

Miscarriage, Religious Participation, and Mental Health

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ABSTRACT

Approximately 15-20% of pregnancies result in miscarriage, yet pregnancy loss remains a socially taboo topic and one that has received limited attention in the literature. Utilizing nationally representative longitudinal data from the NLSY97, this study examines the influence of miscarriage on mental health and whether this relationship is moderated by religious participation. Results from this study suggest that miscarriage is associated with lower mental health among women who also experience a live birth. Results also suggest that religious participation moderates the relationship between miscarriage and mental health; religion is more likely to lead to increases in mental health among women who experience a miscarriage than among women who do not experience a miscarriage. Overall, evidence suggests that religion may be an important coping mechanism for women who deal with pregnancy loss.

Miscarriage, Religious Participation, and Mental Health

Miscarriage is a relatively common experience, with some estimates suggesting that 25% of pregnancies may end in miscarriage within the first 6 weeks after the last menstrual period, and recent evidence suggesting that 12-13% of women report experiencing a miscarriage in their lifetime (Lang and Nuevo-Chiquero 2012). Despite the prevalence of miscarriage, pregnancy loss remains a socially taboo topic that is not commonly discussed as these losses are often minimized, attributed to fate (“it just wasn’t meant to be”), and not treated the same as other deaths (Bakker and Paris 2013; Brier 2008). However, even though pregnancy loss remains a taboo subject, self-reported miscarriages have increased over time as women have become more aware of early pregnancy due to technological advances such as home pregnancy tests (Lang and Nuevo-Chiquero 2012).

Research suggests that women who experience a miscarriage (or other form of pregnancy loss) may experience negative outcomes such as depressive symptoms, post-traumatic stress, and anxiety (Brier 2008; Daugirdaite, van den Akker, and Purewal 2015; Klier, Geller, and Ritsher 2002). However, much of the research on pregnancy loss utilizes small and/or non-representative samples, is qualitative in nature, and/or retrospectively looks at the association between pregnancy loss and well-being (Brier 2008; Daugirdaite et al. 2015; Gold et al. 2016; Klier et al. 2002). Moreover, few studies have examined factors that moderate the relationship between miscarriage and mental health (Brier 2008; Cowchock et al. 2010). In order to more fully understand the consequences of miscarriage (especially as more women report these losses today), more research in this area is needed.

This study contributes to this understudied area by utilizing a nationally representative sample to examine whether religious participation moderates the relationship between

miscarriage and mental health. Although a large body of literature has examined the influence of religion on bereavement and grief, relatively few studies have explored the relationship between religion and pregnancy loss (Cowchock et al. 2010). Research generally suggests that religion helps people to cope with difficulties in life, including death and even the loss of a child (Anderson et al. 2005; McIntosh, Silver, and Wortman 1993; Pargament 1997). Thus, religion may help women to more effectively cope with loss due to a miscarriage. Indeed, the limited research on religion and pregnancy loss (and infertility) generally reflects these patterns (Cowchock et al. 2010; Domar et al. 2005; Mann et al. 2008). Yet, religion may also hinder the coping process if individuals feel abandoned by, or blame, God for their loss (Pargament 1997).

The current study builds on this understudied area of research by focusing on two research questions. First, is miscarriage associated with declines in mental health? Second, does religious participation moderate the relationship between experiencing a miscarriage and mental health? These questions will be assessed using nationally representative longitudinal data to improve on limitations in the literature and increase our understanding of social factors that may influence women's ability to cope with a pregnancy loss occurring due to miscarriage.

BACKGROUND

Miscarriage

Miscarriage (or spontaneous abortion) is the unintended termination of a pregnancy before the fetus is considered viable. Clinicians have typically defined miscarriage as a pregnancy that ends by 14-16 weeks gestation, whereas researchers have typically used 20 weeks gestation as a cutoff point to define miscarriage (although some studies define miscarriage as any pregnancy that ends prior to 27 weeks gestation) (Klier et al. 2002; Lang and Nuevo-Chiquero 2012; Neugebauer et al. 1992; Shapiro 1988). Approximately 15-20% of recognized pregnancies

result in miscarriage (Griebel et al. 2005), although some estimates suggest that these rates are even higher (Lang and Nuevo-Chiquero 2012).

Miscarriage is a significant loss event, and one in which those who experience it need to grieve and cope with (Brier 2008). In many ways, grief following a miscarriage appears similar to grief following other types of loss, yet is different in that individuals are unable to dwell on past experiences and instead often focus on the loss of future experiences with their child (Arnold and Gemma 1994; Brier 2008).

Attachment theory provides a useful framework for understanding the process of loss that occurs through miscarriage. According to Bowlby (1969), attachment is the degree to which an individual experiences a connection and sense of involvement with a loved one. While this theory was initially intended to understand neonatal (i.e., post-birth) attachments, it is increasingly acknowledged that attachment to the fetus is developed during – and even prior to – pregnancy (Klier et al. 2002; Brier 2008). For example, parents engage in activities that increase their attachment to the child prior to birth such as planning a pregnancy, attending doctor’s visits, announcing the pregnancy, feeling the fetus move, and preparing for the child’s birth (Robinson, Baker, and Nackerud 1999). The process of developing attachments to the fetus has been accelerated and heightened with advances in medical technologies. Specifically, the reliability and ease of home pregnancy tests allow women to confirm pregnancy at a very early stage and thus begin to develop an attachment to the fetus earlier than in the past (Lang and Nuevo-Chiquero 2012). In addition, increased use of ultrasounds has allowed parents to develop visual attachments to their child (Robinson et al. 1999). These technologies, in accordance with physical and psychological processes that are occurring within pregnant women, aid in the formation of bonds between expectant mothers and their unborn children.

Once an attachment is created, there are consequences if (and when) that attachment is broken. Specifically, loss of an attachment figure creates a gap in an individual's life that leads to a period of mourning and grief (Bowlby 1969; 1980). During this time, it is also possible for individuals who lost a loved one to experience more severe reactions to loss including depressive symptoms, anxiety, and/or post-traumatic stress (Shaver and Fraley 2008).

However, in contrast to other forms of loss, miscarriage may be particularly challenging to cope with due to how it is perceived in society. Miscarriage is often viewed as a non-event, particularly because miscarriages generally occur prior to a viable pregnancy and people may not even know that a pregnancy took place unless informed by the expectant parent (Brier 2008; Rajan and Oakley 1993). In addition, loss of a fetus is viewed as less significant than other losses, and perhaps even as a necessary loss (i.e., ending a nonviable pregnancy). There are also fewer resources available to assist in the bereavement process as there is generally not a funeral following a miscarriage, and people often do not discuss miscarriage (Bakker and Paris 2013; Brier 2008; Rajan and Oakley 1993). Thus, people who experience miscarriage often have to cope with their grief by themselves with limited support from others, which may increase the difficulty of coping with their loss (Rajan and Oakley 1993).

Not surprisingly, miscarriage increases the risk of psychological distress. Specifically, research suggests that miscarriage is associated with increased depressive symptoms (Gold et al. 2016; Klier et al. 2002; Neugebauer et al. 1992), post-traumatic stress (Cowchoc et al. 2011; DaugiDerdaite et al. 2015; Gold et al. 2016), and elevated levels of anxiety, especially during subsequent pregnancies (Bergner et al. 2008; Cecil and Leslie 1993). Consistent with this literature, I expect that:

H1: Experiencing a miscarriage will be associated with declines in mental health.

Religious Participation and Coping

Because of the numerous potential mental health consequences of miscarriage, it is important to explore factors that may help individuals to cope with their loss. One of these potential factors is religion. Specifically, attending religious services frequently provides individuals with a social support network that they can rely on for help (Durkheim ([1897] 1951; Ellison 1991; Ellison and Levin 1998). Religious teachings may also provide individuals with a sense of meaning and purpose in life (Ellison 1991; Pargament 1997). Such messages may help individuals to better cope with stressful situations and perhaps even consider them part of a divine plan (Ellison 1991; Pargament 1997; Smith, McCullough, and Poll 2003). Individuals who attend religious services more frequently may be more likely to internalize these teachings and rely on them to provide a framework for understanding and coping with difficulties in life (Ellison 1991; Ellison and Levin 1998; Smith et al. 2003). Thus, involvement in a religious community may help to protect against psychological distress following a stressful event. Indeed, weekly religious attendance is associated with fewer symptoms of depression and anxiety (Sternthal et al. 2010).

The influence of religiosity on coping (and ultimately mental health) varies by how religion is used. In particular, positive religious coping is linked to more positive outcomes following stressful events (Ano and Vasconcelles 2005; Pargament 1997). Such strategies involve religious forgiveness, seeking religious support, belief in a loving God, and engaging in religious rituals (Pargament 1997; Pargament et al. 1998). Research suggests that individuals who engage in positive religious coping are generally better able to deal with stressful situations (Ano and Vasconcelles 2005; Smith et al. 2003). In particular, the vast majority of studies

suggest that religiosity has a positive influence on bereavement, although methodological weaknesses prevent any definite conclusions (Becker et al. 2007).

However, religion also has the potential to make coping with stress more difficult. In particular, engaging in negative religious coping strategies such as viewing God as punishing, feeling frustrated with one's religious community, and feeling abandoned by God may increase the likelihood of experiencing psychological distress following a stressful event (Pargament 1997; Pargament et al. 1998). Indeed, research suggests that negative religious coping is positively associated with symptoms of anxiety and depression (Ano and Vasconcelles 2005; Smith et al. 2003; Sternthal et al. 2010). In addition, there is some evidence that positive religious coping may be associated with continued attachment (Cowchock et al. 2010); highly religious individuals may sanctify (i.e., find greater meaning and spiritual significance in) their relationships with others, increasing their feelings of attachment and making it more difficult to deal with the loss of a significant other (Cowchock et al. 2010; Mahoney et al. 2003).

Despite the somewhat mixed findings on religious coping, research generally suggests that religious participation has a protective effect for individuals dealing with stress, and bereavement in particular. Thus, I expect that:

H2: Religious participation will be positively associated with mental health.

Religious Participation and Pregnancy Loss

The support provided by religion may be particularly helpful to individuals who experience miscarriage given that social support for parents who miscarry is often lacking (Bakker and Paris 2013; Brier 2008; Rajan and Oakley 1993). Women may turn to religious communities for support and guidance on how to deal with their loss. In particular, women may rely on religious teachings to find meaning and purpose in their loss (McIntosh et al. 1993;

Pargament 1997). Unfortunately, research on whether and how religion may help individuals to cope with pregnancy loss is limited and has produced mixed findings (Cowchock et al. 2010).

On the one hand, there is some evidence to suggest that religion may be beneficial to individuals coping with miscarriage. Specifically, research suggest that religious participation and having stronger religious beliefs may help women who experience pregnancy loss to grieve in more positive ways than women who are less religious (Cowchock et al. 2011; Mann et al. 2008; Kersting et al. 2007). Moreover, focusing on loss of an infant, McIntosh et al. (1993) found that religious participation indirectly influences psychological well-being by enhancing perceptions of social support. Studies of women dealing with infertility also provide further evidence that religiosity is associated with better mental health among women seeking infertility treatment (Domar et al. 2005; Mahajan et al. 2009).

On the other hand, other studies do not find any evidence that religious participation helps individuals to cope with pregnancy loss (Cowchock et al. 2010). Moreover, research suggests that there are ways in which religion may inhibit the coping process. For example, negative religious coping is associated with higher levels of grief among women who experience pregnancy loss (Bakker and Paris 2013; Cowchock et al. 2010). In addition, the protective effect of religion may be mitigated by strong attachments to an unborn child, lengthening the bereavement period and making it more difficult to get over the loss (Cowchock et al. 2010). Some parents dealing with pregnancy loss also report feeling isolated within their religious community; the emphasis on childbearing within many religious institutions may lead women who miscarry to feel stigmatized and subsequently reduce their religious involvement (Bakker and Paris 2013; Domar et al. 2005).

Given the mixed findings on pregnancy loss, religion, and mental health, and the overall lack of research in this area, the primary goal of this study is to utilize data from a nationally representative sample to assess whether religious participation helps women who experience a miscarriage to cope with the loss and protect against declines in mental health. Consistent with the larger literature on religion and coping, I expect that:

H3: The influence of experiencing a miscarriage on mental health will be moderated by religious participation. That is, among women who experience a miscarriage, women with higher levels of religious participation will have better mental health than women with lower levels of religious participation.

DATA AND METHODS

Sample

Data for this study comes from the National Longitudinal Study of Youth 1997 (NLSY97). The NLSY97 contains a nationally representative sample of approximately 9,000 youths. Youths were first interviewed in 1997, and have been re-interviewed annually in each subsequent year (with the exception of 2012) through 2013 (Moore et al., 2000). Information about mental health was collected in six waves of the NLSY97 (2000, 2002, 2004, 2006, 2008, and 2010), and these are the waves of data that are used for this study.

To construct the sample for this study, the sample was first restricted to females because detailed information about pregnancies was only asked of female respondents (N = 4,385). The sample is further restricted to females who answered the survey questions of interest in the six waves that are used for this study (N = 4,183). In addition, to avoid comparing miscarriage to other forms of pregnancy loss, women who reported having an abortion (N = 468) or

experiencing a stillbirth (N = 69) were excluded.¹ These restrictions result in a final sample size of 3,646 females for this study.

Variables

Mental Health. A short version of the Mental Health Inventory (MHI-5) was included in the six surveys that comprise the focus of this study. The MHI-5 is a reputable instrument to assess mental health (e.g., Friedman, Heisel, and Delavan 2005). The version included in the NLSY97 includes five questions regarding how frequently (1 = all of the time to 4 = none of the time) the respondent (a) has been a nervous person, (b) felt calm and peaceful (reverse coded), (c) felt down or blue, (d) been a happy person (reverse coded), and (e) been depressed in the past month. Responses to each question are summed, and the mean is used as the indicator of mental health. This measure is taken from each of the six surveys in which the MHI-5 was included, allowing for an assessment of respondents' mental health over time.

Miscarriage. At each wave of the NLSY97, female respondents were asked whether they had been (or currently are) pregnant since their last interview and what the outcome of each pregnancy was. For example, in the sixth round of surveys (year 2002), female respondents were asked to report on whether they had been pregnant since the fifth survey round (year 2001) and what the outcome of each pregnancy was. Information from these questions was used to construct the indicators of miscarriage. Thus, information on pregnancies that occurred prior to each wave of data in which mental health information was collected is used to construct the indicators of miscarriage for this study. Informed by the conceptual framework, women are classified as (a) not having a miscarriage (used as reference category),² (b) having a miscarriage only, (c) having a miscarriage and a live birth, and (d) having a miscarriage and currently being pregnant.

It is important to acknowledge that this approach likely results in an undercounting of miscarriages. Because mental health information is only collected in 6 of 16 surveys, there are waves that are not included here in which females may report experiencing a miscarriage. An alternative approach would be to combine waves of data to capture these cases by using pregnancy data from 1997-2000 surveys to predict mental health in 2000, 2001-2002 surveys to predict mental health in 2002, etc. However, this approach would increase the time between experiencing a miscarriage and the assessment of mental health, making it difficult to assess this relationship given that research shows that the detrimental impact of miscarriage on mental health dissipates over time as individuals learn to cope with the loss (Brier 2008).³ Thus, this study takes a conservative approach by focusing only on miscarriages that occur in the year prior to each survey in which mental health information is collected.

Religion. The primary indicator of religion is religious participation, which is a time-varying variable (taken from each available wave) that indicates how frequently respondents attend religious services (ranging from 0 = never to 6 = once a week or more). In addition, respondents were asked to report their religious affiliation in three of the NLSY97 surveys (2000, 2005, and 2008). Time-invariant indicators of religious affiliation (taken from the 2000 survey) are included in the models. Using the classification scheme created by Steensland et al. (2000) as a guide, religious affiliation is coded as (a) Catholic, (b) mainline Protestant, (c) evangelical Protestant, (d) other Protestant, (e) other religion, and (f) no religious affiliation (used as reference group).

Control Variables. A number of variables are included as controls. Age, education (ranging from 1 = did not complete high school to 5 = master's degree or higher), and income (ranging from 0 = none to 8 = \$200,000 or more) are time-varying variables taken from each

wave. Race/ethnicity is coded as: (a) white (used as reference category), (b) Black, (c) Latino, and (d) other race/ethnicity. Family structure is a time-varying variable that is coded as: (a) married (used as reference category), (b) cohabiting, (c) single, and (d) living with parents. An indicator of substance use is also included as substance use has been linked to both mental health and miscarriage (Elliott, Huizinga, and Menard 1989; Ness et al. 1999). Dichotomous variables indicating whether respondents (a) smoked, (b) binge drank at least once, (c) used marijuana, and (d) used other illicit drugs in the month prior to each survey were constructed. Responses were then summed to create a time-varying indicator of substance use. The indicator of substance use included in the models is a lagged variable to assist with time-ordering (i.e., whether substance use reported in the prior survey influences mental health in the current survey). In addition, a variable is included to indicate females who experienced a prior miscarriage (e.g., a respondent who reported a miscarriage in the 2004 survey who also reported a miscarriage in the 2000 survey). Data from all 16 available surveys was used to construct this measure to allow for miscarriages occurring in surveys not included (i.e., odd numbered years) to be at least partially accounted for. Finally, a time-varying variable is included to indicate number of children, which helps to account for live births that occurred in waves that are not the focus of this study.

Analytic Strategy

Growth curve (or multilevel) models were used as the method of analysis for this study. These models allow for an assessment of trajectories of mental health over time, and account for the lack of independence and clustering in longitudinal data due to repeated measurements over time (level 1) nested within individuals (level 2) (Raudenbush and Bryk 2002). Each model takes the same basic form and varies by the covariates included in the model (Raudenbush and Bryk

2002; Singer and Willett 2003). Each model is comprised of two equations. The level-1 (within person) model is expressed as:

$$Y_{ij} = \eta_{0i} + \eta_{1i} WAVE_{ij} + \eta_{2i} WAVE^2_{ij} + \varepsilon_{ij}$$

where Y_{ij} is the predicted level of mental health for person i at time j . η_{0i} indicates an individual's initial level of mental health and η_{1i} and η_{2i} indicate the linear and quadratic rate of change in mental health over time. The first wave of data (year 2000) was coded as 0 (to interpret the intercept in a meaningful way). Both linear and quadratic models were estimated, and quadratic models were used because they fit the data better.

Level-2 models include variables that help to explain between-person differences in both the initial level of mental health and change in mental health over time:

$$\Pi_{0i} = \pi_{00} + \pi_{01} PVARIABLE1_i + \pi_{02} PVARIABLE2_i + \dots + \zeta_{0i}$$

$$\Pi_{1i} = \pi_{10} + \pi_{11} PVARIABLE1_i + \pi_{12} PVARIABLE2_i + \dots + \zeta_{1i}$$

where π_{00} and π_{10} represent the level-2 intercepts for the initial level and rate of change in mental health, π_{01} , π_{02} , etc. represent the effect of each person-level variable on the initial level of mental health, and π_{11} , π_{12} , etc. represent the effect of each person-level variable on the rate of change in mental health.

A series of growth curve models was used to test the hypotheses. The first model included only the indicators of miscarriage. Religion and control variables were added in the second model, and the third model includes interaction terms to assess whether religious participation moderates the relationship between miscarriage and mental health. Random effect terms were included for survey year to allow individual trajectories to vary over time; tests for additional random effects and slopes either did not improve the fit of the models or resulted in a lack of convergence in the models. Continuous variables were mean-centered, and missing

values for variables assessed only once were imputed using regression-based imputation (results using listwise deletion were consistent with those presented here).

RESULTS

Summary statistics for all variables are included in Table 1. Estimates show that approximately 10% of women in this sample reported experiencing a miscarriage. This estimate is slightly lower than estimates reported in other studies (Griebel et al. 2005; Lang and Nuevo-Chiquero 2012). This may be due to the relatively young sample used for this study (maximum age of women in this sample is 31), as risk of miscarriage increases as women age (Nybo Anderson et al. 2000). On average, miscarriages occurred between 9 and 10 weeks gestation (results not shown). Approximately 3% of women in this sample reported a prior miscarriage, suggesting that about 1/3 of the women who experienced a miscarriage in this sample actually experienced multiple miscarriages. Mean values in Table 1 also suggest that women in this sample report generally good mental health across all waves, and women attend religious services less than once a month on average.

----- Insert Table 1 About Here -----

Results in Table 2 provide estimates from growth curve models examining the influence of miscarriage and religious participation on trajectories of mental health. These results show the fixed effects estimates of each variable on the initial level of mental health (i.e., intercept) and linear rate of change in mental health (i.e., slope) as well as the quadratic rate of change in mental health and random effects estimates (in the form of variance components). Results in Model 2 provide partial support for H1. Although it was expected that women who experienced a miscarriage would report lower mental health, this only appears to be the case for women who report experiencing both a miscarriage and live birth in the same year. That is, women who

experience a miscarriage and live birth report lower mental health than women who do not experience a miscarriage ($b = -.20, p < .05$). Women who experience both a miscarriage and live birth may initially experience heightened anxiety due to fears about experiencing another miscarriage, leading to declines in mental health (Bergner et al. 2008). However, these fears may dissipate over time; results in Model 2 show that the linear rate of change in mental health for women who experience both a miscarriage and live birth is positive ($b = .03, p < .05$), suggesting that mental health increases over time for these women ($b = .03, p < .05$). Consistent with the larger literature, results in Table 2 also provide support for H2; religious participation is positively associated with mental health among women ($b = .02, p < .001$), and this positive relationship persists over time (i.e., the linear rate of change coefficient is not statistically significant).

----- Insert Table 2 About Here -----

Interaction terms were included in Model 3 to assess whether religious participation moderates the relationship between having a miscarriage and mental health. Results provide partial support for H3. Specifically, religious participation seems to provide some protection against initially lower levels of mental health for women who experience only a miscarriage; among women who experience a miscarriage, those who attend religious services frequently have significantly higher mental health than those who attend less frequently ($b = .03, p < .05$). There is also some evidence suggesting that religious participation may be associated with initially higher levels of mental health among women who also experienced a live birth in addition to a miscarriage ($b = .05, p < .10$).

----- Insert Figure 1 About Here -----

These findings are further illustrated in Figure 1. To create Figure 1, estimates from Model 3 in Table 2 were first used to calculate predicted values of mental health by type of miscarriage and level of religious participation. These estimates were then used to calculate the percentage difference in average levels of mental health of women with average levels of religious participation who did not have a miscarriage (reference group) to all other groups of women in the sample. Results in Figure 1 show the percentage difference in mental health score from the reference group. Not surprisingly, results generally show that higher levels of religious participation are associated with higher levels of mental health for all groups (consistent with results in Table 2). However, consistent with H3, the difference in mental health between those with low and high levels of religious participation is greatest among women who experience a miscarriage. Specifically, among women who experience only a miscarriage, levels of mental health are 6% higher among frequent attenders compared to infrequent attenders. Similarly, among women who also experienced a live birth in addition to having a miscarriage, levels of mental health are over 8% higher among frequent attenders compared to infrequent attenders. This difference is larger than for women who experience miscarriage and are currently pregnant (3% difference) and for women who did not report a miscarriage (less than a 3% difference in mental health between high and low levels of attendance). Overall, these results suggest that religious participation may help protect against negative mental health outcomes among women dealing with miscarriage.

DISCUSSION

Despite the fact that miscarriages are a relatively common occurrence, miscarriage remains a socially taboo topic and one that has been understudied in the literature. The goal of this study was to improve on methodological limitations in previous research by utilizing

nationally representative longitudinal data to examine the relationship between miscarriage and mental health and explore whether this relationship is moderated by religious participation.

The first hypothesis suggested that miscarriage would lead to declines in mothers' mental health. Attachment theory suggests that attachments are developed once individuals feel connected and involved with a loved one (Bowlby 1969). Loss of an attachment figure thus creates a gap in an individual's life that leads to a period of mourning and grief (Bowlby 1969; 1980). Stronger attachments may be especially difficult to get over, possibly leading to unresolved grief that may result in various forms of psychological distress (Shaver and Fraley 2008). Given advances in technologies, mothers are able to develop attachments to their unborn child from a very early age (Lang and Nuevo-Chiquero 2012; Robinson et al. 1999), and loss of an unborn child may be especially difficult to cope with due to the way society largely ignores miscarriage (Bakker and Paris 2013; Brier 2008). As a result, previous studies have found an increased risk of psychological distress among women who miscarry (Brier 2008; Cowchock et al. 2011; Klier et al. 2002).

Somewhat surprisingly, results from this study suggest that miscarriage is associated with lower mental health only among women who experience both a miscarriage and a live birth. It is possible that the process of experiencing a live birth and parenting an infant may heighten the attachment that mothers feel to their unborn child. A unique aspect of grief following a miscarriage is that parents have to grieve over the loss of future experiences with their child (in contrast to dwelling on past experiences for other types of loss) (Arnold and Gemma 1994; Brier 2008). Having a live birth, and having such experiences with an infant, may make the loss of an unborn child more tangible and difficult to deal with as the "future experiences" that are lost

become more real. As a result, the bereavement process may be lengthened and thus harder to deal with, resulting in lower mental health (Cowchock et al. 2010).

The second hypothesis focused on the relationship between religious participation and mental health. Consistent with previous literature, results from this study suggest that religious participation is associated with better mental health. Religious participation helps to provide individuals with access to a social support network as well as teachings that may help to provide meaning and purpose to stressful life situations (Ellison 1991; Pargament 1997). By attending religious services frequently, individuals may internalize these teachings and rely on them to cope with difficulties in life (Ellison 1991; Ellison and Levin 1998; Smith et al. 2003).

The third hypothesis focused on whether religious participation moderated the influence of having a miscarriage on mental health. Despite mixed findings in the limited literature on religion and pregnancy loss, results provide some evidence that religious participation may help to protect against negative mental health outcomes among women who experience a miscarriage. Specifically, religious participation is more likely to enhance mental health among women who experience a miscarriage (either only a miscarriage or a miscarriage and live birth) than among women who do not miscarry. Religious participation may provide much needed social support to women who miscarry, as social support and resources for dealing with miscarriages are often limited (Bakker and Paris 2013; Brier 2008; Rajan and Oakley 1993). Attending religious services frequently may also expose women to teachings and messages on how to find meaning in loss, which may serve as a useful coping mechanism (McIntosh et al. 1993; Pargament 1997). The social support and framework provided by religion may be especially beneficial to mothers who miscarry but also have a live birth, as results from this study suggest they are the most likely

to experience declines in mental health and may be in need of support and guidance on how to cope with their loss.

Despite the strengths of this study, there are also a few limitations to note. First, the mental health inventory was only asked in some waves of the NLSY97. This presents some methodological challenges and results in a conservative estimate of the relationship between miscarriage and mental health in this study. Having information about both mental health and miscarriage at each wave of data would allow for a more comprehensive examination of the influence of miscarriage on mental health.

The indicators of religion available in the NLSY97 are also limited. The only variable included in each survey is religious participation. Although this appears to be an important resource for women (both in enhancing mental health overall and being especially beneficial for women who miscarry), it is difficult to determine what specifically about religious participation (e.g., perceived or actual support, messages heard from religious teachings, etc.) aided in the coping process. Furthermore, this study is unable to assess whether and how other aspects of religion may aid or hinder the process of coping with a miscarriage. Other studies have found that intrinsic or personal aspects of religiosity may be just as, if not more, important in helping individuals to cope with loss (Cowchock et al. 2010; 2011; Mahajan et al. 2009; Sternthal et al. 2010). In addition, research suggests that religion can either be helpful or harmful to individuals coping with loss depending on whether they use positive or negative religious coping strategies (Pargament 1997; Pargament et al. 1998). Future studies should look to incorporate additional measures of religiosity in larger, longitudinal datasets to allow for a more comprehensive examination of the relationship between pregnancy loss, religion, and mental health outcomes.

Focus groups or in-depth interviews with women who experienced a miscarriage would also be helpful in understanding how these women may use religion to cope with their loss.

Finally, this study focuses on a relatively young sample of women. Research suggests that the risk of miscarriage increases with age (Nybo Anderson et al. 2000). Thus, this study may provide a conservative estimate of the rate of miscarriage and the association between miscarriage and mental health. The percentage of women in this sample who experience a miscarriage may increase as these women age, and there may also be women who are unable to achieve another pregnancy as they get older (which may have consequences for mental health). Future research should continue to follow NLSY97 respondents to assess the relationships between miscarriage, religion, and mental health once these women have completed their fertility.

Overall, this study contributes to an understudied field of inquiry that affects a sizeable portion of the population. Utilizing data from a nationally representative sample, results suggest that miscarriage is associated with lower mental health among women who also experience a live birth. Results also suggest that religious participation moderates the relationship between miscarriage and mental health; religion is more likely to lead to increases in mental health among women who experience a miscarriage than among women who do not miscarry. As such, evidence suggests that religion may be an important coping mechanism for women who deal with pregnancy loss. Future research should continue to explore this understudied area to further understand the consequences of miscarriage for parents and how parents cope with their loss.

NOTES

¹ Analyses including these cases (i.e., focusing on pregnancy loss instead of miscarriage specifically) produced results that were generally consistent with those presented here.

² Analyses that included additional categories to make the reference group more specific (e.g., having a live birth, being pregnant, not getting pregnant) produced results that are consistent with those presented here.

³ This approach was used in supplementary analyses, and results from these models produced similar trends but results were not always statistically significant (perhaps due to greater time passing between miscarriage and the assessment of mental health).

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Table 1. Summary Statistics

	<i>M</i>	<i>SD</i>	<i>Max</i>	<i>Min</i>
Mental Health	3.03	0.49	1	4
<u>Miscarriage</u>				
Only Miscarriage (% ever)	0.06	-	0	1
Miscarriage and Live Birth (% ever)	0.02	-	0	1
Miscarriage and Currently Pregnant (% ever)	0.02	-	0	1
Did not experience miscarriage*	0.90	-	0	1
<u>Religion Variables</u>				
Religious Participation	3.13	1.91	1	6
Catholic	0.27	-	0	1
Mainline Protestant	0.13	-	0	1
Evangelical Protestant	0.41	-	0	1
Other Protestant	0.05	-	0	1
Other Religion	0.12	-	0	1
No Religious Affiliation*	0.02	-	0	1
<u>Control Variables</u>				
Age	22.78	3.68	15	31
White*	0.52	-	0	1
Black	0.26	-	0	1
Hispanic	0.21	-	0	1
Other Race	0.01	-	0	1
Married*	0.21	-	0	1
Cohabiting	0.15	-	0	1
Single	0.23	-	0	1
Living with Parents	0.41	-	0	1
Number of Children	0.65	1.01	0	7
Education	2.17	0.96	1	5
Income	3.44	1.67	0	8
Substance Use (lagged)	0.75	0.94	0	4
Prior Miscarriage	0.03	-	0	1

N = 3,646

*Used as reference category

Table 2. Estimates from Growth Curve Models Predicting Mothers' Mental Health

Variable	Model 1		Model 2		Model 3	
	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>	<i>B</i>	<i>SE B</i>
<u>Initial Status</u>	2.98	0.01***	3.17	0.05***	3.17	0.05***
<i>Miscarriage</i>						
Only Miscarriage	-0.03	0.05	-0.04	0.05	-0.03	0.05
Miscarriage and Live Birth	-0.18	0.08*	-0.20	0.08*	-0.17	0.08*
Miscarriage and Currently Pregnant	0.03	0.10	-0.05	0.09	-0.05	0.09
<i>Religion Variables</i>						
Religious Participation			0.02	0.00***	0.02	0.00***
Catholic			-0.06	0.04	-0.06	0.04
Mainline Protestant			-0.05	0.05	-0.05	0.05
Evangelical Protestant			-0.07	0.04	-0.07	0.04
Other Protestant			-0.06	0.05	-0.06	0.05
Other Religion			-0.03	0.05	-0.02	0.05
<i>Control Variables</i>						
Age			0.01	0.01	0.01	0.01
Black			0.02	0.02	0.02	0.02
Hispanic			-0.03	0.02	-0.03	0.02
Other Race			-0.10	0.08	-0.10	0.08
Cohabiting			-0.01	0.02	-0.01	0.02
Single			-0.06	0.02*	-0.06	0.02*
Living with Parents			-0.11	0.02***	-0.11	0.02***
Number of Children			-0.03	0.01**	-0.03	0.01**
Education			0.03	0.01*	0.03	0.01*
Income			0.01	0.00	0.01	0.00
Substance Use			-0.01	0.01†	-0.01	0.01†
Prior Miscarriage			-0.10	0.11	-0.10	0.11
<i>Interactions</i>						
RP x Only Miscarriage					0.03	0.01*
RP x Miscarriage and Birth					0.05	0.03†
RP x Miscarriage and Pregnant					0.00	0.02
<u>Linear Rate of Change</u>	0.02	0.00***	-0.01	0.01	-0.01	0.01
<i>Miscarriage</i>						
Only Miscarriage	-0.00	0.01	-0.00	0.01	-0.00	0.01
Miscarriage and Live Birth	0.02	0.01†	0.03	0.01*	0.02	0.01
Miscarriage and Currently Pregnant	0.01	0.01	0.02	0.01	0.02	0.01
<i>Religion Variables</i>						
Religious Participation			-0.00	0.00	-0.00	0.00
Catholic			0.01	0.01*	0.01	0.01*
Mainline Protestant			0.01	0.01*	0.01	0.01*
Evangelical Protestant			0.01	0.01	0.01	0.01
Other Protestant			0.01	0.01	0.01	0.01
Other Religion			0.01	0.01	0.01	0.01
<i>Control Variables</i>						

Age			-0.00	0.00	-0.00	0.00
Black			0.00	0.00	0.00	0.00
Hispanic			0.00	0.00†	0.00	0.00†
Other Race			0.00	0.01	0.00	0.01
Cohabiting			0.00	0.00	0.00	0.00
Single			-0.00	0.00	-0.00	0.00
Living with Parents			0.00	0.00	0.00	0.00
Number of Children			0.00	0.00†	0.00	0.00†
Education			-0.00	0.00	-0.00	0.00
Income			-0.00	0.00	-0.00	0.00
Substance Use			-0.00	0.00**	-0.00	0.00**
Prior Miscarriage			-0.00	0.00	-0.00	0.00
<u>Quadratic Rate of Change</u>	-0.00	0.00*	-0.00	0.00	-0.00	0.00
<u>Variance Components</u>						
Level 1: Within Person	0.12	0.00***	0.12	0.00***	0.12	0.00***
Level 2: Between Person	0.13	0.00***	0.12	0.00***	0.12	0.00***
Year	0.00	0.00***	0.00	0.00***	0.00	0.00***
<u>Log-likelihood</u>			-10875	-10716		-10712

N = 3,646 (19,187 person-years)

† $p < .10$. * $p < .05$. ** $p < .01$. *** $p < .001$

Figure 1. Predicted Values Showing Percentage Difference in Mental Health compared to Non-Pregnant Mother with Average Religious Participation

