling forth an arsenal of coping strategies. Lazarus and Folkman (1984) in their stress and coping theory, postulate that coping is a function of how the event (stressor) is viewed by the individual (meaning to the person) and the subsequent assessment of resources to deal with the stressor (secondary appraisal). These assessments are termed the appraisal process and theorized to predict coping and outcome (emotional response). Thus, how miscarriage is experienced and the meaning ascribed to the event by the individual or couple determines how they move forward.

It is helpful to understand the meanings attributed to miscarriage in order to understand those most impacted by the loss and potentially most in need of additional support. Instruments that seek to measure the meaning of miscarriage as opposed to the emotional aftermath (e.g. depression, grief, anxiety) may prove useful in informing providers about those couples most in need of coping support. The purpose of this study was to psychometrically evaluate and potentially revise the Impact of Miscarriage Scale (IMS; Swanson, 1999a). Data were derived

from the Couples Miscarriage Healing Project that included 341 women and their male partners (Swanson, Chen, Graham, Wojnar, & Petras, 2009). The IMS was used with men for the first time in the Couples Miscarriage Healing Project..

Background and Conceptual Framework

Approximately 20% of all pregnancies end in miscarriage (Katz, 2012), with a rate of 10% – 12% occurring in women under the age of 35, and 21%- 42% in women 35 years and older (Knudsen, Hansen, Juul, Secher, 1991). Although the meaning assigned to miscarriage varies across individuals, many report symptoms of grief, depression, and anxiety in the weeks following the miscarriage (Beutel, Willner, Deckardt, Von Rad, & Weiner, 1995; Lok & Neugebauer, 2007; Neugebauer et al., 1997; Swanson, 1999a; Swanson et al., 2009). Partners report grief and depression, although it is often significantly less than mothers (Beutel et al., 1995; Swanson et al., 2009). When followed prospectively, most individuals have a gradual decline in depression and grief over the course of a year, with levels at one year, similar to comparison populations (Beutel et al., 1996; Lok, Yip, Lee, Sahota, & Chung, 2010). However, some develop complicated grief or a major depressive episode with the potential to impact not only the functioning and mental health of the individual but also the relationship in which the miscarriage took place (Kersting & Wagner, 2012). Pregnancy subsequent to perinatal loss may be associated with greater anxiety and stress than pregnancies in women with no loss history (Blackmore et al., 2011; Cóté-Arsenault, 2007; Fertl, Bergner, Beyer, Klapp, & Rauchfuss, 2009; Woods- Giscombé, Lobel, & Crandell, 2010), leading to more interactions with the healthcare system (Hutti, Armstrong, & Myers, 2011).

Response to perinatal loss has generally *not* taken into account differences in the meaning assigned to the event, but instead has focused on the emotional reaction to the loss. These

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responses include depression, anxiety, and grief. However, when viewed through the lens of the

stress and coping theory (Lazarus, & Folkman, 1984), these emotional states can be viewed as

third order outcomes that are the result of first, the cognitive appraisal of the event, and second,

the appraisal or evaluation of what can be done in response (coping). Instruments such as the

IMS, designed to measure the cognitive appraisal or "meaning" of the event versus the emotional

sequelae, may have a role in understanding those for whom coping may be problematic.

Instruments to Measure Responses to Perinatal Loss

Several instruments have been used in miscarriage-related research to quantify emotional

responses. Anxiety and depression have been measured using standardized inventories of

symptoms (e.g. Beck Depression Inventory [Beck, Steer, & Garbin, 1988], Centers for

Epidemiological Studies Depression Scale [CES-D; Radloff, 1977], State-Trait Anxiety Scale

[Spielberger, Gorsuch, Lushene, Vagg, & Jacobs, 1983], Hospital Anxiety and Depression Scale

[Zigmond & Snaith, 1983]). Several instruments specific to perinatal loss have been developed

to measure symptoms of grief including: The Perinatal Bereavement Scale (Theut et al., 1989),

The Miscarriage Grief Inventory (Nikcevic, Snijders, Nicolaides, & Kupek, 1999), the Perinatal

Bereavement Grief Scale (Ritsher & Neugebauer, 2002), and the Perinatal Grief Scale (Toedter,

Lasker, & Alhadeff, 1988), and short form (Potvin, Lasker, & Toedter, 1989). These instruments

were derived from various sources including: other grief instruments (Perinatal Grief Scale,

Miscarriage Grief Inventory), clinical, counseling, and/or research related literature (Perinatal

Grief Scale, Perinatal Bereavement Grief Scale, the Perinatal Bereavement Scale), and/or

interviews with those who had miscarried (Perinatal Bereavement Scale). The Perinatal Grief

Intensity Scale (Hutti, dePacheco, & Smith, 1998), was designed to measure factors theorized to

account for grief intensity: a) the reality of the pregnancy or baby within, b) congruence between

how the miscarriage was experienced versus how one thinks it should be experienced, and, c) the ability to advocate for oneself in dealing with incongruence between the experience of the miscarriage and how one thinks it should be.

The IMS (Swanson, 1999a) was developed to capture the meaning of miscarriage as opposed to measuring grief, depression, or anxiety. IMS items were derived from interviews with 20 women who experienced a recent miscarriage. Within the context of stress and coping theory (Lazarus, & Folkman, 1984), Swanson's (1999a) focus on the individual perception of the experience and significance to the person, may offer clinical insight into how miscarriage is appraised. Such understanding may be useful in tailoring interventions to women and their partners.

The Impact of Miscarriage Scale

The IMS is a 24–item, four-option, forced choice instrument composed of four empirically-derived factors (see Table 2.1). Swanson (1999a) described a three step process in the development of the IMS: a) item generation, 105 emic statements were taken from women who had miscarried representing what they had lost and/or gained from the experience; b) instrument refinement, the 105 items were sent to 446 North American women who had miscarried within the last 2 years and through empiric and expert evaluation reduced to 30 items; and c) subscale identification, the 30 items were administered to women enrolled in the Miscarriage Caring Project and were reduced to 24 items through assessment of variance and item-item correlations and factor analysis. For a full description of the development and testing of the IMS, the reader is referred to Swanson (1999a). There are 4 factors in the IMS. The first, *Personal significance* (7 items), describes the meaning attributed to miscarrying. It has an alpha of .83. *Devastating event* (5 items), captures the degree to which the event itself was viewed as

hope destroying or devastating (alpha = .86) *Loss of baby* (6 items), evaluates the extent to which

the person viewed miscarriage as losing a baby versus losing a pregnancy (alpha = .86); *Isolated*

(6 items) describes the degree to which the person feels alone and isolated by the miscarriage

(alpha = .79; Swanson, 1999a). Some items are reverse coded and higher scores reflect a stronger

impact or deeper meaning being assigned to the miscarriage. Construct validity of the 30-item

IMS was reported by Swanson-Kauffman, Kieckhefer, Powers, & Carr (1990; as cited in

Swanson, 1999a) with significant differences ($p < .05$) in IMS scores being detected between

women with and without a history of infertility, women with and without children, and women

with a history of one or two miscarriages versus those with three or more. When the IMS was

used in the Couples Miscarriage Healing Project, ,response options were revised and made

consistent across all items ("definitely true for me," "quite true for me," "rarely true for me,"

"definitely not true for me"). In addition, the wording was adapted for use with men by

changing the possessive "my miscarriage" to "our" and the item "I feel my body has betrayed

me" to "I feel my mate's body has betrayed us." The inclusion of men provides an opportunity

to re-examine the IMS, especially to look at the functionality of the items and the underlying

structure of the IMS to determine whether the measure performs similarly across genders.

Concerns exist about the original factor analysis of the IMS. Firstly, the original

exploratory factor analysis (EFA) was done using principal component analysis with an

orthogonal rotation. Although commonly used methods for EFA, these approaches are criticized

for inflating factor loadings (principal component analysis may lead to inclusion of items that

would otherwise be eliminated) and not being sensitive to the likelihood that factors in social

science measures *will be* correlated, making an orthogonal restraint in factor rotation artificial

(Gorsuch, 1983; Pett, Lackey, & Sullivan, 2003). Given the opportunity to re-examine the

structure of the IMS, it would be prudent to use an analytic approach that is more "correlation based" (principal axis factoring), with a rotation method that embraces the likelihood of inter-factor relationships (an oblique rotation method), as would be expected in the conceptual domains within the meaning or understanding of the impact of miscarriage. An additional consideration is that the initial EFA was done using data from 188 women, fewer than Costello and Osborne's (2005) recommended minimum of 10 subjects per item.

The Couples Miscarriage Healing Project was a randomized controlled trial designed to evaluate the clinical effectiveness of three interventions based on Swanson's Caring Theory and Meaning of Miscarriage Model (Swanson, 1999b). Swanson et al. (2009) have reported the effect of the interventions on depression and grief in men and women, but have not reported any analyses related to the IMS. Extending the use of the IMS to men may be problematic because it may not fully index the meaning of miscarriage for men. It is noteworthy, however, that many of the concepts indexed by the current IMS are supported by qualitative studies of men's experience with miscarriage (Khan, Drudy, Sheehan, Harrison, & Geary, 2004; McCreight, 2004; Murphy, 1998; Puddifoot & Johnson, 1997). Murphy (1998), Puddifoot and Johnson (1997), and McCreight (2004) have reported that male participants whose partners experienced perinatal loss had feelings of loss and hopelessness. In addition, some men have also reported feelings of guilt or self-blame for the miscarriage (Murphy, 1998), whereas other men blamed their partner or an employer (Puddifoot & Johnson, 1997).

The purposes of this study were to explore the factor structure, construct validity, and reliability of the IMS. The specific steps to be followed were as follows: a) confirm the original factor structure of the IMS in women, and if confirmed, see if it is also confirmed in men; b) if the factor structures were not confirmed then to re-examine the structure of the IMS using

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exploratory factor analysis (EFA), and derive a solution that is reliable in both men and women; c) assess divergent or convergent validity by examining associations with indices of grief and depression; and d) assess the internal consistency and test-retest reliability of subscales.

Method

This study was a secondary analysis of the IMS scores from the Couples Miscarriage Healing Project (Swanson et. al., 2009). Approval for this study was obtained from the University of North Carolina at Chapel Hill Institutional Review Board.

Sample

Data came from both members of 341 heterosexual couples residing in the Pacific Northwest who had experienced a miscarriage within 3 months of enrollment in the Couples Miscarriage Healing Project. Ages ranged from 18 to 53 years (mean = 33, SD = 6.42). Most couples were educated beyond high school (men = 87%, women = 91%), employed (men = 87%, women = 69%), and identified themselves as White (men = 86%, women = 84%). The mean gestational age at miscarriage was 9.8 weeks (SD = 3.1). Baseline data were collected within 3 months of miscarriage and prior to randomization. Confirmatory factor analysis (CFA) and EFA used baseline data to ensure adequate numbers for analysis. Follow-up data were collected through mailed surveys at 3, 5, and 13 months. Follow-up data from the control group (N = 172) were used for test-retest reliability.

Additional Measures

The *Pure grief* subscale of the Miscarriage Grief Inventory (Nikcevic, et al., 1999) and the Centers for Epidemiological Studies-Depression Scale (CES-D) (Radloff, 1977) were used in the assessment of construct (convergent/divergent) validity.

The Miscarriage Grief Inventory (Nikcevic, Snijders, Nicolaides, & Kupek, 1999) is an instrument composed of 17-items which constitute 3 empirically derived subscales (*Pure grief*, *Grief related emotions*, and *Perceived adjustment to miscarriage*). Adapted from the Texas Inventory Grief Scale (Zisook, Devaul, & Click, 1982), it was designed to measure grief symptoms related to miscarriage, as opposed to other perinatal losses. From a sample of 207 women who had experienced a miscarriage within 13 months, baseline reliability estimates (Cronbach's alpha) for *Pure Grief* were .88 in men and women.

The CES-D (Radloff, 1977) is a standardized 20-item instrument used to measure depressive symptoms within the past week. It has been shown to discriminate between psychiatric and general populations (Radloff, 1977). In this study, baseline reliability estimates (alpha) were .92 in women and .86 in men.

Procedures

Data Analysis. To assess whether the original factor structure was valid, CFA was performed. Normality for CFA was assessed with attention to kurtosis and skewness of the data as recommended by Harrington (2009) and Kline (2005). CFA was carried out using maximum likelihood estimation in AMOS 19.0, the default approach when there are missing data (Byrne, 2009; Harrington, 2009). The fit of the model was assessed using a variety of fit indices: a) the absolute fit index or goodness of fit; in this test, the specified model's observed covariance matrix is compared to the expected covariance matrix of a perfectly fitting model using the chi-square statistic and is very sensitive to sample size; b) the relative fit index of the root mean square of error of approximation (RMSEA) which is not sensitive to sample size and takes into account the complexity of the model (number of parameters estimated); and c) the Tucker-Lewis

and comparative fit indices which compare fit relative to a restricted model of no correlation among variables (Byrne, 2010; Harrington, 2009).

Using Statistical Package for Social Sciences (SPSS, version 20), prior to EFA the data were assessed for factorability by evaluation of the correlation matrix, the Kaiser-Meyer-Olkin measure of sampling adequacy, and the Bartlett's test of sphericity. Factorability was confirmed with the correlation matrix containing multiple correlations > .30, a Kaiser-Meyer-Olkin index of .942 (> .5 desired), and Bartlett's test of sphericity being significant ($p < .0001$). Convergence was achieved using principal axis factoring with Promax rotation for a correlated structure with delta set at a default of 4. Pattern and structure matrices were reviewed to assess factor loadings and item-factor correlations. The number of factors set was based on examination of both the scree plot (elbow) and plus/minus one breakpoints. The following guidelines were used to determine the final structure: a) at least 50% of variance was explained by factor structure; 2) items retained had to load at ≥ .40 on a factor; b) in the case of cross-loadings, a difference of greater than 0.15 was necessary for the item to be retained on the highest loading factor; c) factor reliabilities of greater than .70 using Cronbach's alpha statistic; and d) if two different factor structures were identified using previously mentioned criteria, the factor structure with the best substantive interpretability and sufficient factor reliabilities was retained based on various recommendations in the literature (Gorsuch, 1983; Nunnally, 1978; Pett, et al., 2003).

Reliabilities were calculated for men and women to discern any discrepancies based on gender (SPSS, version 20). Test-retest reliabilities (Pearson correlation coefficient) were evaluated comparing control group scores at baseline with post-enrollment scores at 3, 5, and 13 months ($n = 86$). Pearson correlation coefficients were also used to assess convergent/divergent validity between the IMS and CES-D, and IMS and *Pure grief*.

Results

Confirmatory Factor Analysis

Of the potential 8184 (341 women x 24 items) item responses, there were only 5 missing data points. There were no serious violations of normality as described by Byrne (2009). The model was recursive and convergence achieved in nine iterations. None of the fit indices reached the desired specified values and thus the measurement model was not confirmed (see Table 2.2).

Exploratory Factor Analysis

An 18-item, four-factor structure was identified explaining 57.49% of the total shared variance (see Table 2.3). Except for Factor IV, all measures of internal consistency met the aforementioned criteria (Table 2.3). Factor I, *Isolation and guilt,* included 6 items and explained 39.64% of the shared variance. This factor indexed feelings related to guilt and aloneness following the loss. Factor 2, *Loss of baby*, contained 5 items, which indexed the degree to which the miscarriage was viewed as the loss of a baby. This factor explained approximately 7% of the shared variance. Factor 3, *Devastating event*, contained 5 items and addressed the harm or devastation accompanying miscarriage. It explained 6% of the total variance. Factor 4, *Adjustment* contained only 2 items related to adjustment after miscarriage and explained 4.69% of the shared variance. However, with only 2 items, the Cronbach's alphas lower than the acceptable value for women, men, and the combined sample. Factor (subscale) means and standard deviations at baseline as well as 3,5, and 13 months for the control group are provided in Table 2.4.

Convergent/Divergent Validity

The Pearson correlation coefficients for the four Revised IMS (RIMS) subscales (*Isolation and guilt*, *Loss of baby*, *Devastating event*, *Adjustment*) with the CES-D ranged from .42 to .61 for women and .27 to .48 for men (see Table 2.5). Correlations between the RIMS subscales and *Pure grief* were moderate ranging from .50 to .68 for women and .32 to .63 for men (see Table 2.4).   All correlations were statistically significant at $p \leq .01$.

Test-Retest Reliability

In women, *Isolation and guilt* had Pearson correlation coefficients greater than .70 between baseline and 3, 5, and 13 months, with *Loss of baby* and *Devastating event* having correlation coefficients greater than .80 for all three time points (Table 2.5). For men, *Isolation and guilt* test-retest reliabilities between baseline and 3, 5, and 13 months were .66, .72, and .69 respectively. The other two subscales, *Loss of baby* and *Devastating event*, both had test-retest reliabilities greater than .74 for all time points. For both men and women, *Adjustment* test-retest reliabilities showed a downward trend between baseline and 3, 5, and 13 months.

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Discussion

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As expected, given the method and sample size used in the original IMS factor analysis, the measurement model was not confirmed. The EFA revealed a four-factor structure that has some empirical support in the literature for both men and women. The four factors identified were as follows: *Isolation and guilt* - or the degree to which the person feels alone and guilt related to the loss, *Loss of baby* - what the person feels was lost from the miscarriage, *Devastating event* - how the event was experienced, and *Adjustment* - how one perceives personal progress in dealing with the miscarriage. This fourth factor contained only two items, had unacceptable reliability, and addressed coping as opposed to appraisal. Thus, it is

recommended that without additional development the fourth factor ought not be included in the revised measure and that the two associated items ("I have gotten through with dealing with my miscarriage" and "After my (our) miscarriage I was down for several days…") be dropped from the IMS. The three remaining factors are similar in name to three of the original factors: *Loss of baby, Isolated, and Devastating event*; however the items comprising these scales are somewhat different (see Table 2.1). In addition, the original *Personal significance* subscale was dropped, with many of the items loading across the other subscales. *Isolation and guilt*, *Loss of baby*, and *Devastating event*, can be interpreted in terms of stress and coping theory (Lazarus & Folkman, 1984) as identifying the harm incurred and loss associated with the miscarriage.

Factor 1, *Isolation and Guilt*, contains two items that were originally on *Personal significance*. These two items "my (our) miscarriage destroyed my zest for life" and "I feel my body (my partner's body) has betrayed me (us)" express sentiments related to isolation or betrayal and thus are consistent with the other Factor I items. *Isolation and guilt* indexes the isolation experienced subsequent to miscarriage and the guilt-betrayal felt related to the loss. As per stress and coping theory (i.e., Lazarus, 1999; Lazarus & Folkman, 1984;), feelings of isolation and guilt may be viewed as an appraisal of harm to self. Lazarus (1999) states that for guilt to be provoked, one must believe that she/he had some moral failing in the past either real or imagined. When no concrete medical reason for the miscarriage can be given, women may seek their own explanations such as: exercising too vigorously, payback for an elective abortion, or a drink of champagne on New Year's Eve. Hale (2007) points out a potential flaw in care provider's attempt to deflect blame away from the mother for the miscarriage. Prior to and during pregnancy, women are surrounded with messages of the importance of taking care of themselves: eating right, getting enough rest, and abstinence from medications. Yet, once the

miscarriage happens, providers often seek to absolve the woman from any blame by stating there is nothing she could have done. Attribution theory postulates that when faced with a negative event, there is a need to attribute blame or explain why the event occurred and this is important in assigning meaning to the event (Taylor, Lichtman, & Wood, 1984). When a pregnancy ends unexpectedly and in the absence of any other concrete explanation, the woman may turn inward and attempt to reconcile conflicting messages: a) "the health of your pregnancy and baby are the result of your behaviors" and b) "miscarriage is normal and not a result of any of your actions". Simmons Singh, Maconochie, Doyle, and Green, (2006) found support for this conflict in their analysis of qualitative data from the United Kingdom's National Women's Health Study. Thirty-five percent of the 172 narratives ascribed their own actions as causal to the miscarriage. Nikcevic, Tunkel, Kuczmierczyk, and Nicolaides (1999) found that self-blame for a miscarriage was significantly less in women who were given a medical reason for the loss.

One troubling issue on *Isolation and guilt* is the item revised for men: "I feel that my partner's body has betrayed us." Men's responses to this item were skewed, with most men responding with "strongly disagree." What is not known is if men found the item offensive (laden with judgment about their partner) or if they actually experienced their own body as the source of betrayal. There is increasing evidence that defects in male sperm can not only impact fertility, but may also lead to early miscarriage (Khadem, Poorhoseyni, Jalali, Akbary, & Heydari, 2012; Lin et al., 2008). Thus, for some couples in which male infertility may be a factor, this question may not tap into the father's perceived contribution to the miscarriage event.

Factor 2, *Loss of baby* subscale identifies what was lost (i.e. a fetus, person, baby, or pregnancy). Two statements from the original IMS were dropped "miscarriage equals a loss of a part of my partner and me" and "I would describe my miscarriage as just the loss of a

pregnancy." However, one statement "I dwell on the fact that my child will only exist in my memory" loaded on *Loss of baby*, while on the original IMS it was on *Isolated*. This item is congruent with the other items on *Loss of baby*, since it names the loss as a "child" and acknowledges this loss as only a "memory". Johnson and Puddifoot (1996) reported increased grief in men who had viewed a viable fetus on ultrasound or whose partners were further along in pregnancy, suggesting that identifying the pregnancy as the loss of baby may be related to attachment and predict difficulty with the loss in men. Beutal et al. (1996) found that 57% of both men and women had a mental image of the sex of the fetus prior to miscarriage (6-16 weeks gestational age) and that ultrasound visualization had a greater impact on the women's attachment to the fetus than the father's (mean age at miscarriage was 10 weeks).

Factor 3, *Devastating event* is very similar to the original subscale with only one item, "miscarriage equals loss of hope" being dropped from the original scale and one item being added "My miscarriage represents a major setback for me" (Table 2.1). This subscale can be viewed as measuring how the event was experienced as well as the harm suffered. This appraisal may be related to the couple's prior experience, their understanding of the prevalence of miscarriage, and the timing of their loss compared to when miscarriage is normally expected to occur (Lazarus & Folkman, 1984). Thus, in an age when Western medicine has perpetuated the idea that pregnancy can be controlled both in prevention and conception, the uncontrollable nature of miscarriage does not conform to this notion and may increase the harm suffered.

For the most part, test-retest reliability for the control group, revealed stable reliability over 13 months for the three factors in both men and women. This stability suggests that the meaning of the miscarriage, as constructed by the person, may not change over time and thus appraisal of the event may be a constant phenomena for at least one year. What is not clear is if

the meaning assigned to the miscarriage as measured by the RIMS can be altered through intervention. Swanson (1999a) found that women who were exposed to three counseling sessions after miscarriage attached less significance to the miscarriage as measured by *Personal significance* than those in the control group. However, there were no differences in the other subscales over time based on treatment.

Limitations

The findings of small to moderate gender differences in associations between the three RIMS subscales and depression and grief (see Table 2.4), suggest a difference in the way men and women appraise the meaning of miscarriage and/or the ways they regulate emotions subsequent to miscarriage. Men's scores were less correlated with the CES-D and *Pure grief* than women's and this was especially true for *Devastating event* and CES-D. Prior qualitative studies (Puddifoot & Johnson, 1997; McCreight, 2004; Murphy, 1998) describe helplessness and marginalization as common feelings in men as they try to navigate the care-giver role while dealing with their own loss. Ideally, prior to using the IMS in couples, a focus group would have been conducted to ascertain the relevance and comprehensiveness of the IMS in capturing the male experience. Such an exploration would likely have yielded additional items that more fully indexed the male experience.

The IMS has not been used in homosexual couples and therein lies an opportunity to explore gender versus partner experiences as it relates to couples. There is little in the literature regarding homosexual couples' experiences, but in addition to the experiences of heterosexual couples, homosexual couples may be confronted with cultural values related to their rights to pregnancy and further marginalization of the partner's role in the experience (Peel, 2010; Wojnar, 2007; Wojnar, Swanson, Adolfsson, 2011).

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The statements from the original IMS were taken from emic statements made by women regarding what was lost or gained through miscarriage (Swanson-Kauffman, 1983). In a review of the statements from the original study, several participants cited "becoming closer with their partner" or experiencing some growth as a human being (Swanson-Kauffman, 1983). Others have also reported that the miscarriage experience was viewed as an opportunity for growth for some women (Letherby, 1993; Swanson, Connor, Jolley, Pettinato, & Wang, 2007; Wojnar, et al., 2011). There are no statements in the original IMS that reflect potential opportunities for growth introduced through miscarrying. Inclusion of items that capture miscarriage as a learning or growth experience may be important in assessing the full range of meanings attributed to the event (Lazarus, 1999).

Lazarus (1999) describes threat as the appraisal of the potential for future harm. The threat to future pregnancy loss is not included in either the RIMS or IMS. Swanson-Kauffman (1983) described the experience of "Trying again" as relevant to understanding the full impact of miscarrying. Central to this theme was the concern of not only what could happen with a future pregnancy but also feeling more "vulnerable to other losses" (Swanson-Kauffman, 1983 p. 211). Murphy and Merrell (2009) found that women do worry about future pregnancies after a miscarriage. Pregnancy after loss may also be viewed as a threat (Côté-Arsenault, 2007). In addition, others have found that in pregnancies after miscarriage, women experience higher pregnancy related anxiety than women with no previous miscarriage history and that they are more likely to interact with the healthcare system (Hutti et al., 2011).

The sample populations for both the Miscarriage Caring Project and Couples Miscarriage Healing Project were heterosexual, predominantly White, well educated and recruited from the Pacific Northwestern region of the United States. Caution is warranted in applying this

instrument with other populations for future research and clinical purposes. For example, Van and Meleis (2003) reported the sentiment of one African American woman as being typical of their sample, "…we are not expected to go to counseling and [are] brought up to make it on our own, to try to be strong, …[We're taught that] the only thing you need to do is get on your knees [to pray] and you'll be ok.' (p. 32). African American women may be at greater risk than White women for both singular and multiple pregnancy loss (Price, 2008). Thus, understanding the experience of miscarriage in African American women and other non-Caucasian groups is important for effective care.

Implications for Nursing Education, Research, and Practice

Understanding the significance or meaning that individuals assign to life events and how this impacts their ability to cope successfully is necessary for developing evidenced based strategies to meet the needs of patients and their families. As our society confronts family formation in various forms, opportunities to explore the meaning of miscarriage and other forms of reproductive loss with regards to gender, partner, and cultural norms will help inform care that is sensitive to the needs of the patient and their partner. Further enhancement and testing of the RIMS with items that index a greater range of partner experiences and cultural meanings is warranted. In addition, how the appraisal of miscarriage impacts future pregnancies and healthcare interaction is an area that warrants further study. If future testing of the RIMS reveals that the appraisal of the miscarriage event is time invariant, then it may be a useful instrument to identify patients with prior miscarriage that may need additional support in current pregnancies.

Conclusions

This exploratory analysis of the IMS resulted in a revised measure (RIMS) with a three-factor structure with acceptable reliabilities in both men and women. It has the potential to

identify those who may experience greater harm, loss, or threat through miscarriage and, consequently, face greater difficulty coping with miscarriage. Important next steps in establishing the validity of the RIMS include testing its ability to differentiate groups for whom miscarriage may have different meanings and to predict those in greater need of support. In addition, further exploration of partner's experiences in reproductive loss will enhance the RIMS ability to fully evaluate the impact of miscarriage and assist in the development and possibly the evaluation of interventions to facilitate positive coping strategies.

Table 2.1

Items on the Original and Revised IMS Scales

Item	Original IMS Subscale	Revised Subscale
My (our) miscarriage destroyed my zest for life.	PS	Isolation/guilt
I feel my body has betrayed me.		Isolation/guilt
When I think of my miscarriage, I still feel emotional pain.*		
My miscarriage represents a major setback for me.		Devastating event
After my miscarriage I was down for several days but then I got over it.		Adjustment
I have gotten through with dealing with my miscarriage.		Adjustment
Miscarriage equals a loss chance to be a mother/father. *		
Miscarriage equals a loss of a part of my partner and me.*	LB	
Through miscarriage, I feel I lost a part of myself.		Loss of baby
I feel there will always be a place in my heart for the miscarried baby.		Loss of baby
Through miscarriage I feel that I have lost a person.		Loss of baby
I get irritated when my miscarried baby is called a fetus.		Loss of baby
I would describe my miscarriage a just the loss of a pregnancy.*		
I felt much alone in my loss.	Isolated	Isolation/guilt
Through my (our) miscarriage, I have experienced a loss of pride in myself.		Isolation/guilt
I dwell on the fact that my child will only exist in my memory.		Loss of baby
I wonder "why did miscarriage happen to me." *		
I feel guilt about my miscarriage.		Isolation/guilt
I feel very isolated by my miscarriage.		Isolation/guilt
My miscarriage was a horrendous, devastating event.	DE	Devastating event
Miscarriage equals one big loss of control.		Devastating event
Miscarriage is like going from one extreme of happiness to the other, total unhappiness.		Devastating event
Miscarriage is a nightmare.		Devastating event
Miscarriage equals loss of hope. *		

Note. PS = Personal significance, *LB* = Loss of baby, *DE* = Devastating event. * Dropped from IMS after factor analysis.

Table 2.2

Results of Confirmatory Factor Analysis of the IMS

Fit Indices	Desired Value*	Sample Value (*df, p*)
χ^2	*p* > .05	792.64 (246, < .0001)
RMSEA	< .06	.08
TLI	≥ .95	.79
CFI	> .95	.83

Note. * based on Byrne (2010). TLI = Tucker-Lewis Index. CFI = comparative fit index.

Table 2.3

Revised IMS Scale Factor Loadings and Reliabilities

Subscale and Items (variance explained)	Factor Loading	Alphas		
		Women	Men	Combined
Isolation/Guilt (39.64%)		.78	.82	.82
Through my (our) miscarriage, I have experienced a loss of pride in myself.	.75			
I feel guilt about my (our) miscarriage.	.67			
I feel very isolated by my (our) miscarriage.	.65			
I feel my (partner's) body has betrayed me.	.62			
I felt much alone in my loss.	.48			
My (our) miscarriage destroyed my zest for life.	.45			
Loss of Baby (7.12%)		.80	.84	.83
Through miscarriage I feel that I have lost a person.	.85			
I feel there will always be a place in my heart for the miscarried baby.	.73			
I get irritated when my (our) miscarried baby is called a fetus.	.60			
I dwell on the fact that my child will only exist in my memory.	.56			
Through miscarriage, I feel I lost a part of myself.	.50			
Devastating Event (6.04%)		.81	.81	.83
Miscarriage is a nightmare.	.87			
Miscarriage is like going from one extreme of happiness to the other, total unhappiness.	.79			
My (Our) miscarriage was a horrendous, devastating event.	.67			
My (Our) miscarriage represents a major setback for me.	.52			
Miscarriage equals one big loss of control.	.44			
Adjustment (4.69%)		.69	.48	.62
I have gotten through with dealing with my (our) miscarriage.	.75			
After my (our) miscarriage I was down for several days but then I got over it.	.60			

Table 2.4

Correlations Between RIMS Subscales and the CES-D
and Pure Grief Subscale of the Miscarriage Grief Inventory

RIMS Subscale	CES-D	MGI-Pure grief
	r	*r*
Isolation/guilt		
women	.61	.57
men	.48	.49
combined	.63	.63
Loss of baby		
women	.42	.61
men	.31	.63
combined	.43	.66
Devastating event		
women	.50	.68
men	.29	.62
combined	.47	.70
Adjustment		
women	.50	.50
men	.27	.32
combined	.46	.49

Note. All correlations significant, $p < .01$. All comparisons are with baseline values. Combined = women and men together

Table 2.5

Revised IMS Mean Subscale Scores and Test-Retest Reliabilities for Control Group with Baseline Scores

Sample/Time	Isolation/Guilt			Loss of Baby			Devastating Event			Adjustment		
	n	Mean *(SD)*	*r*	*n*	Mean *(SD)*	*r*	*n*	Mean *(SD)*	*r*	*n*	Mean *(SD)*	*r*
Women												
Baseline	86	12.41 (4.00)	NA	86	12.69 (4.00)	NA	86	14.07 (4.03)	NA	85	5.93 (1.64)	NA
3 months	77	12.12 (4.88)	.76	77	12.34 (4.32)	.83	79	13.57 (4.41)	.87	79	5.49 (1.68)	.60
5 months	79	11.92 (4.28)	.75	79	12.43 (4.16)	.83	79	13.52 (4.47)	.82	79	5.47 (1.62)	.56
13 months	79	12.00 (4.55)	.71	79	11.94 (4.18)	.86	79	13.37 (4.33)	.82	78	5.12 (1.71)	.48
Men												
Baseline	85	9.34 (3.34)	NA	86	11.24 (4.23)	NA	86	11.65 (3.87)	NA	85	4.93 (1.74)	NA
3 months	80	9.20 (3.33)	.66	80	10.86 (4.08)	.88	78	11.09 (4.14)	.83	79	4.52 (1.50)	.55
5 months	78	9.33 (3.56)	.72	79	10.61 (3.97)	.84	79	10.96 (4.55)	.80	79	4.48 (1.48)	.52
13 months	76	9.30 (3.39)	.69	76	10.72 (3.89)	.83	76	11.26 (3.96)	.75	76	4.50 (1.33)	.37
Combined												
Baseline	171	10.88 (3.99)	NA	172	11.96 (4.17)	NA	172	12.86 (4.12)	NA	170	5.43 (1.76)	NA
3 months	157	10.63 (4.40)	.76	157	11.59 (4.25)	.86	157	12.34 (4.44)	.87	156	5.01 (1.66)	.61
5 months	157	10.64 (4.15)	.77	158	11.52 (4.16)	.84	158	12.24 (4.67)	.82	156	4.97 (1.62)	.58
13 months	155	10.68 (4.23)	.74	155	11.34 (4.07)	.84	155	12.33 (4.27)	.80	152	4.80 (1.56)	.46

Note. *r* = Pearson's *r* correlation coefficient. All correlations significant ($p < .01$).

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CHAPTER 3: COUPLES AND SPONTANEOUS ABORTION: THE INFLUENCE OF GENDER, MENTAL HEALTH TREATMENT HISTORY, AND REPRODUCTIVE FACTORS ON THE MEANING OF MISCARRIAGE

Introduction

Miscarriage or the spontaneous loss of a pregnancy is a common occurrence. The risk of miscarriage rises with advancing maternal age from 7-15% in women under the age of 30 to 34-52% in women over the age of 40 (Hassold & Chiu, 1985; Maroulis, 1991; Speroff & Fritz, 2005; Stein, 1985; Warburto, Kline, Stein, & Stobino, 1986). The impact of miscarriage has most often been studied in women; a few studies have looked at the male experience from both a qualitative (Beutel, Willner, Deckardt, Von Rad, & Weiner, 1996; Murphy, 1998; Puddifoot & Johnson, 1997) and quantitative perspective (Beutel et al., 1996; Franche, 2001; M. P. Johnson & S. R. Baker, 2004; Kagami et al., 2012; Kong, Chung, Lai, & Lok, 2010; Stinson, 1992; Swanson, Chen, Graham, Wojnar, & Petras, 2009). The experience of miscarriage can be a substantial loss for women, their partners, and a threat to the couple's relationship (Carter, Misri, & Tomfohr, 2007; Swanson, Karmali, Powell, & Pulvermakher, 2003). There can be significant grief and/or depressive responses following miscarriage (Beutel, Deckardt, von Rad, & Weiner, 1995; Cumming et al., 2007; Kong et al., 2010; Lok, Yip, Lee, Sahota, & Chung, 2010; Neugebauer et al., 1992a; Swanson et al., 2009). Moreover, psychological morbidity can be present for several months to over a year after the event (Cumming et al., 2007; Lok et al., 2010; Swanson et al., 2009). As providers, it is important to identify couples who may be more impacted by the miscarriage and offer support that is relevant to the couples' experiences and expectations.

Several studies have sought to answer the question of who is more likely to suffer negative emotional consequences from pregnancy loss through identification of personality traits and interpersonal resources (Barr, 2004; Engelhard, van den Hout, & Schouten, 2006; Franche, 2001; Janssen, Cuisinier, de Graauw, & Hoogduin, 1997). However, from a clinical perspective, this information is not generally in the scope of the health care provider. Identification of factors that impact the response to miscarriage and that are within the scope of assessment for the clinician may prove more useful. A history of depression or other psychiatric illness has consistently been found to have a negative impact on initial adjustment after miscarriage (Beutel et al., 1995; Cumming et al., 2007; Engelhard et al., 2006; Mann, McKeown, Bacon, Vesselinov, & Bush, 2008; Neugebauer et al., 1997). Studies have also identified certain physical/contextual factors that may influence the emotional impact of the miscarriage. These factors include fertility status (Cheung, Chan, & Ng, 2013), previous miscarriage history (Swanson, 2000; Thapar & Thapar, 1992), age of the mother (Janssen, Cuisinier, Hoogduin, & de Graauw, 1996; Neugebauer, 2003; Swanson, 2000), presence of living children (Adolfsson, Bertero, & Larsson, 2006; Janssen et al., 1997; Swanson, 2000), and gestational age at loss (Janssen et al., 1997; Neugebauer et al., 1992b). Studies have found inconsistent effects with these physical/contextual factors; few studies have included men, and many studies have not explored interaction effects. Most studies have relied on instruments designed to measure emotional symptomatology (grief, depression, anxiety).

Lazarus and Folkman (1984) theorized that how an event is cognitively appraised (harmful, threatening, benign-positive), also known as primary appraisal, is related to the meaning of the event to the individual. This initial appraisal and the person's secondary appraisal of what, if anything, can be done contribute to the outcome of an event from both a

physiological and psychological perspective.   Differences in the appraisal process are thought to contribute to the individual variation in how one copes with the event and the psychological and physical responses. Thus, measures that are designed to index the meaning of the event to the individual may be more beneficial in predicting those for whom coping may become ineffective. The purpose of this study, therefore, was to assess the influence of previously identified contextual and obstetrical factors on the impact of miscarriage as measured by the Revised Impact of Miscarriage Scale (RIMS) (Huffman et al., in press), an instrument designed to measure the meaning of miscarriage.

The specific research questions addressed were:

In a sample of 341 couples within 3 months of miscarriage, what are the effects of mental health history, fertility status, prior miscarriages, number of living children, age, and gestational age at loss on the impact of miscarriage on 1) men, 2) women, and 3) couples?

Materials and Method

Design

This was a cross-sectional comparative study using data gathered at baseline for all participants from the Couples Miscarriage Healing Project (CMHP), a randomized controlled clinical trial assessing the effects of three theory-based interventions on grief and depression as experienced by couples during the first year after a miscarriage (Swanson et al., 2009). Approval for this secondary analysis was obtained from the University of North Carolina at Chapel Hill Institutional Review Board.

Sample

Only English-speaking, heterosexual couples, 18 or older, were recruited for the CMHP. Each member of the couple was instructed to complete all mailed surveys independent of their

partner. Baseline data were collected within three months of miscarriage and prior to randomization to experimental treatment conditions. Demographic data are presented in Table 1.

Measures

The RIMS (Huffman et al., 2014) is a 16-item, Likert–type instrument designed to measure the impact of miscarriage by assessing the meaning of the miscarriage as experienced by the individual through three subscales. The subscales are: 1) *Isolation/Guilt* (*I/G*), or how alone or guilty an individual feels after miscarriage, having a maximum score of 24; 2) *Losing a Baby* (*LB*), or how strongly the miscarriage is identified as the loss of a baby/person, having a maximum score of 20; and 3) *Devastating Event* (*DE*), or the degree of hopelessness the miscarriage engendered, having a maximum score of 20. The RIMS was administered to both women and men in the CMHP. Cronbach's alpha reliabilities for the *I/G*, *LB*, and *DE* subscales were calculated for the overall sample (.82, .83, .83, respectively) and separately for men (.78, .80, .80, respectively) and women (.78, .84, .81, respectively). The *I/G* and *DE* subscales are positively associated with grief as measured by the *Pure Grief* subscale of the Miscarriage Grief Inventory (Nikcevic, Snijders, Nicolaides, & Kupek, 1999) (*I/G*: $r = .63$, $p < .01$; *DE*: $r = .70$, $p < .01$) and depression as measured by Centers for Epidemiological Studies-Depression Scale (CES-D) (Radloff, 1977) (*I/G*: $r = 63$, $p < .01$; *DE*: $r = .47$, $p < .01$) (Huffman et al., in press).

Mental health treatment history (MHT) was classified as either yes or no and based on whether the participant had reported having ever been treated for grief, depression, or anxiety. Infertility was self-reported with couples asked (yes / no) whether they had experienced infertility. All continuous contextual and obstetrical factors of respondents were categorized. Number of living children was classified into three groups based on reported number of "children born alive" (none, one, or 2 or more). Miscarriage history was classified into 3 groups

(first, second, and third or greater). The latter group having three or more miscarriages is consistent with the diagnosis of recurrent pregnancy loss (Speroff & Fritz, 2005). Age at the time of miscarriage was designated 34 or less ("younger") or 35 or older "older", based on the common clinical cut-point of 35 as an age associated with diminishing fertility as well as greater risk for fetal genetic defects. Gestational age at miscarriage was classified as early miscarriage (up to 7 weeks 6 days), late 1st trimester miscarriage (8 weeks to 12 weeks, 6 days), or second trimester loss (13 weeks to 20 weeks, 6 days).

Statistical Analysis

Normality of the distribution was assessed by examining baseline subscale quantile - quantile plots in men, women, and couples and residual plots of the models. In cases where the residual plots deviated from normality, subscale scores were log transformed to determine if normality assumptions improved. In those cases, models were run with both raw and log transformed data. If there were no substantive differences between log transformed and non-transformed models, non-log transformed models were retained for ease of interpretation.

In step 1, all data were analyzed for men and women separately and without regard to couple status. Multifactorial Analysis of Variance (ANOVA) of all 2-way interactions were used to assess main effects and pairwise interactions for all factors (age, MHT, fertility status, miscarriage history, number of living children, and gestational age) on RIMS subscale scores. To ensure parsimony, the joint test (Maxwell & Delaney, 2004) was used to test if the model with all pairwise interactions was significantly better than the main effects model. If there were no significant differences, the main effects model was retained. If significant, a sequential, backward selection approach was used to simplify each model beginning with all possible 2-way

interactions. At each step, the interaction terms were tested for significance and dropped if found nonsignificant.

In the second step, the couple was treated as the unit of analysis and the model accounted for the dependence between the male and female members of a given couple. Gender was added as an additional factor to models and all 3-way interactions with gender were included along with all 2-way interactions. Age of the female was used in couple models for the age effect. Presence of MHT was coded as yes if either or both members of the couple had a history of treatment for grief, depression, or anxiety. Models were tested for significance against the main effects model using the chi-square test for goodness of fit and simplified as above if the interactions were found to be significant. Except for the main effects of gender, reported mean scores consequently reflect a statistical averaging of the male and female scores combined.

The level of significance was set at $\alpha = .05$ with the Tukey-Kramer correction for multiple comparisons. Separate ANOVA models in men and women were fitted using the General Linear Model procedure in SAS v 9.2 (SAS Institute, Cary, NC). Analyses assessing the couple as a unit were performed using the MIXED procedure in SAS v 9.2. Except for descriptive statistics, *least squares* means (*M*) are reported with standard errors; these represent means as adjusted for all other terms in the model.

Results

The sample consisted of 341 heterosexual couples. The mean age for men was 33.91 (*SD* = 6.7, range 18-53) years and for women was 32.38 (*SD* = 6.0, range 18-48) years. Mean subscale scores for women were: *I/G* = 12.92, (*SD* = 4.23, range 6-24), *DE* = 14.30 (*SD* = 3.91, range 5-20), *LB* = 12.84 (*SD* = 4.02, range 5-20). Mean subscale scores for men were: *I/G* = 9.00 (*SD* = 3.12, range 6-24), *DE* = 11.59 (*SD* = 3.92, range 5-20) and, *LB* = 10.45 (*SD* = 4.08, 5-20).

Mean gestational age at time of miscarriage was 9.8 (*SD* 3.10) weeks. Demographic characteristics are described in Table 3.1.

Results of ANOVA in Women

Table 3.2 displays results of the ANOVA analyses as separately conducted in women. Although there were some deviations from normality for the subscale scores in men and women, there were no substantive differences from models fitted to log transformed data; thus, untransformed models were reported. Joint tests favored main effects models over full models for all subscales (See Table 3.2). There were no significant interactions. Age, MHT, fertility status, miscarriage history, children living, and gestational age at loss were all significant factors affecting the impact of miscarriage on women.

Age. Younger women were more likely to feel isolation and guilt (*M* = 14.71, *SE* = 0.43 vs. *M* = 12.59, *SE* = 0.44, *p* ≤ .0001). Compared to older women, younger women were more devastated by the miscarriage (*M* = 15.64, *SE* = 0.40 vs. *M* = 13.72, *SE* = 0.41, *p* ≤ .0001) and more likely to view the miscarriage as the loss of a baby (*M* = 14.53, *SE* = 0.41 vs. *M* = 12.38, *SE* = 0.42, *p* ≤ .0001).

MHT. Women with a MHT history experienced greater feelings of isolation and guilt than women without any such history (*M* = 14.46, *SE* = 0.42, vs. *M* =12.84, *SE* = 0.44, *p* ≤ .001). MHT history was not a significant factor in the degree of devastation felt or the extent to which the miscarriage was perceived as the loss of a baby.

Infertility. Compared to women with infertility, those fertile felt less isolation and guilt (*M* =12.99, *SE* = 0.37 vs. *M* =14.30, *SE* = 0.54, *p* < .05) and less devastation (*M* =14.13, *SE* = 0.34, vs. *M* =15.22, *SE* = 0.50, *p* < .05).

Miscarriage History. Compared to women with two miscarriages, those experiencing their first miscarriage felt less isolated and guilty ($M = 12.64$, $SE = 0.39$ vs. $M = 14.43$, $SE = 0.55$, $p \leq .001$) and less devastated by the event ($M = 13.88$, $SE = 0.36$, vs. $M = 15.20$, $SE = 0.51$, $p < 0.05$). There were no significant differences between those with three or more miscarriages and either of the other comparison groups.

Living Children. Women having at least 2 children were more likely to view the loss as a baby when compared to women with no children ($M = 14.69$, $SE = 0.58$ vs. $M = 12.90$, $SE = 0.49$, $p \leq .01$) or only one child ($M = 14.69$, $SE = 0.58$ vs. $M = 12.78$, $SE = 0.46$, $p \leq .01$). The presence of living children had no significant impact on isolation/guilt or devastation experienced.

Gestational Age. Compared to those who miscarried early, women who had late first trimester miscarriages were more inclined to view their miscarriage as a devastating experience ($M = 13.80$, $SE = 0.43$ vs. $M = 14.98$, $SE = 0.36$, $p < .05$). Women whose loss occurred in the second trimester also scored higher on the *DE* subscale, but this did not reach statistical significance.

Results of ANOVA in Men

Table 3.3 displays results of the ANOVA analyses as separately conducted in men. Joint tests favored main effects models over full models for all subscales. There were no significant interactions detected among the identified factors. Mental health history, infertility, and miscarriage history did not have an effect on any of the subscale scores in men.

Age. Age contributed significantly to the experience of guilt and how the loss was viewed for men. Younger men (< 35) were more likely to feel isolation and guilt than older men

(M = 10.07, SE = 0.35 vs. M = 9.15, SE = 0.33, p = 0.009) and to view miscarriage as the loss of

a baby (M = 11.52, SE = 0.46 vs. M = 10.54, SE = 0.42, p = 0.031).

Living Children. Men with no living children were more likely to view the miscarriage

as devastating than men with one child (M = 12.40, SE = 0.42 vs. M = 11.09, SE = 0.47, $p \leq$ .05).

Men with two or more children (M = 12.11, SE = 0.62) were more likely than those with no

children (M = 10.49, SE = 0.43, p = .03) or only 1 child (M = 10.48, SE = 0.48, p = .042) to

identify the miscarriage as the loss of a baby.

Gestational Age. Gestational age contributed significantly to men's guilt and likelihood

of viewing miscarriage as the loss of a baby. Men whose partners miscarried in the 2nd trimester

(M = 10.58, SE = 0.53) were more likely to feel isolated than those with early first trimester (M =

8.96, SE = 0.36, p = .015) and late first trimester miscarriages (M = 9.28, SE = 0.31, p =.039) and

most likely to view the miscarriage as loss of a baby (M = 12.75, SE = 0.69, vs. M = 10.02 [early

miscarriage], SE = 0.47, $p \leq$ .0001 and M = 12.75 [2nd trimester loss], $p \leq$ .01). Although there

was a trend for men to feel more devastated as gestational age increased, this trend did not reach

statistical significance.

Results of ANOVA in Couples

Table 3.4 displays results of the ANOVA analyses as conducted in couples.

Interaction Effects. There were no significant interactions with gender. Unlike the

separate analyses in men and women, there were significant interactions for two of the subscales

(*I/G* and *DE*), and these models were favored over the corresponding main effects models. All *p*

values for pairwise comparisons subsumed by an interaction were adjusted based on the Tukey

method. Younger couples with a history of MHT in either partner (M =13.30, SE= 0.36), felt

more isolated than younger couples with no such history (M =11.64, SE = 0.36, $p \leq$ .0001) and

older couples without MHT ($M = 10.70$, $SE = 0.34$, $p \leq .0001$) and older couples with MHT ($M = 11.13$, $SE = 0.38$, $p \leq .0001$). Couples who experienced their first miscarriage as an early loss were less devastated when compared to couples who experienced their first miscarriage late in the first trimester ($M = 11.65$, $SE = 0.35$ vs. $M = 13.04$, $SE = 0.29$, $p < .05$) or in the second trimester ($M = 11.65$ vs. $M = 13.86$, $SE = 0.52$, $p < .01$); or to those experiencing their second miscarriage in late first trimester ($M = 11.65$ vs. 13.99, $SE = 0.40$, $p \leq .001$).

Significant main effects were observed for gender, fertility status, miscarriage history and number of children (Table 3.4). Women were overall more impacted by the miscarriage event than men; this held true for all subscales.

Female Age. Younger couples were more likely to identify the miscarriage as the loss of a baby than their older counterparts ($M = 12.94$, $SE = 0.30$ vs. $M = 11. 48$, $SE = 0.30$, $p \leq .0001$) and were more devastated by the miscarriage ($M = 13.92$, $SE = 0.31$, vs. $M = 12.38$, $SE = 0.30$, $p \leq .0001$).

MHT. Couples with a MHT history were more likely to be devastated than those with no such history ($M = 13.48$, $SE = 0.32$ vs. $M = 12.83$, $SE = 0.29$, $p < .05$).

Infertility. Compared to those who were fertile, couples reporting infertility were more devastated ($M = 13.59$, $SE = 0.37$ vs. $M = 12.72$, $SE = 0.27$, $p < .05$) and experienced more isolation and guilt ($M = 14.03$ $SE = 0.34$, vs. $M = 11.20$, $SE = 0.24$, $p \leq .01$).

Miscarriage History. Couples who miscarried for the second time felt more isolation and guilt than those experiencing their first loss ($M = 12.32$, $SE = 0.35$, vs. $M = 11.00$, $SE = 0.25$, $p \leq .01$).

Children. Couples with two or more children were more likely to identify the miscarriage as the loss of a baby than couples with no children ($M = 13.34$, $SE = 0.42$, vs. $M =$

11.66, $SE = 0.29$, $p \leq .001$) or only one child ($M = 13.34$ vs. $M = 11.63$, $SE = 0.33$, $p \leq .01$).

Those with no children were more devastated than couples with one child ($M = 13.60$, $SE = 0.30$ vs. $M = 12.68$, $SE = 0.30$, $p < .05$).

Gestational Age. Compared to couples who miscarried in the second trimester, those with a very early first trimester loss felt less isolated and guilty ($M = 11.19$, $SE = 0.29$, vs. $M = 12.40$, $SE = 0.44$, $p < .05$) and were less likely to view their miscarriage as the loss of a baby ($M = 11.28$, $SE = 0.32$, vs. $M = 13.50$, $SE = 0.0.48$, $p \leq .0001$). Couples with a late first trimester loss were also less likely to view the loss as a baby compared to those who miscarried in the second trimester ($M = 11.72$ vs. 13.50, $p \leq .001$).

Discussion

The unique contribution of this study is that it focused on the meaning of miscarriage from both an individual and couple perspective in a large sample of couples who had recently experienced a miscarriage. Our findings identified several factors that contribute to greater meaning being placed on the miscarriage event. We found no significant interactions of gender with any of the identified factors in the couple models even though separate analyses showed that men were more likely to differ on their scores based on gestational age and number of children and women were more likely to differ based on number of prior miscarriages, infertility, and history of mental health treatment. Thus, it would appear that both men and women are influenced by their partner in how they appraise the miscarriage event.

Few studies have analyzed men's responses to miscarriage or quantified their reactions, but in those that have, it has been found that men's psychological morbidity related to miscarriage is for the most part significantly less than women's (Beutel et al., 1996; Cumming et al., 2007; Swanson et al., 2009). Our results confirm this with men reporting significantly less

impact than their female partner (see Table 3.4). For both men and women, age at time of miscarriage contributed to impact with younger women scoring higher on all three subscales and younger men scoring higher on *I/G* and *LB* subscales. However, it should be highlighted that the RIMS may not fully index the male experience of miscarriage and thus the impact in men may be underestimated (Huffman et al., in press).

In the couple analysis there were two interaction effects. Young couples with at least one member previously treated for anxiety, depression, or grief experienced more isolation and guilt than young couples with no MHT history. Age appears to moderate the effect of previous MHT on isolation and guilt, since there was no difference seen in older couples with and without a history mental health treatment. The interaction effect between miscarriage history and gestational age on the *DE* subscale demonstrates that gestational age has a moderating effect on miscarriage history as it relates to the devastation experienced by the current miscarriage. This simple effect of first miscarriage at < 8 weeks gestation being less devastating than miscarriages at later gestational age in first or second miscarriages, may be related to several factors including: 1) couples having less opportunity to form attachment or fantasize about the "child" and parenting, and 2) the low likelihood of having a dilation and curettage (D&C) before 8 weeks gestation. In this sample, only 24% of subjects had a D&C at < 8 weeks gestation while 49% of subjects who miscarried ≥ 8 weeks underwent a D&C. There are anecdotal accounts of emotional trauma related to D&C procedure and hospital experience (Gerber-Epstein, Leichtentritt, & Benyamini, 2008; Murphy, 1998; Smith, Frost, Levitas, Bradley, & Garcia, 2006). Wieringa-de Waard et al. (2002) found that mental health related quality of life improved more rapidly in women who were randomized to expectant management for miscarriage versus

surgical management, indicating that the D&C procedure itself may contribute to the devastation experienced with miscarriage in addition to gestational age at loss.

Fertility status, fertile versus infertile, contributed to the levels of devastation and isolation/guilt experienced by the couples. Others have found that women with infertility experience an added sense of hopelessness after miscarriage (Freda, Devine, & Semelsberger, 2003; Harris & Daniluk, 2010) move Nikcevic & Nicolaides, 2013). This may be related to the repeated disappointment that often accompanies infertility treatment. Our findings support that infertility was a significant contributor to the sense of hopelessness through the *DE* subscale. Our analysis focused on only the self-report of infertility and did not look at the length of time to pregnancy or whether treatment was required to conceive. These two variables may further influence infertility's effect on the experience of miscarriage. Cheung et al. (2013) in a sample of 150 women, found that those who conceived via assisted reproductive technologies ($n = 75$) were more likely to be distressed at 4 and 12 weeks after miscarriage than those who conceived naturally ($n = 75$). Nikcevic, Tunkel, Kuczmierczyk, and Nicolaides (1999) in a study of 143 women with ultrasound detected early pregnancy loss (< 14 weeks) found that at 4 months post-loss, those whose conception was "assisted" experienced more depression and grief. It would be expected that couples with more time and money invested in conception and more involved treatment (e.g., in vitro fertilization) may feel more hopeless or guilty especially if they are unable to resume infertility treatment due to lack of resources. We were unable to fully assess the role of infertility due to missing and incomplete data regarding time to conceive and treatment required. Fertility status had no bearing on the perception of miscarriage as the loss of a baby.

Miscarriage history significantly influenced the feeling of isolation and guilt and devastation following the miscarriage. Couples having their second miscarriage were much

more likely to report higher *I/G* than those with no prior miscarriage history. As previously

noted, there was an interaction effect with miscarriage history and gestational age in relation to

the feeling of devastation. In the analysis of men and women separately, miscarriage history

exerted an effect only in women. Thus, while women uniquely experience the physical act of

miscarriage it appears that men are influenced by their partner's miscarriage history when the

couple relationship is considered.

Studies are inconsistent regarding miscarriage history and the emotional impact of

miscarriage. Neugebauer et al. (1997) found that the relative risk of a major depressive disorder

in the six months following a miscarriage *was not* related to previous miscarriage history. Our

data show a significant difference in isolation and guilt between the first miscarriage and the

second but not between the first and third or more or between the second miscarriage and third or

more. Rowlands and Lee (2010) examined the general mental health of 998 women who

reported at least one miscarriage over a 7-year period to identify predictors of negative versus

positive trajectories using data from the Australian Longitudinal Study on Women's Health.

Women reporting ≥ 2 miscarriages had significantly lower general mental health scores than

those experiencing their first, however when other variables were included in the model (coping

resources, psychological variables, educational status), miscarriage history was no longer

significant. Klock, Chang, Hiley, and Hill (1997) found that 32% of women with repeated

miscarriages (≥3) were depressed and reported higher than average levels of anxiety when

compared to the general population as assessed by the Beck Depression Inventory (Beck, Steer,

& Garbin, 1988) and the State-Trait Anxiety Inventory (Spielberger, Gorusch, Lushene, Vagg, &

Jacobs, 1983). However, they found no significant differences in scores on the psychological

measures between women with three or more and those with only two miscarriages. There were

no comparisons made with women having only one miscarriage nor did they control for time since last miscarriage. Neugebauer et al. (1992b) assessed women within 4 weeks of miscarriage for depression using the CES-D. Although it did not reach significance, depression scores in their sample of women experiencing their second miscarriage ($M = 25.8$) were higher than those experiencing their first ($M = 23.9$) or third or more ($M = 21.6$). In our study, the means for all three subscales were lower for women who had suffered 3 or more miscarriages compared to those who had suffered their second, although it did not reach statistical significance. This may represent couples avoiding attachment to the pregnancy based on their prior experience.

For many, the first miscarriage may be seen as an unfortunate but normal event, while the second may evoke greater fear concerning their ability to successfully carry a child to term. Given that women with their second miscarriage have not met the diagnostic criteria for repeated pregnancy loss, they may not have been referred for further work-up and thus may experience more anxiety related to future pregnancies. Although provision of accurate information to couples is needed regarding causes and chances for a normal subsequent pregnancy, sensitivity to the present loss is essential. Miscarriage may be a "normal" event in reproduction; however, it is anything but normal for the woman or couple experiencing the event (Wong, Crawford, Gask, & Grinyer, 2003). It also demonstrates that waiting until 3 miscarriages before initiating a work-up may not be in the best emotional interest of the couple, although over half of all couples may never have an identifiable cause for their pregnancy losses (Speroff & Fritz, 2005).

Having a child appears to offer some protection from the feeling of hopelessness and devastation in couples. Cecil (1994b) in her interview of 27 women following miscarriage found that although women generally found some comfort in living children "…there existence did not provide an alternative to the desire for a baby" (p. 421). Others have found that the absence of

children to be associated with higher depression scores (Klier, Geller, & Ritsher, 2002a, 2002b) and grief (Adolfsson et al., 2006). In regards to the *DE* subscale, couples with no children scored significantly higher compared to couples with one child, but not compared to couples with ≥ 2 children.   This finding is somewhat unexpected since it would seem reasonable that couples with any number of children would score similarly. It may be that couples who have more children are actively trying to extend their family. Desired family size has been associated with religious affiliation with larger families being more desired in pronatalist Christian denominations (e.g. Catholic, Mormon, and conservative-Protestant) (Adsera, 2006). Although there is little in the research literature regarding how miscarriage may be experienced in couples from pronatalist traditions, an article posted on a Catholic website, expressed the pain of one woman of her miscarried "souls", her feelings of being judged as not "a good Catholic", and her desire to have more children, although she had three living children (Edmisten, 2007). Data on religious affiliation were not collected, thus we cannot comment on whether this may be a factor in the current study. In the separate analyses in men and women, having one child appeared to buffer the sense of devastation in men; however, this was not true in women.

This study also highlights that having children does not necessarily reduce the impact of miscarrying. It is interesting to note that couples with two or more children trended toward feeling more devastated by the miscarriage than those with only one child. Although the difference was not statistically significant, caution is warranted when making assumptions that the impact of miscarriage is less in couples with more children. Provision of support and follow-up with a couple is warranted regardless of whether there are other children present. Assessment of a couple's desired family size or cultural/religious views toward family building may enable better understanding and provider support.

Younger couples (female partners < 35) were more impacted by the miscarriage than older ones. Janssen et al. (1997) found that older women scored higher on grief as measured by the Perinatal Grief Scale (Potvin, Lasker, & Toedter, 1989) than younger women (*n*=221). Our results are not consistent with this, with older women scoring lower on all three measures: *DE*, *I/G*, and *LB*. Others have found increasing age to have a protective effect on depression (Mann et al., 2008; Neugebauer, 2003) and grief (Mann et al., 2008) in women following miscarriage. Kagami et al. (2012) found that in couples with a history of recurrent pregnancy loss (RPL), men < 35 had higher anxiety scores than men over 35. The authors did not see an effect of age in women. Although aging may be detrimental to fertility, it appears that older couples were more resilient to miscarriage and this may reflect maturity and growth gained through broader contextual experiences that accompany aging.

As mentioned previously, age appeared to moderate the effect of MHT on the experience of isolation and guilt. However, age had no moderating effect on MHT for devastation in the couple analysis. We did not include a history of treatment for anger or substance abuse in our definition of MHT, which may have led to seeing a greater impact of MHT on both isolation and guilt and devastation. Cumming et al. (2007) found that a history of anxiety or depression was associated with higher baseline scores of anxiety or depression but not with the trajectory of scores over time. Since we only looked at baseline effects, it is unclear if MHT affects the trajectory of *I/G* and *DE* scores over time.

Gestational age at time of loss has been found to be a factor in the emotional reaction to miscarriage in some but not all studies. Couples whose miscarriage occurred in the second trimester were more likely to feel guilt and isolation and identify the loss as a baby compared to couples who miscarried very early. In our separate analyses of men and women, gestational age

was a significant factor for men regarding guilt and isolation and their perception of losing a baby, but these findings were not true for women. Thus, gestational age at time of loss may more likely influence the man's perception of losing a child. Johnson and Puddifoot (1996) studied 126 partners of women who had miscarried and found a positive relationship between gestational age and scores on the Perinatal Grief Scale (PGS) (Toedter, Lasker, & Alhadeff, 1988). In a later study with 323 men, Puddifoot and Johnson (1999) found that there was a significant increase in PGS scores men with increasing gestational age, although it just reached significance ($p = .049$). In addition, ultrasound visualization of the fetus was related to higher scores on the PGS. This may explain why in our sample, men whose partners' miscarried at a later gestational age were more likely to identify miscarriage as the "loss of a baby". At later gestational ages it is more likely that men could have accompanied their partner during a fetal ultrasound. Jordan (1990) interviewed 56 new and expectant fathers and found that for many the reality of the baby was not completely formed until after the birth. Nonetheless viewing the baby on ultrasound, hearing the heartbeat, and feeling the baby move did serve as "reality boosters". Unlike men and contrary to conventional wisdom, gestational age at loss was not related to the assignment of personhood as measured by the *LB* subscale in women. Thus women's realization of pregnancy as "baby" appears to be cemented earlier than men.

Miscarriage is known to be a traumatic event for women and their partners and may lead to elevated stress and anxiety in subsequent pregnancy (Blackmore et al., 2011; Côté-Arsenault, 2007; D. Côté-Arsenault & M.-T. Dombeck, b., 2001; Fertl, Bergner, Beyer, Klapp, & Rauchfuss, 2009; Woods-Giscombe, Lobel, & Crandell, 2010). In addition to the factors identified in this paper, additional research is needed to identify for whom miscarriage or future pregnancy may be more difficult in order to provide intervention for those in greatest need.

Whether the RIMS is able to predict coping and outcomes or identify those for whom subsequent pregnancy may be more emotionally charged would help to establish the clinical utility of the instrument.

In addition to the limitations already discussed, caution should be exercised in generalizing these results since the majority of the couples in this study were white, well educated, and all were in heterosexual relationships. The study required that both members agree to participate which implies that they were more likely to be in a supportive relationship. Administration of RIMS in more diverse samples is warranted. This study was also limited by its reliance on the RIMS. The original IMS was developed based on interviews with women following miscarriage, thus it may not fully tap into the experience of men or same-sex partners. Men have reported feelings of helplessness in dealing with their partner, marginalization by healthcare providers and staff, and the need to be strong and hide their own feelings (McCreight, 2004; Murphy, 1998; Puddifoot & Johnson, 1997). Addition of items that reflect these and other experiences of the partner may provide greater accuracy in measuring the meaning of miscarriage.

Table 3.1

Demographic Characteristics of CMHP

	Women (n=341) Number (%)	Men (n=341) Number (%)
Education		
≤12 years	32 (9.3)	43 (12.6)
Some College/College	205 (60.1)	213 (62.4)
Graduate Degree	104 (30.5)	84 (24.6)
Missing		1 (0.3)
Employed	236 (69.2)	296 (86.8)
Race		
Native American	7 (2.0)	2 (0.6)
Black	13 (3.8)	16 (4.7)
Asian/Pacific Islander	21 (6.2)	19 (5.6)
Hispanic	11 (3.2)	11 (3.2)
White	287 (84.2)	292 (85.6)
Missing	2 (0.6)	1 (0.3)
Income		
$0-20 K	39 (11.4)	38 (11.1)
$21-50 K	76 (22.2)	78 (22.9)
$51-90 K	130 (38.1)	118 (34.6)
$91+ K	95 (27.8)	105 (30.8)
Missing	1 (0.3)	2 (0.6)

Note. Percentages may not sum to 100% due to rounding.

Table 3.2

Least Squares Means from Multifactorial ANOVA in Women

		n	Isolation/Guilt			Devastating Event			Loss of Baby		
			LS Means	SE	F^a (df)	LS Means	SE	F^a (df)	LS Means	SE	F^a (df)
Age Group	**<35 years**	(217)	14.71****	0.43	19.19 (1, 330)	15.64****	0.40	18.30 (1, 330)	14.53****	0.41	21.98 (1, 328)
	≥35 years	(124)	12.59	0.44		13.72	0.41		12.38	0.42	
Mental Health History	**Negative**	174	12.84****	0.44	13.18 (1, 330)	14.28	0.41	3.69 (1, 330)	13.31	0.42	0.48 (1, 328)
	Positive	166	14.46	0.42		15.07	0.39		13.60	0.40	
Fertility Status	**Fertile**	268	12.99*	0.37	5.41 (1, 330)	14.13*	0.34	4.34 (1, 330)	13.35	0.35	0.15 (1, 328)
	Infertile	73	14.30	0.54		15.22	0.50		13.56	0.35	
# Prior Miscarriage	**1st a**	232	12.64a<b**	0.39	5.57 (2, 330)	13.88a<b*	0.36	3.77 (2, 330)	12.79	0.37	2.96 (2, 328)
	2nd b	73	14.43	0.55		15.20	0.51		14.04	0.52	
	3rd or more	36	13.88	0.69		14.94	0.64		13.55	0.66	
# Living Children	**0 a**	181	13.51	0.42	0.14 (2,330)	15.02	0.39	0.82 (2, 330)	12.90a<c**	0.41	4.93 (2, 328)
	1 b	107	13.78	0.48		14.45	0.45		12.78b<c**	0.46	
	≥2 c	53	13.66	0.61		14.55	0.57		14.69	0.58	
Gestational Age	**< 8 weeks**	100	13.33	0.46	0.46 (2, 330)	13.80	0.39	3.57 (2, 330)	12.71	0.44	2.96 (2, 328)
	≥8 < 13 weeks	198	13.57	0.38		14.98	0.36		13.28	0.37	
	≥ 13 weeks	43	14.05	0.69		15.28	0.64		14.38	0.66	

Note. $F^a = F$ statistic for main effects. *LS* Means= Least squares means. * $p \leq .05$. ** $p \leq .01$. *** $p. \leq .001$. **** $p \leq .0001$. a,b,c = significant comparisons.

Table 3.3

Least Square Means from Multifactorial ANOVA in Men

Factor	Factor Level	n	Isolation/Guilt			Devastating Event			Loss of Baby		
			LS Means	SE	F^a (df)	LS Means	SE	F^a (df)	LS Means	SE	F^a (df)
Age	<35	191	10.07[**]	0.35	6.93	12.03	0.45	1.69	11.52[*]	0.42	4.68
	≥35	150	9.15	0.33	(1, 326)	11.46	0.41	(1, 327)	10.54	0.46	(1, 325)
Mental Health History	Negative	252	9.29	0.30	2.70	11.52	0.38	0.82	10.82	0.38	0.71
	Positive	86	9.93	0.40	(1, 326)	11.97	0.52	(1, 327)	11.24	0.52	(1, 325)
Fertility Status	Fertile	268	9.32	0.30	1.89	11.58	0.38	0.39	11.07	0.38	0.15
	Infertile	73	9.90	0.42	(1, 326)	11.91	0.52	(1, 327)	10.98	054	(1, 325)
Miscarriage History	1st [a]	232	9.23	0.30	1.97	11.75	0.38	1.28	11.28	0.39	2.96
	2nd [b]	73	10.07	0.43	(2, 326)	12.36	0.54	(2, 327)	11.67	0.56	(2, 325)
	3rd or more [c]	36	9.53	0.54		11.12	0.68		10.14	0.70	
Children Living	0 [a]	181	9.81	0.33	0.43	12.40	0.42	3.74	10.49[a<c*]	0.43	3.59
	1 [b]	107	9.48	0.37	(2, 326)	11.09[b<a*]	0.47	(2, 327)	10.48[b<c*]	0.48	(2, 325)
	≥2 [c]	53	9.53	0.48		11.75	0.60		12.11	0.62	
Gestational Age	< 8 weeks [a]	100	8.96[a<c*]	0.36	4.03	10.98	0.46	2.74	10.02[a<c***]	0.47	7.45
	≥8 < 13 weeks [b]	198	9.28[b<c*]	0.31	(2, 326)	11.58	0.39	(2, 327)	10.32[b<c**]	0.40	(2, 325)
	≥ 13 weeks [c]	43	10.58	0.53		12.68	0.67		12.75	0.69	

Note. F^a = F statistic for main effects. *LS* Means= Least square means. [*] $p \leq .05$. [**] $p \leq .01$. [***] $p. \leq .001$. [****] $p \leq .0001$. [a, b, c] = significant comparisons.

Table 3.4

Least Square Means from Multifactorial ANOVA in Couples

Factor	Factor Level	n	Isolation/Guilt LS Means	SE	F^a (df)	Devastating Event LS Means	SE	F^a (df)	Loss of Baby LS Means	SE	F^a (df)
Gender	**Female**	341	13.53****	0.27	166.96 (1, 664)	14.44****	0.30	73.90 (1, 662)	13.36****	0.29	56.02 (1, 662)
	Male	341	9.85	0.28		11.87	0.30		11.05	0.30	
Age in Female	**<35**	217	12.47****MHT	0.28	25.19 (1, 664)	13.92****	0.31	22.60 (1, 662)	12.94****	0.30	19.28 (1, 662)
	≥35	134	10.91	0.28		12.38	0.30		11.48	0.30	
Mental Health History	**Negative**	126	11.17****Age	0.29	11.71 (1, 664)	12.83*	0.29	4.36 (1, 662)	12.04	0.28	1.06 (1, 662)
	Positive		12.22	0.26		13.48	0.32		12.37	0.32	
Fertility Status	**Fertile**	268	11.20 **	0.24	7.76 (1,664)	12.72*	0.27	5.4 (1, 662)	12.17	0.26	0.04 (1, 662)
	Infertile	73	14.30	0.34		13.59	0.37		12.24	0.37	
Miscarriage History	**1st a**	232	11.00 b**	0.25	7.42 (2, 664)	12.85*GA	0.27	1.30 (2, 662)	12.01	0.27	2.78 (2, 662)
	2nd b	73	12.32	0.25		13.69	0.49		12.84	0.38	
	3rd or more c	36	11.75	0.44		12.91	0.50		11.77	0.48	
Children Living	**0 a**	181	11.72	0.27	0.02 (2, 664)	13.60a<b*	0.30	3.72 (2, 662)	11.66 a<c***	0.29	8.01 (2, 662)
	1 b	107	11.72	0.30		12.68	0.30		11.63 b<c**	0.33	
	≥2 c	52	11.64	0.39		13.17	0.42		13.34	0.42	
Gestational Age	**< 8 weeks a**	100	11.19 a<c*	0.29	3.20 (2, 664)	12.88*MISCX	0.36	0.58 (2, 662)	11.28 a<c****	0.32	9.44 (2, 662)
	≥ 8 < 13 weeks b	175	11.49	0/24		13.01	0.29		11.72 b<c***	0.28	
	≥ 13 weeks c	66	12.40	0.44		13.57	0.59		13.50	0.48	

Note. F^a = F statistic for main effects. MHT = mental health treatment history, Miscx = miscarriage, GA = gestational age at loss. *LS Means*= Least squares means. $^*p \leq .05$. $^{**}p \leq .01$. $^{***}p \leq .001$. $^{****}p < .0001$. a,b,c = denotes significant comparisons. *Isolation/guilt*: significant interaction of age by MHT such that < 35 years with MHT history (13.30, *SE* = 0.36) scoring significantly higher than: 1) < 35 years without MHT history (11.64, *SE* = 0.30, *p* < .0001); 2) ≥ 35 years without MHT history (10.70, *SE* = 0.34, *p* < .0001); and 3) ≥ 35 years with MHT history (11.13, *SE* = 0.38, *p* < .0001). *DE*: significant interaction of Miscx by GA, such that 1st miscarriage < 8 weeks GA (11.65, *SE* = 0.35) scoring significantly lower than: 1) 1st and 2nd miscarriage, late 1st trimester (13.04, *SE* = 0.29, *p* = .02, and 13.99, *SE* = 0.40, *p* < .0001, respectively), and 2) 1st miscarriage, second trimester miscarriage (13.86, SE = 0.52, *p* = .02).

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CHAPTER 4: APPRAISAL OF MISCARRIAGE: A BAYESIAN ANALYSIS OF COUPLES' DATA IN A RANDOMIZED CONTROLLED TRIAL OF THREE CARING-BASED INTERVENTIONS

Introduction

Miscarriage occurs in approximately 15-20% of all pregnancies (Katz, 2012) with incidence increasing with maternal age (Knudsen, Hansen, Juul, & Secher, 1991). Although it is a relatively common reproductive event, the experience is both frightening and devastating for many women and their partners. Grief, depression, and anxiety are common emotions in the weeks and months following miscarriage (Brier, 2008; Cumming et al., 2007; Lok et al., 2010). For some, suffering may be prolonged (Brier, 2008; Klier et al., 2002b; Lok et al., 2010).

The meaning of a miscarriage is unique to each couple and reflects internal and external experiences, values, and goals. Stress and coping theory (Lazarus & Folkman, 1984) predicts that the meaning or personal significance assigned to an event, also known as primary appraisal, informs how one copes with a stressful situation. Thus, measures that index the meaning attributed to miscarriage may help identify those likely to face greater difficulty coping after loss. The Impact of Miscarriage Scale (IMS) (Swanson, 1999a) is one such measure. Items for the IMS were derived through a phenomenological study of women who had recently miscarried. Psychometrics were originally established with women; it has recently been revised for use in men (Huffman, Swanson, & Lynn, 2014).

Background

Most studies examining the psychological impact of miscarriage in women and partners have focused on emotional symptomatology such as grief, depression, and anxiety. Both men

and women are emotionally affected by miscarriage (Beutel et al., 1996; Conway & Russell, 2000; Cumming et al., 2007; Martin P. Johnson & Sarah R. Baker, 2004; Stinson, 1992; Swanson et al., 2009) with women generally demonstrating greater suffering (Beutel et al., 1996; Cumming et al., 2007; Stinson, 1992). Women experience grief (Broen, Moum, Bodtker, & Ekeberg, 2005; Swanson et al., 2009), anxiety (Broen et al., 2005; Cumming et al., 2007), and depression (Cumming et al., 2007; Lok et al., 2010; Swanson et al., 2009) in the weeks following miscarriage with a gradual decline over the course of a year or more. There is evidence that pregnancy subsequent to miscarriage results in greater anxiety (Armstrong, Hutti, & Myers, 2009; Gong et al., 2013; Woods-Giscombe et al., 2010) and increased healthcare utilization (Hutti, Armstrong, & Myers, 2011).

Although miscarriage typically takes place within a couple relationship, few studies have focused attention on the dyad. Lazarus and Folkman (1984) describe appraisal as a cognitive process whereby one must decide whether an event is harmful or benign and "…reflects the unique and changing relationship taking place between a person with distinctive characteristics (values, commitments, styles of perceiving and thinking) and an environment whose characteristics must be predicted and interpreted (pp. 23-24). If the event is deemed to be harmful or potentially harmful then one must ascertain their ability and resources to adapt to the situation. By definition, this process is dynamic and informed by both past and present experiences but also the environment and social relationships. Within a dyad, the meaning or impact of miscarriage is likely to be mutually and individually constructed and thus influences the couple's adjustment to early pregnancy loss. Thus, for couples, dealing with the aftermath of miscarriage also entails managing each other's experience. Intimate and social support has been associated with less grief (Toedter, Lasker, & Janssen, 2001) and depression (Beutel et al., 1995;

Scheidt et al., 2012) in women following miscarriage. While women and men often times describe their partner as a source of support after a miscarriage (Cecil, 1994a; Conway & Russell, 2000; Van, 2012), there may be a perceived qualitative decline in their overall (Beutel et al., 1996; Swanson et al., 2003) and sexual relationship during the first year after loss (Swanson, Connor, Jolley, Pettinato, & Wang, 2007; Swanson et al., 2003). Swanson et al. (2007) reported that while 52.4% of women who felt overwhelmed 1 week after miscarriage experienced sexual distance from their partner at 1 year no-one who self-described as "healing" at one week reported sexual distance at a year. Partners of women who have miscarried frequently describe putting aside their own feelings in order to support their mate; they also report feeling helpless in managing this task (Abboud & Liamputtong, 2003; McCreight, 2004; Murphy, 1998; Puddifoot & Johnson, 1997; Wojnar, 2007). The need to put aside grief for the sake of being strong for one's partner may result in a delayed grief response (Stinson, et al., 1992). Women, on the other hand, report frustration with the lack of emotion expressed by their partner and his relative ease at putting the event behind him (Abboud & Liamputtong, 2003; Adolfsson, Larsson, Wijma, & Bertero, 2004). Women may also perceive that their partner's main concern was for their well-being as opposed to the loss of the pregnancy (Cecil, 1994a).

Women have expressed dissatisfaction and the need for better follow-up care after miscarriage from both a physical and emotional perspective (Cuisinier, Kuijpers, Hoogduin, de Graauw, & Janssen, 1993; Musters, Taminiau-Bloem, van den Boogaard, van der Veen, & Goddijn, 2011; Séjourné, Callahan, & Chabrol, 2010; Wong et al., 2003). Studies exploring the benefits of various interventions to assist with the emotional recovery from miscarriage have found mixed results and have focused mostly on emotional symptomatology and coping in women. Nikcevic et al. (2007) compared the effects of two intervention strategies: medical

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counseling (MC -focusing on cause of miscarriage) or medical plus psychological counseling (MCP -MC plus 50-minute visit with psychologist focusing on feelings and restructuring of trauma experience) to a convenience sample of women who received usual care after miscarriage. Those receiving MC showed less self-blame after loss compared to the usual care group; those in MCP demonstrated less worry and grief compared to both the MC and usual care groups. Neither intervention impacted depression or anxiety scores.

In a randomized control trial, Swanson et al. (2009) reported the effects of three caring-based interventions on the resolution of grief and depression in couples during the first year after loss using Bayesian Odds. Couples were randomized to one of four arms: 1) nurse caring (NC)-three one-hour nurse caring sessions, 2) self-caring (SC)- three mailed videotape and workbook modules, 3) combined-caring (CC- one nurse-caring session plus the three SC modules), or 4) control. Self-caring modules included a video of the PI coaching couples on ways to practice self and partner caring along with self-reflective workbooks. Intervention content was based on the Meaning of Miscarriage Model (MMM) (Swanson, 1999b). Jeffreys (1961) criteria for levels of evidence were used to compare the hypothesized effects of one treatment ("A") versus a rival treatment ("B"); specifically, a Bayesian odds ≥ 3.2 was considered substantial evidence and a Bayesian odds ≥ 10 was considered strong evidence that the hypothesized effect of A over B held true. According to these criteria, there was substantial evidence favoring NC for the resolution of depression in women; and for SC and NC favoring the resolution of grief and grief related emotions. For men, there was strong evidence favoring NC and CC in the resolution of grief; substantial evidence favoring CC in the resolution of grief related emotions; and substantial evidence that no treatment and NC was favorable to CC and SC for the resolution of depression.

In a recent Cochrane meta-analysis, Murphy, Lipp, and Powles (2012) concluded there was insufficient evidence to support post-miscarriage intervention as a benefit to psychological well-being (depression, grief, and anxiety). Only six studies met the authors' eligibility criteria (Adolfsson et al., 2006; Lee, Lygo, & Slade, 1996; Lok, 2006; Nikcevic, Kuczmierczyk, & Nicolaides, 2007; Swanson, 1999a; Swanson et al., 2009). However, only one of these studies included partners (Swanson et al., 2009), and it was not included in the meta-analysis since results were published as median differences in slopes of recovery. In addition, the authors recognized several limitations of their review: many of the studies had insufficient power, the interventions employed across the studies were heterogeneous in regards to theoretical bases, and they were not able to assess secondary outcomes within the meta-analysis.

Although measuring intervention effectiveness based on clinical symptomatology is important, there is benefit in understanding whether intervention impacts the appraisal (meaning) of miscarriage. In an earlier randomized controlled trial of 244 women within 5 weeks of miscarriage ($\leq$ 20 weeks gestation), Swanson (1999a) showed that nurse-caring reduced not only negative mood states (i.e., overall emotional disturbance, anger, depression) but also the meaning assigned to the event as measured by the 24-item IMS when compared to control. Since the original IMS was recently revised for use in both men and women (Huffman, Swanson, & Lynn, 2014), it is not known whether couple-focused caring-based interventions will have the same effect on meaning as measured by the Revised Impact of Miscarriage Scale (RIMS).

Therefore, the purpose of this study was to see if the appraisal/meaning of miscarriage as measured by the RIMS (Huffman, et al., 2014) changes over time in couples and whether any of three couples-focused caring-based interventions affect the meaning of miscarriage in men and women. Data from this study were from the Couples Miscarriage Healing Project (Swanson et

al., 2009). Multi-level modeling using Bayesian methods for parameter estimation was

employed, which enabled estimation of model effects for men and women while allowing

simultaneously for estimation of the correlation within the couple dyad.

Materials and Method

Sample

The CMHP enrolled 341 couples from the Pacific Northwest within three months of

miscarriage. The sample was predominately white, married, and educated beyond high school

(Table 1) and 97.7% reported that the pregnancy was wanted. All couples were heterosexual and

could speak and write English. For this analysis, only couple dyads with complete baseline and

some follow-up data for both members were kept.

Design

The CMHP was a randomized controlled trial of the effects of three caring-based

couples-focused interventions on psychological well-being during their first year after

miscarriage. Baseline measures were collected prior to randomization and each member of the

couple was asked to complete mailed surveys separately from their partner. Couples were

randomized to one of four intervention groups: NC, CC, SC, or control as described earlier. For

randomization procedures the reader is referred to Swanson et al. (2009). Follow-up surveys

were mailed at 3, 5, and 13 months.

Intervention

All three interventions were based on the MMM which describes six common

experiences of women after a miscarriage: 1) "coming to know" - the realization of the loss in

the face of the hope for the pregnancy, 2) "losing and gaining"- identifying what was lost and

gained in the event, 3) "sharing the loss"- identifying who is and is not available for support and

validation of the loss, 4) "going public"- entering the world again as a no longer expectant mother, 5) "getting through it" - recognition of personal progress in moving forward and 6) "trying again"- facing ongoing fears and uncertainty for future conception and pregnancy. Each intervention was delivered based on Swanson Caring theory (SCT) (Swanson, 1999b) which consists of five ways of relating: 1) seek to understand an event as it has meaning to the other, 2) be emotionally receptive and genuinely concerned, 3) do for the person what they would do for themselves if they were able, 4) empower the other by offering information, support, and validation, and 5) communicate belief in the other's ability to get through the event and transition back to a meaningful life.   Interventions were delivered at 3, 5, and 11 weeks post enrollment. The interventions at week 3 (post enrollment) focused on "coming to know" and "losing and gaining", week 5 focused on "sharing the loss" and "going public" and week 11, "getting through it" and "trying again".

Measures

The RIMS (Huffman, et al., 2014) is a sixteen-item questionnaire devised to measure the impact of miscarriage. Psychometrics for the RIMS were established using the same data set as used in this study. The RIMS is comprised of three subscales: 1) *Isolation and guilt* (*I/G*) or how isolated or guilty the persons feels after the miscarriage with a maximum score of 24; 2) *Loss of baby* (LB) or how strongly one identifies the miscarriage as the loss of a baby/person with a maximum score of 20; and 3) *Devastating event* (DE) or the degree of devastation or hopelessness experienced through miscarriage, with a maximum score of 20. Higher scores indicate greater impact. The RIMS has been shown to discriminate between those who theoretically may be more impacted by miscarriage due to contextual factors (i.e., infertility, later gestational age at loss, previous miscarriage history, childlessness) (Huffman, Swanson, &

Schwartz, under review). All three subscales are positively correlated with Pure grief

(Miscarriage Grief Inventory) (Nikcevic, Snijders, et al., 1999) and depression (Centers for

Epidemiological Studies-Depression Scale [Radloff, 1977]) (Huffman, et al., 2014). Cronbach's

alpha reliabilities for baseline subscale scores were calculated separately for men (*I/G,* .78; *LB,*

.80; *DE,* .80) and for women (*I/G,* .78; *LB,* .84; *DE,* .81). Control group (*n* = 86 [women], *n* =

85 [men]) test-retest reliabilities between baseline and 13 months for the three subscales were:

.69 (*I/G*), .83 (*LB*), and .75 (*DE*) in men; and .71 (*I/G*), .86 (*LB*), and .82 (*DE*) in women

(Huffman, et al., 2014).

Data Analysis

Analysis of variance was used to test for group equivalency on subscale scores at baseline

between the four randomized groups as well as to compare baseline subscale scores in those who

had some follow-up after baseline and those who were excluded from the analysis for lack of

follow-up.

Bayesian methods were used to estimate the effect of time and intervention on subscale

scores over a 13-month period for both men and women.

Model

The model included parameters for women and men while simultaneously allowing for

estimation of the degree of correlation within couples. The overall model for woman *i*, in

intervention group *j*, at the kth follow-up visit is:

$$\Upsilon_{ijk} = \beta_1 \Upsilon_{ij1} + \beta_2 \text{time}_{ijk} + \beta_{3j} + \beta_{4j} \text{time}_{iik} + u_{1i} + u_{2i} \text{time} + \varepsilon_{ijk}$$

β_1 is the effect of the baseline value of the subscale (Υ_{ij1}), β_2 is the effect of elapsed time

since miscarriage measured in days, β_{3j} is the effect of intervention group (*j* = 1-4), β_{4j} is the

estimate of the intervention group-specific slope over time (allowing for a group by time

interaction, j=1-4), ε_{ijk} is the random error, u_{1i} is the random intercept estimating the variation of each individual from his/her gender specific mean while accounting for couple membership, and u_{2i} is the random slope estimating the variation of each individual from his/her gender specific mean slope. These latter two random effects allow for estimation of the degree of correlation within dyads. In our case, the priors for the linear model coefficients were normal with mean 0.0 and variance of 1000, representing nearly flat distribution with one value being for the most part, just as likely as another. The random effects were specified with an inverse gamma distribution with shape=0.1 and scale=10. An identical model, with a different set of parameters, was constructed for the men.

Bayesian models were fit in R (version 3.0.1) using Just Another Gibbs Sampler (JAGS) version 3.4.0 for the Markov chain Monte Carlo estimation (MCMC). All models were run with 2 chains, 100,000 iterations, a burn-in of 20,000, and thinning set at 10. This resulted in 16,000 samples being retained (2*100,000 - 40,000/10 =16,000). Both traceplots and $\hat{R}$ (the ratio of between to within-chain variance) were evaluated for convergence with a $\hat{R}$ of < 1.05, which is even more conservative than what is considered appropriate (Gelman & Shirley, 2011).

The goal of model fitting was to select a parsimonious model for each subscale. This was done through evaluation of the posterior probability of the parameter estimates. If the posterior probability of any parameter being greater than zero was more than 95% (i.e. the parameter, based on its posterior distribution, was nearly always positive) or less than 5% (i.e. the parameter was nearly always negative), then it was retained in the model. The deviance information criterion (DIC) was used in conjunction with the above criterion to corroborate model selection. The DIC is the sum of two components: 1) a model fit component - the mean deviance of the posterior ($\bar{\bar{D}}$), which is the mean of the -2 log likelihood of the iterations, and 2) a measure of

model complexity (p_D)-which is $\bar{\bar{D}}$ - D($\bar{\bar{\theta}}$) , with D($\bar{\bar{\theta}}$) representing the -2log likelihood of the posterior parameter means. There are no formal guidelines as to what constitutes a meaningful difference across various ranges of DIC (Spiegelhalter, Best, Carlin, & Linde, 2002). In our case, when there was little difference in DIC ($<$ 5% change between models), the analysis of the posterior probabilities of the main effects was used as the primary method to select the best-fitting model.

If there was evidence of a group effect, pairwise comparisons were performed by computing the percentage of samples (i.e. posterior probability) in which the parameter for the designated group was greater than that for its comparator. To estimate the degree of correlation within couple dyads, the mean correlation between the random intercepts (and slopes, where appropriate) for women and their partners was computed at every iteration, and the posterior distribution of this correlation was examined.

After the best-fitting model for each subscale was determined, age and history of mental health treatment (MHT) were added separately to the final model to evaluate whether they had an effect on the overall subscale scores. Age was dichotomized as $\geq$ 35 and $<$ 35 (the reference group). Persons reporting a history of past treatment for depression, anxiety, or grief were coded as having a history of mental health treatment (MHT). The effect of MHT over time was also evaluated by adding a MHT*time interaction term, which was evaluated in the same manner as the group*time interaction. Using the best-fitting model for each subscale and the overall mean for each gender, predicted subscale scores were plotted for 3, 6, 9, and 12 months from the date of miscarriage and displayed in Figures 4.2 - 4.6.

We further investigated the effects of intervention group on those couples in whom the women experienced the highest impact of miscarriage, i.e. for each subscale a subsample of

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couples (*n*) was selected in whom the female scored greater than or equal to 1 *SD* above the overall mean score for the subscale. This was done, to see if the effect of intervention in those most impacted was being masked when modeled with those not as impacted by miscarriage. For each subscale, we refit with the main effect for treatment group, controlling for covariates found to be significant in the analysis of the entire sample. Group comparisons were made as described previously.

In order to test the robustness of our model and the impact of our priors, sensitivity analysis was carried out by altering the model for the *I/G* subscale in four ways: 1) doubling the number of iterations to 200,000 with a burn-in of 40,000, yielding 32,000 iterations for analysis, 2) decreasing variance of the normal priors, 3) changing the mean of the normal priors to 5 and 10, and 4) changing the hyperprior on the random effects by decreasing the precision to .01. Parameter and posterior probability estimates were then compared with the original model to discern if there were significant differences.

Results

Sample and Randomization

Figure 4.1 shows the subject flow for the original study, including recruitment, eligibility, randomization, and treatment. Of the 341 couples randomized, 27 were excluded due to no data after baseline and another 12 couples were excluded due to no follow-up data in one of the two partners: 1 couple in NC, 5 couples in CC, 5 couples in SC, and 1 couple in the control group. Thus, 302 dyads were included in the analysis: 1) NC contained 82 dyads, 2) CC contained 74 dyads, 3) SC contained 66 dyads, and 4) the control contained 80 dyads. The mean age of women was 32.62 (*SD* = 6.01) and of men was 34.08 (*SD* = 6.77). Sixty-two percent of women were under the age of 35 as were 55% of men.   The mean gestational age at miscarriage

was 9.9 weeks (*SD* = 3.08). Mean days since miscarriage at time of enrollment was 29.98 (*SD* = 22.55) for women and 31.89 (*SD* = 24.18) for men. Forty-eight percent of women reported MHT as did 24% of men. Twenty-two percent of couples reported a history of infertility. This was the first miscarriage for 67% of the couples, second for 23%, and third or greater for 10%. Fifty-two percent of couples had no other living children; 33% had one other living child. Demographic data are presented in Table 1. There were no significant differences in mean baseline subscale scores based on group assignment (Table 4.2). There were also no significant differences in subscale scores between those deemed eligible for analysis based on sufficient follow-up data and those excluded from analysis due to insufficient follow-up data.
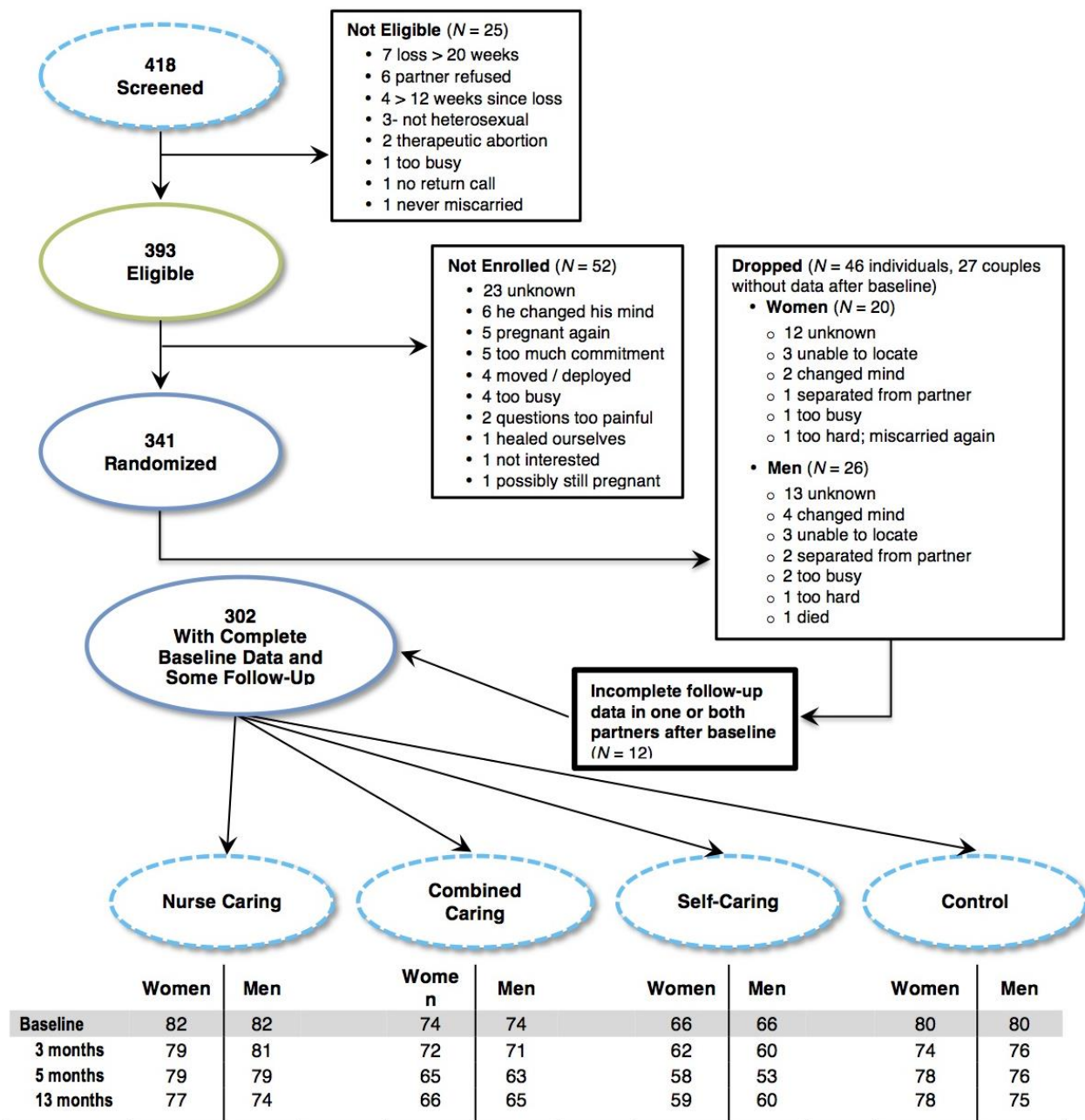
Not Eligible (*N* = 25)
- 7 loss > 20 weeks
- 6 partner refused
- 4 > 12 weeks since loss
- 3- not heterosexual
- 2 therapeutic abortion
- 1 too busy
- 1 no return call
- 1 never miscarried

418 Screened

393 Eligible

Not Enrolled (*N* = 52)
- 23 unknown
- 6 he changed his mind
- 5 pregnant again
- 5 too much commitment
- 4 moved / deployed
- 4 too busy
- 2 questions too painful
- 1 healed ourselves
- 1 not interested
- 1 possibly still pregnant

341 Randomized

Dropped (*N* = 46 individuals, 27 couples without data after baseline)
- **Women** (*N* = 20)
  - 12 unknown
  - 3 unable to locate
  - 2 changed mind
  - 1 separated from partner
  - 1 too busy
  - 1 too hard; miscarried again
- **Men** (*N* = 26)
  - 13 unknown
  - 4 changed mind
  - 3 unable to locate
  - 2 separated from partner
  - 2 too busy
  - 1 too hard
  - 1 died

302 With Complete Baseline Data and Some Follow-Up

Incomplete follow-up data in one or both partners after baseline (*N* = 12)

Nurse Caring · Combined Caring · Self-Caring · Control

	Nurse Caring Women	Nurse Caring Men	Combined Caring Women	Combined Caring Men	Self-Caring Women	Self-Caring Men	Control Women	Control Men
Baseline	82	82	74	74	66	66	80	80
3 months	79	81	72	71	62	60	74	76
5 months	79	79	65	63	58	53	78	76
13 months	77	74	66	65	59	60	78	75

Figure 4.1 Subject flow from CMHP: Recruitment, eligibility, randomization, and RIMS completion by treatment group.

Interaction and Intervention effects.

For all subscales, the group by time interaction was removed because the posterior

probabilities of group by time interaction effects different from zero were in the 5%-95% range

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(posterior probability [*pp*] ranged from 18%-70%, Table 4.3). The models also favored the

removal of the random slopes as evidenced by a substantially lower DIC when removed from the

models (Table 4.3). Although in some cases the DIC was lower for models containing the main

effect for intervention group, posterior probabilities for the group parameters were all between

5% and 95%. Thus, the main effect for intervention group was dropped from all models. The

following are results for the subscale analyses after both the group by time interaction and the

main effect for intervention group were dropped.

Isolation/Guilt Subscale

For the *I/G* subscale, the posterior mean correlation coefficient for the random intercept

within dyads was .11 (credible interval [CI] = .03, .18) and posterior probability of a positive

correlation was .99, meaning that women with high *I/G* over time relative to other women tended

to have partners with high *I/G* relative to other men, even after controlling for baseline *I/G*. The

DIC was 9842 (Model 4). For women, the baseline value of *I/G* was strongly predictive of

current guilt ($\beta_{\text{baseline } I/G.} = 0.77$, CI = 0.70, 0.83) with 100% of the estimates being greater than

zero (*pp* = 1). Isolation and guilt decreased gradually over time in women ($\beta_{\text{time}} = -0.002$, CI =

-0.003, -0.001; *pp* = .99). For men, baseline *I/G* was also strongly predictive of current *I/G* with

an estimate of 0.65 (CI = 0.58, 0.72; *pp* > 0 = 1). Unlike women, time was not associated with a

drop in *I/G* ($\beta_{\text{time}} = 0.0005$, CI = -0.0004, 0.001; *pp* = .84).

Age and Mental Health. When age was added to the model (Model 5), we found that

older age was associated with higher *I/G* in women ($\beta_{\text{age}} = .26$, credible interval [CI]= -0.32,

0.88; *pp*=.81) but lower *I/G* in men ($\beta_{\text{age}} = -0.32$, CI = - 0.75, -.11; *pp* = .07). Neither

parameter met our criterion for inclusion in the model. The addition of age to the model did not

change the model *DIC* substantially (9842 vs. 9783, a 0.6% change). For both men and women,

a history of MHT predicted higher *I/G* with a greater probability of an effect in men (β_{MHT} =

0.62, CI= 0.11, 1.12; *pp* = .99) than women (β_{MHT} = 0.38, CI = - 0.20, 0.95; *pp* = .90). Adding

MHT (Model 6) resulted in the model with the lowest *DIC* (9512 vs. 9842, a 3% change).

Because of the strong effect of MHT in men, this model was selected to be the best. Figure 4.2

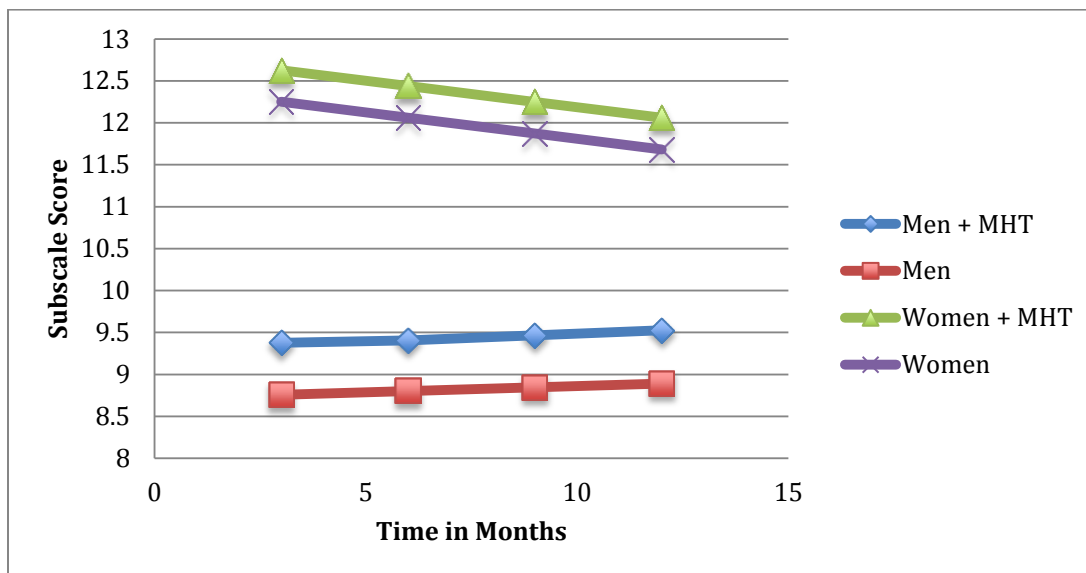shows the model predicted *I/G* scores adjusted for MHT.

Figure 4.2 Predicted follow-up scores for Isolation/Guilt in women and men with mental
health treatment history (+ MHT) and without.

Devastating Event Subscale.

The mean correlation within dyads was .33 (CI = .28, 37) and the probability of a positive

correlation within dyads was .99. For women, baseline value of *DE* was predictive of current

devastation ($\beta_{basine\ DE}$ = 0.56, CI = 0.48, 0.64; *pp* = 1). The model predicted a decrease in

devastation over time in women (β_{time} = -0.002, CI = -0.002, -0.001; *pp* = 0). For men, baseline

devastation was predictive of current devastation with an estimate of 0.62 (CI= 0.49, 0.74; *pp* =

1). For men, *DE* also decreased gradually over time, though the probability of a time effect was

lower in men (β_{time} = -0.0007, CI= - 0.002, 0.0001; *pp* = .06). The *DIC* was 11648 (Model 4).

Age and Mental Health. Older age was found to be associated with lower devastation in men ($\beta_{age} = -0.43$, CI = -1.17, 0.32; $pp = .13$) and women ($\beta_{age} = -0.35$, CI= -1.07, 0.36; $pp = .12$). Mental health treatment history (Model 6) was associated with a slight decrease in devastation in women ($\beta_{MHT} = -0.27$, CI = -0.98, 0.43; $pp = .22$) and small increase in men ($\beta_{MHT} = 0.09$, CI = -0.79, 0.97; $pp = .58$); however both parameter estimates were outside our inclusion criterion. The model controlling for MHT also resulted in an increase in DIC (12250, 5.17 % increase) as did the model controlling for age (11858, 1.8% increase). The posterior probabilities for both age and mental health treatment history were outside the criterion for inclusion; thus, model 4 was retained as the best fitting model. Figure 4.3 shows the model predicted *DE* scores over the course of one year in both men and women.
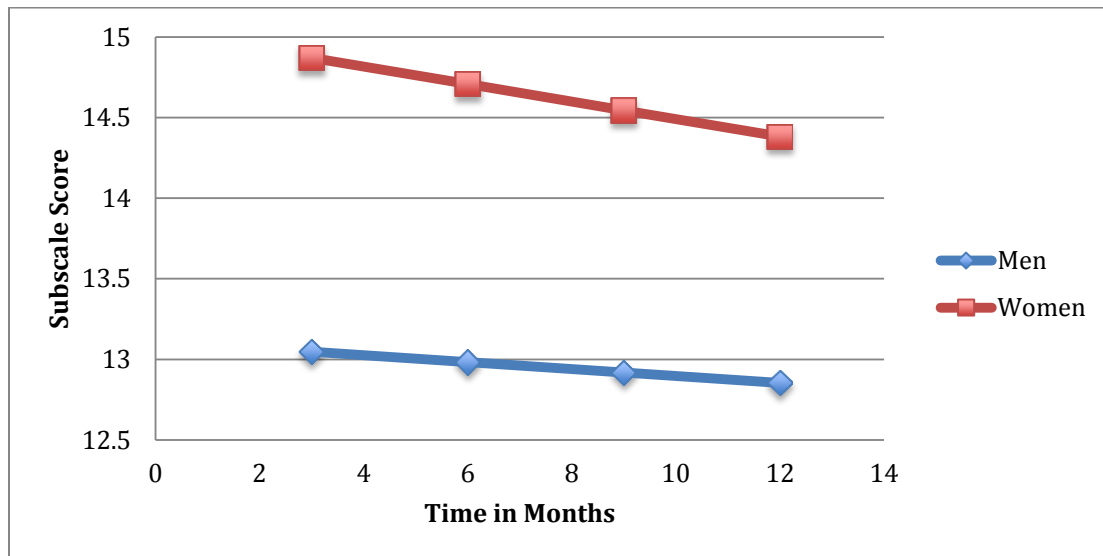

Figure 4.3 Predicted follow-up *DE* scores in women and men.

Loss of Baby

The mean correlation within dyads was .42 (CI = .38, .46) and the probability of a positive correlation within dyads was .99. For women, baseline *LB* score was predictive of

current *LB* ($\beta_{\text{baseline LB}}$ = 0.44, CI = .34, 53; *pp* = 1). *LB* scores decreased gradually over time in

women (β_{time} = -0.001, CI = -0.002, -0.0003; *pp* = .99). For men, baseline *LB* score was

predictive of current *LB* score with an estimate of 0.56 (CI = 0.43, 0.68; *pp* = 1). Time did not

have a significant impact on the "loss of a baby" in men (β_{time} = - 0.0002, CI = -0.001, 0.0006;

pp = .27). The DIC for Model 4 was 13198.

Age and Mental Health. Older women were less likely to identify the loss as a "baby"

than younger women (β_{age} = -1.16, CI= -1.96, -0.37, *pp* = .003). Older men were also less likely

to view the loss as baby (β_{age} = - .54, CI= -1.29, 0.19, *pp* = .07), though only women met our

threshold for significance. The addition of age to the model (Model 5) resulted in a decrease in

DIC score (12539, 5% decrease). Mental health treatment history did not have an effect in

women (*pp* = .29) nor men (*pp* = .68 [Model 6]) nor did it improve the model substantially (DIC

= 12965, 1.7% decrease). Figure 4.4 displays the model predicted *LB* scores in men and women
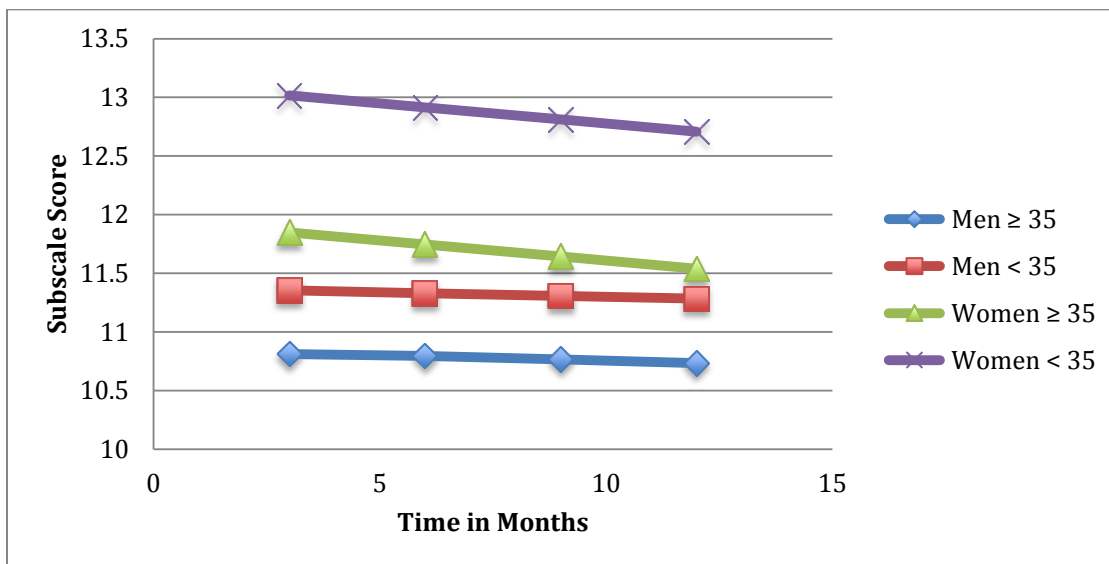
adjusted for age.

Figure 4.4 Predicted follow-up scores for *LB* in women and men by age.

Sensitivity analyses were conducted by varying the priors, hyperprior, and number of iterations in the model for *Isolation/Guilt*. These variations yielded estimates and posterior probabilities consistent with the original model (Table 4.4).

Subgroup Analysis of Highly Impacted Women.

In the model for *I/G* (68 couples, $M = 18.88$ [women], $M = 10.57$ [men]) women in the "combined-caring" treatment group showed a drop in scores compared to the control group ($\beta_{CCgroup} = -2.35$, CI = -4.46, -0.24; $pp = .01$)(Figure 4.5). The parameter estimate for MHT was 0.33 in women (CI = -1.20, 1.89; $pp = .66$). For men, there was no significant impact of group membership on *I/G*; however, MHT continued to be a significant covariate ($\beta_{MHT} = 1.38$, CI = 0.23, 2.52; $pp = .99$). The correlation within dyads was .06 (CI = -.09, .21).

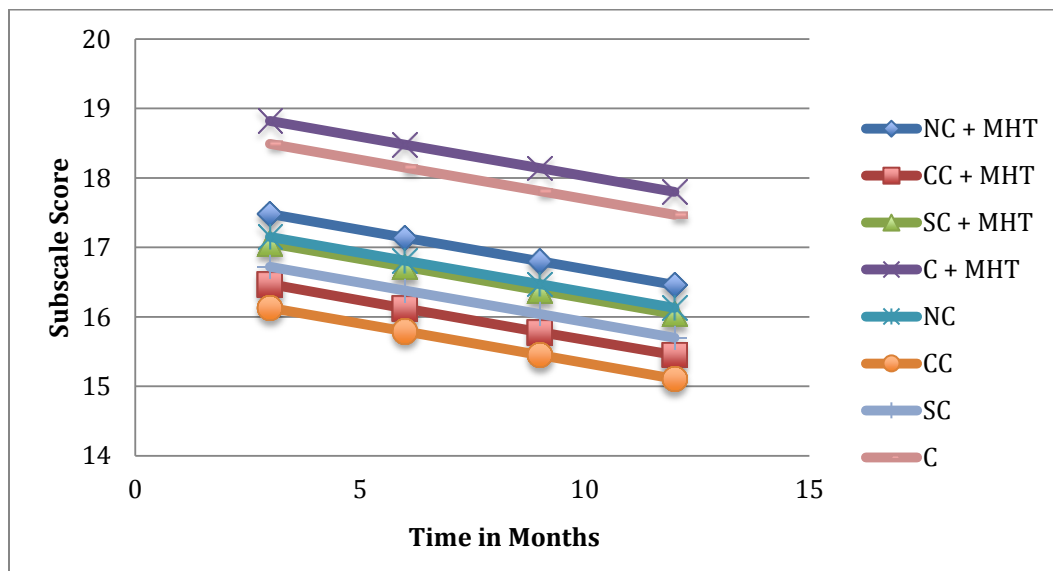

Figure 4.5 Predicted follow-up *I/G* scores in Women by MHT and treatment group.

For *DE* ($n = 74$, $M = 18.96$ [women], $M = 14.19$ [men]), women in the combined caring group ($\beta_{CC\ group} = -1.57$, CI= -3.10, -0.04; $pp = .02$) and nurse-caring group, ($\beta_{NC\ group} = -1.18$, CI = -2.18, 0.36; $pp = .06$) had a significant drop in *DE* scores compared to control (Figure 4.6).

The correlation within dyads in the high *DE* subgroup was .32 (CI = .20, 43). As with *I/G*, treatment group had no impact on men's *DE* scores. There were no observed treatment effects in the high *LB* scoring women (*n* = 63, *M* = 18.49 [women], *M* = 13.20 [men]) or their partners.
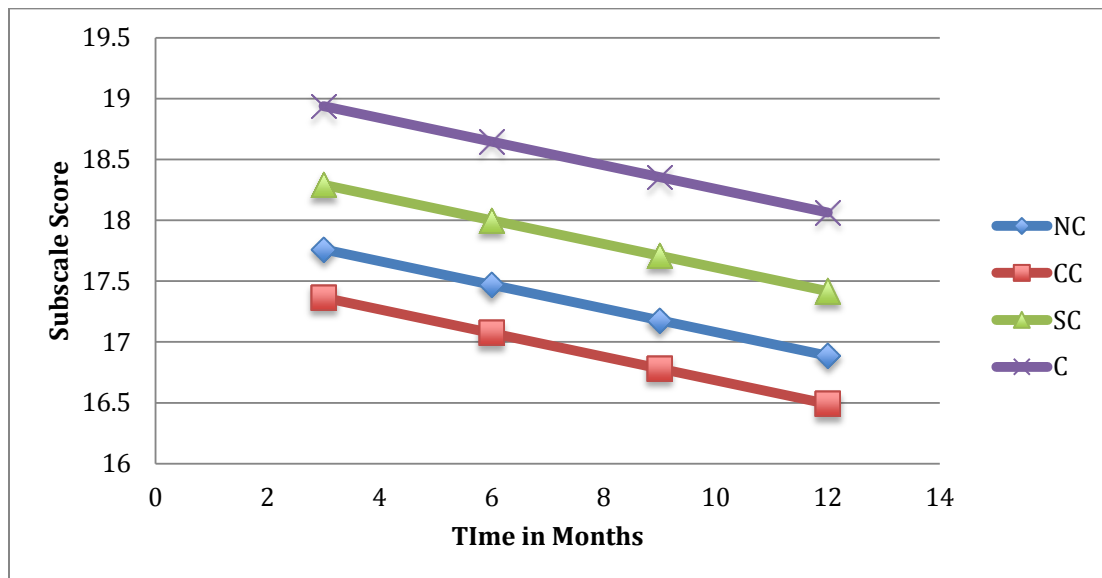

Figure 4.6 Predicted follow-up *DE* scores in high *DE* women by treatment group.

Discussion

The findings of this study are strengthened by our ability to explore gender differences within couple dyads in a relatively large sample compared to other studies (Beutel et al., 1996; Cumming et al., 2007; Lasker & Toedter, 1991; Serrano & Lima, 2006; Stinson, 1992). Our results show that for most men and women, appraisal of miscarriage was not influenced by treatment intervention but is affected by time. However, in those women who felt the most isolation/guilt or devastation at baseline, treatment, especially combined caring, was effective in reducing isolation/guilt and devastation during the first year after loss. Lok et al. (2010) showed that those women who were initially the most distressed (general health quality and depression) after miscarriage remained so over the course of the year when compared to those less distressed

at baseline. Thus, identifying women who may place greater significance on the miscarriage may be beneficial in offering cost-effective treatment to those at greater risk. Our results also demonstrate that, while women tend to be more impacted by miscarriage than their partners, the intensity of one partner's response is mirrored in the other's.

While the significance assigned to miscarriage as measured by degree of isolation/guilt, devastation, and identification of the loss as baby diminishes over time in women, only devastation diminishes over time in men. This small decline is not entirely unexpected. In the development of the original Impact of Miscarriage Scale (Swanson, 1999), 105 emic statements from women who had recently miscarried were sent to 423 women within 10 years of miscarriage. Through analysis of item-item correlations, variance, and factor analysis the 105 items were reduced to 24 items for the IMS and further reduced to 16 for the RIMS. Thus, the RIMS contains items that were salient in women up to 10 years post miscarriage.

In the current study, the design requirements of the CMHP may have impaired our ability to detect the effect of treatment on isolation and guilt. The CMHP required that both women and their partners agree to participate. Consequently, the very act of enrolling in the study indicates some degree of cooperation and togetherness. Scores for both men and women for *I/G* were on the lower end. Out of a possible score of 24, men's baseline level of isolation and guilt ranged from 8.53- 9.17 (intervention/control group means) and women's scores ranged from 12.50-13.03 (Table 4.4). Thus, these couples did not perceive themselves as particularly isolated.

Nonetheless, there was a gradual decrease in isolation and guilt over time in women, but for men there was no change with the model showing a gradual rise (though not significant by our criteria, *pp* being $> .95$). The correlation between dyads for *I/G* was the lowest (.11)

compared to the other subscales. Stinson (1992) found a similar pattern between men and women in regards to grief with women showing a significant decline over the course of two years while men's scores remained stable or increased slightly. Again, given the nature of our study design and the mild levels of isolation and guilt experienced by men, seeing no significant change over time is not surprising.

For *I/G*, the model controlling for MHT was favored. Although other studies have reported a significant effect of previous mental health disorder on both grief (Janssen et al., 1997; Lasker & Toedter, 1991) and depression (Cumming et al., 2007; Mann et al., 2008; Neugebauer et al., 1997) in women, our data suggest that MHT may have a greater effect on isolation and guilt in men than in women. This same relationship was observed when we looked at only those couples where the female scored high on *I/G*. To our knowledge, this is the first study that has specifically quantified the effect of MHT on selected outcomes in men subsequent to miscarriage. An earlier study (Huffman, Swanson, & Schwartz, under review) looking at only baseline values of *I/G* in men, found that prior treatment for a mental health disorder had no impact on subscale scores in men. It could be that a previous treatment does not impact the initial reaction, but may do so over time as men try to cope with the burden of taking care of their partner while dealing with their loss. Barr (2004) examined the relationship of certain personality characteristics (shame- and guilt- proneness) and grief in women and men at 1 and 13 months following either a stillbirth or neonatal death. Both shame and guilt proneness have been linked with overall mental health and depression (Barr, 2004). Barr found that omnipotent guilt (feeling responsible for another's happiness and well-being) and shame proneness (feelings of inadequacy, inferiority, or incompetence) were more strongly correlated with both early and late grief in men than women. Barr speculated that men who were more likely to feel omnipotent

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guilt may be more vulnerable if they felt inadequate in alleviating their partner's suffering and this contributed to greater feelings of grief. Controlling for MHT did not improve the model fit for *LB* or *DE*.

For both men and women, the model predicted an increase in devastation at 3 months from baseline with a gradual decline throughout the remaining 10 months. This increase in devastation in the first three months corresponds to the time when couples may be given the "go-ahead" to attempt conception. Swanson et al. (2003) found that initially most women reported feeling closer in their overall partner relationship (60%), however, at 6 and 16 weeks this was no longer the case. Also, women reported more sexual distance initially, at 6 and 16 weeks than at 1-year. Some expressed the need to protect themselves from another pregnancy loss. Since social support has been linked to less grief and depression in women, it may be that the initial feelings of being closer after loss moderate the initial devastation, but as the sense of this support diminishes or the stress of trying again intervenes, devastation is heightened.

Couples had the most agreement on what was lost (i.e. baby) with a moderate correlation between dyads ($r = .42$, $pp = .99$). Peppers and Knapp (1980) discuss the problem of incongruent bonding in men and women, with women having a greater bond to the baby at an earlier stage of pregnancy. However, the advent and routine use of ultrasound in early pregnancy and an increase in vitro fertilization pregnancies has permitted many partners to experience pregnancy more intimately than previous generations. Men who were able to visualize the pregnancy via ultrasound have been shown to have greater grief reactions than those who have not regardless of gestational age (Puddifoot & Johnson, 1999). Sandelowski and Black (1994) in their qualitative study of expectant parents describe some couples as knowing or relating to the embryo/fetus as a baby--that the "…in utero being was a baby from the moment

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they witnessed the first "speck" of its existence." (p. 604). Thus, ultrasound may enable men to identify the pregnancy as a person.

The model also predicted a very small decline in *LB* scores for women, signifying that identification of loss as a baby stays relatively the same over the course of a year (less than a 1/3 of-a-point drop over 12 months), there was no detectable decline in men. Age was a significant predictor of *LB* scores with older women being less likely to identify the loss as a baby than their younger counterparts. Greater identification of the loss as a person/baby (as opposed to pregnancy) has been associated with greater grief intensity (Hutti, dePacheco, & Smith, 1998; Ritsher & Neugebauer, 2002) and duration (Hutti et al., 1998) and with greater anxiety in pregnancy subsequent to loss (D. Côté-Arsenault & M. Dombeck, 2001). Older age has been associated with less grief (Mann et al., 2008) and depression (Neugebauer, 2003) following miscarriage. Thus age may moderate the personification of the pregnancy. Older women potentially have had greater contact with other women who have miscarried through work, family, and social contacts. This contact and greater knowledge of miscarriage may result in less optimistic and greater caution in personifying the pregnancy.

Limitations

Caution should be used in generalizing the findings of this study to populations outside the sample population. Our sample consisted of heterosexual couples with the majority being white Americans, employed, educated, and experiencing the loss of a wanted pregnancy. The meaning of miscarriage may differ when socio-economic factors such as unemployment, racial inequality, or cultural norms surrounding pregnancy and partnership are considered. Kavanaugh and Hershberger (2005) interviewed 23 African American, low-income parents who had suffered a pregnancy loss beyond 16 weeks gestation. One major theme in those interviews was the

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management of pregnancy loss in the midst of major life stressors (e.g., death of relative, unemployment) and the feeling that their care was substandard. Same-sex partners of women who miscarry may feel a greater degree of marginalization from the healthcare system (Wojnar, 2007). Concerns related to the RIMS ability to index the broader experience of miscarriage in relation to other populations and men have been reported elsewhere and are worthy of further exploration (Huffman, Swanson, & Lynn, 2014). Our inability to detect any intervention effects in men with partners who were highly impacted, may be a function of not adequately indexing the partner experience.

Conclusion

The RIMS as a measure of meaning of miscarriage does show some, albeit small, change over time demonstrating that there is some reappraisal of the event. In general, provision of caring-based interventions did not appear to effect the appraisal of miscarriage as a significant event. However, in those women who were most devastated or felt the most isolated/guilty, intervention appears to affect reappraisal. Specifically, a combination of face-to-face nurse-caring session with self-administered follow-up materials was found to be the most beneficial. In the current health care environment, cost-effective strategies to diminish morbidity are necessary. Our results show that the RIMS may be helpful in identifying women who may need and respond to additional supportive care following miscarriage.   Further research is needed to determine the direct and indirect effects of meaning appraisal on coping and outcomes and if outcomes are mediated through the reappraisal of meaning or through effective deployment of coping mechanisms. Determining these relationships is necessary in the proper application of the RIMS as well as in the development of cost-effective interventions to diminish emotional sequelae. Although we did not find any treatment effect in the partners of highly devastated or

isolated women related to the impact of miscarriage, this does not mean that treatment had no

value in these men. Additional research is needed to evaluate the needs of partners as well as

measuring intervention effectiveness in broader domains of overall health and functioning.

Table 4.1

CMHP Sample Characteristics

	Women (n=302) Number (%)	Men (n=302) Number (%)
Ethnicity		
Native American	6(1.99)	1(0.33)
Black	8 (2.65)	12 (3.97)
Asian/Pacific Islander	18 (5.96)	15 (4.97)
Hispanic	9 (2.98)	9 (2.98)
Arabic	NA	1 (0.33)
White	261 (86.42)	264 (87.42)
Education		
<12	5(2)	7(2)
High School/GED	22(7)	30(10)
College/College Deg.	180(60)	188 (62)
Graduate/Prof. Degree	95 (31)	77 (26)
Employment		
Employed	207(69)	264(89)
Missing	1	1
Income		
0-20K	32 (10.63)	32 (10.63
21-50K	66 (21.93)	68 (22.67)
51-90K	118 (39.20)	106 (35.33)
90 K +	85 (28.24)	94 (31.33)

Note. Income data based on reported income from 2003- 2005.

Table 4.2

Baseline Equivalency by Gender and Group

Subscale/Group	Mean (*SD*)	*F* (*df*)	*p*	Levene's Test *F* (*df*)	*p*
Guilt Women					
NC	12.99 (4.21)	0.26,	.85	0.32	.81
CC	12.95 (4.47)	(3, 298)		(3, 298)	
SC	13.03 (4.26)				
Control	12.50 (4.11)				
Guilt Men					
NC	9.17 (3.04)	1.07	.36	0.57	.64
CC	8.76 (2.97)	(3, 298)			
SC	8.53 (2.67)				
Control	9.32 (3.34)				
Loss of Baby Women					
NC	12.48 (3.66)	0.41	.74	3.21	.02*
CC	13.12 (4.58)	(3, 298)		(3, 298)	
SC	13.03 (3.69)				
Control	12.76 (3.95)				
Loss of Baby Men					
NC	10.26 (4.03)	1.89	.13	0.85	.47
CC	10.28 (4.08)	(3, 298)		(3, 298)	
SC	9.73 (3.65)				
Control	11.26 (4.29)				
Devastating Event Women					
NC	14.06 (3.80)	0.63	.60	0.28	.84
CC	14.47 (3.92)	(3, 298)			
SC	14.79 (3.75)				
Control	14.02 (4.05)				
Devastating Event Men					
NC	12.11 (3.70)	1.11	.34	0.93	.42
CC	11.43 (4.08)	(3, 298)		(3, 298)	
SC	10.97 (4.17)				
Control	11.74 (3.76)				

Table 4.3

Model Selection

Subscale Models	DIC	Probability G*T Effect > 0	Probability of Group Effect > 0	r_s r_i
Isolation/guilt				
1- Full Model	12358	.18 - .52	NA	$r_s = .08/r_i = .01$
2- Model 1 w/o G*T	12471	NA	.14 - .95	$r_s = .09/r_i = .01$
3- Model 2 w/o Rand. Slope	9639	NA	.16 - .85	$r_i = .10$
4- Model 3 w/o Group	9842	NA	NA	$r_i = .11$
5- Model 4 with Age	9783	NA	NA	$r_i = .11$
6 Model 4 with MHT*Time	9632	NA	NA	$r_i = .11$
7- Model 4 with MHT[1]	9512	NA	NA	$r_i = .11$
8- Model 3 with MHT with H*I/G*	1972	NA	.99 - .01	$r_i = .10$
Devastating event				
1- Full Model	14581	.20-39	NA	$r_s = .07/ r_i = .24$
2- Model 1 w/o G*T	15059	NA	.82 - .99	$r_s = .07/ r_i = .24$
3- Model 2 w/o Rand. Slope	11920	NA	.47 - .90	$r_i = .32$
4- Model 3 w/o Group[1]	11648	NA	NA	$r_i = .33$
5- Model 4 with Age	11858	NA	NA	$r_i = .32$
6- Model 3 with MHT*T	11998	NA	NA	$r_i = .32$
7- Model 4 with MHT	12250	NA	NA	$r_i = .32$
8- Model 4 in HDE group	1934	NA	.02 - .76	$r_i = .32$
Loss of baby				
1- Full Model	15263	.36 - .70	NA	$r_s = .10$ $r_i = .29$
2- Model 1 w/o G*T	15059	NA	.15 - .73	$r_s = .10$ $r_i = .30$
3- Model 2 w/o Rand. Slope	12892	NA	.19 - .76	$r_i = .42$
4- Model 3 w/o Group	13198	NA	NA	$r_i = .42$
5- Model 4 with Age[1]	12539	NA	NA	$r_i = .42$
6- Model 4 with MHT	12965	NA	NA	$r_i = .42$
7- Model 3 with MHT*T	12875	NA	NA	$r_i = .42$
8- Model 3 in HLB with Age	1679	NA	.27 - .60	$r_i = .37$

Note. [1] Denotes favored model for subscale. G*T= Group by Time. MHT= Mental health treatment history. r_i = mean correlation of couple dyads for random intercept. r_s = mean correlation of couple dyads for random slope. H*I/G*= couples where female $\geq 1SD$ on *Isolation/Guilt*. HDE= couples where female $\geq 1SD$ on Devastating event. HLB = couples where female $\geq 1SD$ on Loss of baby.

Table 4.4

Sensitivity Analysis for Isolation/Guilt Subscale

Model Changes prior (mean, precision)	Intercept (%> 0)		Baseline (% > 0)		Time (%> 0)		DIC
	Male	**Female**	**Male**	**Female**	**Male**	**Female**	
100K iterations[*] (0, 0.001)	3.01 (100)	2.66 (99.9)	0.72 (100)	0.77 (100)	0.0005 (84)	-0.002 (0)	9842
200K iterations (0, 0.001)	3.01 (100)	2.65 (100)	0.65 (100)	0.77 (100)	0.0005 (84)	-0.002 (0)	8767
100K iterations (0,0.1)	2.97 (100)	2.59 (100)	0.65 (100)	0.77 (100)	0.0005 (84)	-0.002 (.025)	9762
100K iterations (0, 1)	2.69 (100)	2.18 (100)	0.68 (100)	0.80 (100)	0.0006 (84)	-0.002 (0)	9846
100K iterations (5, 0.001)	3.01 (99.9)	2.66 (99.9)	0.65 (99.9)	0.77 (99.9)	0.0005 (84)	-0.002 (100)	33848
100K iterations (10, 0.001)	3.01 (100)	2.66 (100)	0.65 (99.9)	0.77 (99.9)	0.0005 (84)	-0.002 (0)	40117

Note. * Final model.

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CHAPTER 5: SYNTHESIS OF FINDINGS AND IMPLICATIONS: MEANING OF MISCARRIAGE: FROM AN INDIVIDUAL AND COUPLE PERSPECTIVE

Background

Miscarriage is common event in the reproductive lives of women and their partners. For many, miscarriage is experienced as a harmful event eliciting grief, anxiety, and depression. Miscarriage can also elicit fears regarding future reproduction, and this may lead to psychological morbidity in future pregnancies (Armstrong, 2007; Blackmore et al., 2011; Côté-Arsenault, 2007; Fertl, Bergner, Beyer, Klapp, & Rauchfuss, 2009; Woods-Giscombe, Lobel, & Crandell, 2010). Although studies show that within a few months to a year, most women and men have demonstrated significant signs of healing (Cumming, et al., 2007; Swanson, Chen, Graham, Wojnar, & Petras, 2009) successful adaptation is not always achieved (Cumming, et al., 2007; Lok, Yip, Lee, Sahota, & Chung, 2010). The percentage of women pregnant again within 12 months has been found to be between 58-64% (Swanson, 2000; Huffman, Crandell, & Swanson, unpublished). Knowledge that subsequent to miscarriage, the quality of the couple's relationship, and well-being of future pregnancies are at risk, makes understanding the appraisal of miscarriage an important step. Thus, identifying women and couples in whom miscarriage represents a significant harm and future threat to well-being is of utmost importance.

This dissertation sought to add to our understanding of miscarriage through the lens of stress and coping theory...understanding that the psychological sequelae of miscarriage (grief, depression, quality of life, anxiety)–the typical measures used to

understand miscarriages impact- neglects the intervening step of appraisal i.e., what is the

meaning of miscarriage and its perception as a harmful or threatening event. Capturing

this appraisal of meaning may have greater utility in identifying individuals and couples for

whom miscarriage may be a watershed moment in their partnership or life.

The CMHP provided the unique opportunity to explore the appraisal of miscarriage

from not only the female but also the male/partner perspective.   Focusing on appraisal

provided an opportunity to psychometrically evaluate the IMS, explore its potential utility

in capturing men's appraisal, explore its ability to distinguish groups that may place

greater meaning on miscarriage, and examine how appraisal may be affected by time and

intervention.   Specifically, this dissertation 1) resulted in the revision of the IMS, (RIMS)

for use in men and women, 2) established that the RIMS is able to discern differences in

groups based on certain reproductive and contextual variables, and 3) provided evidence

that time has a small effect in diminishing isolation/guilt, devastation, and the perception

of the loss as a baby and that women most impacted by miscarriage may benefit from

receipt of one hour of couple-focused theory-based nurse counseling plus follow-up

completion of self-caring modules.

<div align="center">**Summary of Findings**</div>

Paper 1: Evaluation of the Psychometric Properties of the *IMS* (*Chapter 2: Measuring the*

***Meaning of Miscarriage: Revision of the Impact of Miscarriage Scale*)**

The aim of Paper 1 was to psychometrically evaluate the IMS for use in both men

and women. This involved confirming the original factor structure. Since it did not

confirm, the items were subjected to exploratory factor analysis. The goal of refactoring

was to develop an instrument that was reliable in both men and women. This was done

through principal axis factoring. The end result was an 18 item scale with 4 factors: 1) *Isolation/Guilt*, 2) *Devastating Event*, 3) *Loss of Baby*, and 4) *Adjustment*. The fourth factor contained only two items. It was dropped due to poor reliability, concern over ambiguous wording in one item, and the items indexed concepts of coping –outcomes of the appraisal process.

The RIMS demonstrated good reliability and test-retest reliability over the course of a year. Divergent/convergent validity was supported; subscales correlated with indices of grief and depression ranged between .47-.70 (full sample). These correlations demonstrate that as the impact of miscarriage increases (i.e., there is broader meaning assigned to the miscarriage than just loss of pregnancy), so does grief and depression. However, these correlations are in the moderate range, lending support that the RIMS measures something other than grief and depression.   This paper raised concerns regarding the RIMS ability to capture the broader experiences of men, partners, and racially or culturally underrepresented groups.

Paper 2: Group Differences in the Impact of Miscarriage: (*Chapter 3: Couples and Miscarriage: The Influence of Gender, Age, Mental Health History, Infertility, Miscarriage History Children, and Gestational Age at Loss on the Impact of Miscarriage*)

The aim of Paper 2 was to determine if selected demographic and reproductive factors, as well as a history of mental health treatment (MHT) were associated with the impact of miscarriage. Age, MHT, miscarriage history, infertility, gestational age at loss, children living, and gender have all been identified as factors that may impact the degree of emotional trauma experienced by miscarriage. However, findings regarding the effects of these factors on emotional symptomatology have not always been consistent and data

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regarding their impact in men is limited. The large sample size and enrollment of both men and women gave us the opportunity to explore the influence of these factors and any interaction effects. Since all the participants were part of a couple dyad, we were able to explore whether gender differences were still supported when couple membership was accounted for in the models.

This study demonstrated that when considered separately, men were more influenced by gestational age and having other children while women were more influenced by past reproductive history (infertility, miscarriage history) on one or more subscales. However, when they were considered as a couple these differences were no longer apparent as evidenced by no gender by factor interactions. Thus, this study suggests that differences seen in men and women when examined separately may not be as strong within the context of the couple dyad. In couples, the degree of isolation and guilt experienced was influenced by age and MHT. Younger couples, in whom one or both partners had a MHT experienced greater isolation and guilt than younger couples without MHT or older couples with and without MHT. Thus, age appears to moderate the effect of MHT on the degree of isolation felt. Isolation and guilt was also greater in couples with a history of infertility or experiencing their second miscarriage. The degree of devastation was associated with age, infertility, and number of children living. Couples who had experienced an early first trimester miscarriage were less devastated than those who experienced later loss in either their first or second miscarriage.

In addition to the above findings, this study highlighted two areas that may benefit from further investigation: 1) in infertile couples, if the lack of resources to pursue

additional infertility treatment may impact the meaning of miscarriage, and 2) if couples

from pronatalist traditions assign greater meaning to miscarriage.

Paper Three: Time and Treatment Effects: (Chapter 3: *Appraisal of Miscarriage: The*

Effect of Time and Intervention Using a Bayesian Approach)

The aim of Paper 3 was to look at the effect of time and intervention on the stability

of the appraisal/meaning of miscarriage as measured by the RIMS. One feature of this

investigation was the use of Bayesian methods to estimate the effects within a multilevel

model. Bayesian modeling allowed direct estimation of the correlation within dyads,

accounting for random effects, and simultaneous estimation of the effects of time and

treatment in men and women. Using conservative criteria for model selection, only those

parameters with posterior probabilities (*pp* > 0) either < .05% or > 95% were considered.

Meaning, that if the posterior probability was greater than 5% but less than 95% the effect

was deemed non- significant.

There were no treatment by time effects for any of the subscale scores, thus

trajectories were held constant across groups. There were no treatment effects on *I/G*, *LB*,

or *DE* in the sample of 302 couples in whom we had complete baseline data and some

follow-up data on each member of the dyad. However, there was a small but significant

effect of time on *I/G*, *LB*, and *DE* in women. Only in regards to the *DE* subscale was there a

significant effect of time in men, with devastation decreasing over one year.

Two findings are highlighted. Firstly, this study specifically estimated the impact of

past mental health treatment on the meaning assigned to miscarriage separately for both

men and women. For isolation and guilt, MHT appeared to have a greater impact in men

than women. Secondly, although treatment does not appear to affect the reappraisal of

meaning in the general group, for the subgroup of women who experienced the most

isolation/guilt or devastation, treatment was beneficial with combined caring having the

greatest impact. Again there were no significant time by treatment interactions; likely

indicating that reconstruction of meaning is more a product of the intervention itself, with

time being a constant in the reappraisal process as opposed to the intervention accelerating

time's influence.

Strengths of Dissertation

The sample size of the CMHP is the largest sample of couple dyads who have

experienced a miscarriage to be reported in the literature.   Due to the large number of

couples in the parent study, the IMS was able to be refactored for use in men, with the

recommended item-to-subject ratios (Costello & Osborne, 2005). The sample size allowed

exploration of the role of reproductive history and the influence of other contextual factors

on meaning for women, men, and as a couple as well as a any interaction effects with these

factors. Most miscarriages take place within a couple-dyad, whether this dyad is in a

marital relationship or not, thus exploring how partners experience miscarriage can

illuminate discrepancies in adjustment that in turn add additional stressors to the adaption

process.   Since both members filled out the same measures at the same time-points during

the study, discrepancies in meaning are able to be probed more fully.

The CMHP also allowed us to look at the meaning/appraisal of miscarriage over

time due and the potential for intervention to mediate this impact. Since the study

randomly assigned couples post baseline assessment into one of four groups, we were able

look at the effect of method of treatment delivery on impact/appraisal. In this study, we

had 302 couple dyads that had some follow-up data on both partners. Understanding how

each member of a couple-dyad changes over time is key to the provision of services that meet the needs of both parties. Our ability to model the impact over time and obtain estimates of time, treatment, and treatment by time effects separately for both men and women while also being able to directly estimate the correlation within couples strengthens our conclusions.

Limitations

One of major limitation of this dissertation study was the population who participated in the CMHP. In general, the CMHP was composed of couples who were heterosexual, White, educated, and from middle to upper socioeconomic groups. A requirement of the study was that women had to enroll with their heterosexual partner. Much of the literature on miscarriage has been biased toward white (Hutti & de Pacheo, 1998; Nikcevic, 2007; Swanson, 1999; Swanson et al, 2009; Theut et al., 1989;), female (Hutti & dePacheo, 1998; Swanson, 1999; Lok, et al, 2010; Neugebauer et al., 1992; NIkcevic, 2007) middle-upper socio-economic /educated samples (Beutal, 1996; Gerber-Epstein, Leichtentritt, & Benyamini; Huttie & dePacheo, 1998; Janssen et. al, 1997; Lok, 2010 et al.; Swanson, 1999). Knowledge of the health implications of miscarriage in a broader multicultural and socioeconomically diverse population is limited.

African American women are almost twice as likely to suffer a miscarriage than White women (Mukherjee, Edwards, Baird, Savitz, & Hartmann, 2013) and yet they are often under-represented in studies looking at the impact of miscarriage. For African American women, spirituality and religion have been cited as central to their experience and there may be greater reluctance to seek counseling due to the a cultural belief in reliance on community and God (Van, 2001; Van & Meleis, 2003). Others have also

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reported the importance of religion/spirituality in coping in African American samples

facing other health crises (Ward, Clark, Heidrich, 2009). As Kavanaugh and Hershberger

(2005) point out, little is known regarding the experience of miscarriage of women from

lower socioeconomic groups. How additional stressors associated with lower

socioeconomic populations (e.g., limited access to care, limited resources) affect the

appraisal of miscarriage warrants further study. This void in the literature may lead to

erroneous assumptions as to the needs of women and men suffering a miscarriage. As

stress and coping theory predicts, past experiences and environment are principal actors in

how one appraises the harm or threat of miscarriage and how one copes. Not

understanding or being sensitive to the unique aspects of culture, race, gender, sexual

orientation, partner status, religion, or socioeconomic circumstances will hinder the

effectiveness of any intervention.

As has been raised earlier, the IMS was developed based on emic items from women.

The qualitative literature in men and partners demonstrates that partners feel that their

main function after a miscarriage is to support their partner who has miscarried (Murphy,

1998, Puddifoot & Johnson, 1997). Although some have suggested that culturally

sanctioned gender roles perpetuate this idea for men, Wojnar (2007) found that lesbian

partners also feel the need to support their partner. As discussed in Chapter 2, the RIMS

may not adequately index the partner experience and thus this study may underestimate the

impact of miscarriage in partners.

Implications for Research and Practice

Five areas of study are suggested from this research: 1) expansion of the RIMS to

include broader experiences of partners and underrepresented sociocultural groups, 2)

structural equation modeling to test the relationship of the demographic and reproductive

variables identified in Paper 2, RIMS subscales, coping behaviors, and outcomes as

postulated under stress and coping theory, 3) further exploration of predictors of

individual and couple trajectories, 4) whether the RIMS can predict couples for whom

subsequent pregnancy may be more emotionally challenging, and finally 5) exploration of

medicine's/society's influences on how miscarriage is viewed and experienced.

Expansion of RIMS

As demonstrated in this study, men are less likely than women to experience

miscarriage as a devastating event, view the loss as a baby, or feel isolated or guilty. We

were not able to determine if the gender differences observed in this study are truly

indicative of the experience for men as "less of an event" or if these differences represent a

failure to capture the partner's experience. The RIMS does not include items that index the

"need to be strong" for one's partner (Murphy, 1998; Wojnar 2007),

inadequacy/helplessness in responding to their partner's distress (Murphy, 1998), or

feeling marginalized by others (Murphy, 1998; Wojnar, 2007). However, men's responses

to other reproductive losses (i.e., infertility) suggest they are less emotionally impacted

than women (Peterson, Newton, & Rosen, 2003; Peterson, Sejbaek, Pirritano, & Schmidt,

2014).   Gender norms for men have traditionally placed men in the role of supporter in

reproductive matters as opposed to active participants. Men who identify with the

traditional male gender role may be more likely to cast themselves in a supportive role

rather than as a co-griever (Smart, 1992). Also, men may be more likely to be instrumental

grievers (Doka & Martin, 2011), exhibiting less expression of feelings and directing more

energy toward cognitive activities. Beutel et al. (1996) found that men were more likely to

"distract" themselves by increasing their focus on work after miscarriage. Although a phenomenological study in partners similar to the one which produced the items on the IMS and RIMS may be considered, this approach may be more costly in time and resources than warranted. Given that several qualitative studies of partners have resulted in similar themes related to support and helplessness, adding statements to the RIMS that index these experiences should be considered with further psychometric evaluation.

RIMS as a Predictor of Coping and Outcome

Based on the tenets of stress and coping theory (Lazarus & Folkman, 1984), meaning is an individually derived construct that is based on a person's unique interpersonal qualities in interaction with their environment and others. The meaning of the event in turn determines how the event is appraised (benign, harmful, threatening) and impacts coping and outcome. Within a couple, both past experiences and joint experiences are entwined and influence the response to the stressful event. It was beyond the scope of this dissertation to formerly test whether the RIMS predicts coping. Structural equation modeling (SEM) would be useful to support whether the RIMS is a measure of appraisal. In addition, SEM would allow the testing of the demographic and reproductive variables as predictors on *I/G, DE, and LB* as well as whether they predict coping and/or outcomes such as grief, anxiety, depression, and relationship quality. This would add to the construct validity of the scale as a measure of appraisal. Addition of variables that index partner response to miscarriage may also illuminate understanding of mediators of the coping process.

Understanding the Trajectories of the Individual and Couple Dyad

The appraisal of miscarriage as harmful and/or potentially threatening to subsequent pregnancy may be viewed within Berntsen and Rubin's (2006) centrality of event framework. Event or trauma centrality refers to the degree to which a trauma significantly impacts the narrative of the person's life or is seen as a turning point (Boelen, 2009). There is some evidence that women may be more likely to integrate highly emotional events into their central identity than men (Boals, 2010). Berntsen and Rubin (2006) have specifically looked at event centrality and its positive association with post-traumatic stress disorder.

Loss centrality has also been positively associated with post-traumatic growth (Schuettler & Boals, 2011). Post-traumatic growth response is characterized by one or more growth experiences: 1) perceived increase in personal strength or confidence in their ability to weather adversity, 2) improved or closer relationships with family or significant others, and 3) a greater appreciation for life (Tedeschi & Calhoun, 1996). Growth after miscarriage is evident in some women (Swanson, 1986; Swanson et al., 2003; Cecil, 1994) as well as signs of post-traumatic stress (Engelhard, van den Hout, & Arntz, 2001; Hamama, Rauch, Sperlich, Defever, & Seng, 2010). Swanson et al. (2003) found that women who scored high on the IMS at one-year were more likely to report being either closer or more distant in their intimate relationship than those with lower scores. This highlights that stress of any kind can be a watershed moment in the lives of couples. While the RIMS may capture the appraisal of the event, it may be useful to understand how this meaning is translated into the narrative of the individual and couple and if intervention may play a role in translating the event as an opportunity for growth. Others have found that when

there is congruence in how an event is appraised (couples agreeing to the degree of stress experienced) there is better marital adjustment (Petersen, Newton, & Rosen, 2003). Looking at how the degree of congruence within the couple on the meaning of miscarriage affects event centrality and resulting outcomes may also help understand different trajectories of couples (i.e. posttraumatic growth or stress trajectory). Miscarriage for some may be the first crisis that they as a couple face together. Given that a large number of couples will find themselves pregnant again within a year (Swanson, 1999; Swanson et al, 2009) enhancing opportunities for growth may have immense benefits going forward if the couple feels that their relationship is stronger and can endure stressful events.

Our data showed that MHT has a greater negative effect on isolation and guilt in men than women. This may be an important area for further exploration. Gabriel, Beach, & Bodenmann (2010) found that interaction behaviors between couples in whom one member was depressed was somewhat dependent upon the gender of the person with depression. Their findings suggested that there were less positive interaction behaviors in those couples where the male partner was depressed and more negative interaction behaviors in couples where the female partner was depressed. Their findings highlight that we may need a more nuanced understanding and approach to intervention design that takes into account the impact of gender on behavior and within the couple dyad.

Pregnancy Subsequent to Miscarriage

Higher levels of anxiety have been noted in pregnant women with a history of miscarriage when compared to women with no such loss history (Blackmore et al., 2011; Côté-Arsenault, 2007; Woods-Giscombe, et al., 2010). There is also some evidence to suggest that healthcare utilization, specifically unscheduled visits related to mother's concern over

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her baby, are increased in women with a history of a perinatal loss (Hutti, Armstrong, &

Myers, 2011).   According to Berntsen and Rubin (2006) events subsequent to the

traumatic event may now be framed negatively as opposed to neutrally (Berntsen & Rubin,

2006). Event centrality may provide a new framework to explore how informational cues

(physical and or oral) may be appraised differently following miscarriage.

In addition to understanding how miscarriage may influence the appraisal of

subsequent pregnancy (i.e., threat), a screening tool that could identify these couples at the

time of subsequent pregnancy may be beneficial. Both depression (Cumming et al., 2007;

Lok, et al. 2010) and anxiety (Cumming et al., 2007) following miscarriage decrease

significantly during the first year after miscarriage and are found to return to levels

comparable to community norms (Cumming et al., 2007; Lok, et al. 2010). However, the

data from this study support that the meaning of miscarriage may be relatively stable for at

least one year. Thus, the RIMS may have potential as a screening tool, if it is able to predict

for those in whom subsequent pregnancy may be more emotionally difficult. Longitudinal

studies evaluating the administration of RIMS at the time of subsequent pregnancy should

be considered to evaluate its predictive ability in identifying those who may suffer more

anxiety or fears related to the health of their current pregnancy

Miscarriage within A Social Context

Women's experience of isolation, guilt, and devastation may be enhanced in cultures

where a woman's value is tied to her fertility (Hollos, 2005). Some cultures have a bride's

price that is paid to the woman's family. The bride price may be paid at the time of

marriage (Onyango & Mott, 2011) or based on her fertility (van den Sijpt, 2010).

Attainment of womanhood may only be recognized after giving birth (Hollos, Larsen,

Obono, & Whitehouse, 2009). In these cultures, not bearing children can affect not only the woman's psychological well-being but also her livelihood (Hollos et al., 2009).   Society has traditionally supported the notion that women are primarily responsible for reproduction. Men have traditionally escaped the mantle of blame regarding reproduction even though research has supported the role of sexually transmitted disease, sperm abnormalities, and relational stress (Dudgeon & Inhorn, 2004; Morland, Leskin, Block, Campbell, & Friedman, 2008) in reproductive outcomes. This study did not allow examination of cultural-societal influences on specific meanings assigned to miscarriage, but given the rich history of immigrant growth in our country, understanding broader cultural meanings of reproduction is necessary. Additionally, this influence must also be seen as a two-way street whereby the provider's cultural view of gender roles and values must be understood in how it influences their relationship with the patient, care provided, and follow-up offered.

As was raised in Paper 1, there is concern over the wording of the item "I feel that my [partner's] body has betrayed me [us]." This question yielded minimal variability in men's responses. Given the knowledge that sperm abnormalities can affect fertility, rewording of this question for men as it is with women ("I feel that my body has betrayed me.") should be explored to see if greater variability could be obtained. However, in cultures where women are mainly valued for their fertility, the current wording of this item for men may have relevance. Thus, having two items, i.e. "I feel my body has betrayed me" and "I feel that my partner's body has betrayed us " should be considered. Cross-cultural studies would enhance our ability to understand cultural influences and illuminate cultural differences that may affect intervention effectiveness.

In western cultures where science dominates, there is a belief that one can exert control over nature. This control extends to reproduction with both medicine and society projecting images of success in conception and delivery and few images of the failure (Everywoman, 2013). Women and men may also be shielded from the realities of miscarriage and other reproductive loss due to the relative "silence" of these experiences not only in general society but within the workplace as well (Hazen, 2006). Thus, the loss of a pregnancy may deliver a stark blow—life is not always under one's control. Some have theorized that this is the result of our society's fear or taboos related to death (Frost, Bradley, Levitas, Smith, & Garcia, 2007; Reinharz, 1988). It is interesting to note that in this study, younger age was found to be associated with greater identification of the loss as a baby, compared to those 35 years of age or older. Younger men and women may have less experience with death and thus be more likely to believe that pregnancy is devoid of risk, i.e. pregnancy = baby. It may also be, that providers are more open to share the risk of miscarriage with older women, since miscarriage risk increases substantially over the age of 35. Western medicine also emphasizes the need to assign cause to death (Frost et al., 2007). This may place those suffering a miscarriage vulnerable to guilt…in that cause cannot always be assigned. As Hale (2007) argues, this lack of cause directs blame inward. Studies have looked at the role of causation in lessening self-blame after miscarriage (Nikcevic, Kuczmierczyk, & Nicolaides, 2007). What remains to be known is whether pre-conception messages from both health care providers and society in general impact the degree of guilt and blame experienced after miscarriage. If so, then normalization of miscarriage prior to pregnancy may be able to impact how miscarriage is perceived (i.e., neutral-benign vs. harmful-threatening)?

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The CMHP is unique in that it specifically targeted couples in the evaluation of intervention effectiveness in couples suffering from miscarriage. Research in grief has consistently shown the importance of social support in psychological outcomes after loss (Toedter, Lasker, & Janssen, 2001), and yet as with other reproductive outcomes research, the partner is often not targeted in interventions (Dudgeon & Inhorn, 2004). This oversight once again shifts the burden to women and implies that as a society we sanction reproduction and responsibility solely within the female realm. Yet, reproduction is dependent on and negotiated, either passively or actively, within a couple dyad. Our lack of research into the needs of partners and their role in this process may be illustrated in that intervention studies aimed strictly at women have yielded mixed results in outcomes related to grief, anxiety, depression and general quality of health in women (Murphy, Lipp, & Powles, 2012).

Implications for Clinical Practice

This study provided evidence that women who were the most isolated/guilty or devastated benefitted from counseling, specifically combined caring, although all treatment groups showed a high probability of an effect greater than control. Although one cannot conclude that highly isolated/guilty or devastated women are also more likely to benefit in terms of emotional symptomatology or relational metrics, the findings reported in this dissertation study suggest that those who place the most meaning on miscarriage may be those who will most likely benefit from intervention. Although no differences were observed in relation to *I/G* and *DE* in the male partners of highly devastated or isolated women, one cannot surmise that men received no benefit from intervention. Swanson (unpublished data) found that both men and women in the CMHP who were randomized to

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the combined-caring intervention reported greater emotional, sexual, and intellectual intimacy with their partner as measured by the Personal Assessment of Intimacy in Relationship Scale (Schaefer & Olsen, 1981) compared to all other groups. Thus, although we could not find a benefit of treatment in terms of restructuring of the meaning of miscarriage for men, it could be that the benefits of treatment were outside of our scope of measurement.

Our study also demonstrated that reproductive factors do affect the impact of miscarriage. Knowledge of these factors and an understanding that the meaning of miscarriage is not a universal phenomenon can lead to greater sensitivity in the care of women and their partners. Although this study was not able to look at cultural influences, clinicians should be aware that these too may profoundly influence the meaning and subsequent needs of the patient and partner.

Conclusion

The impact or meaning assigned to miscarriage is varied and is related to reproductive factors. Although isolation and guilt, devastation, and identification of the loss as a baby diminished over time, the small decline suggests that the meaning of miscarriage remains relatively constant over time. Concerns relating to the RIMS ability to index the partner and other underrepresented groups experience demonstrate the need to consider expanding the RIMS to include items to capture these experiences more fully. Further research is warranted to establish construct validity of the RIMS as a measure of appraisal, its ability to predict psychological sequelae in pregnancies subsequent to miscarriage and variables that may play a role in how meaning assigned to miscarriage can generate growth or additional stress in individuals and couples.

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