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Allison Badgley Date

Association and mediation of in-hospital support and posttraumatic stress following stillbirth

By

Allison Badgley
Master of Public Health

Epidemiology

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Carol Hogue, PhD, MPH
Faculty Thesis Advisor

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Allison Badgley

Bachelor of Science
Bachelor of Arts
University of California, Davis
2012

Faculty Thesis Advisor: Carol J. Rowland Hogue, PhD, MPH

An abstract of
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Abstract

Association and mediation of in-hospital support and posttraumatic stress following stillbirth

By Allison Badgley

About 1 in 200 pregnancies in the United States end in stillbirth, resulting in substantial psychological morbidity in bereaved mothers and their families. Factors occurring during and immediately after a traumatic event have the biggest impact on the later development of posttraumatic stress (PTS) symptoms, highlighting the importance of support received in the hospital after a stillbirth. This was a cross-sectional investigation of the relationship and possible mediators between reported support received from hospital staff and PTS symptoms. Data were used from the SCRN-OASIS follow-up maternal interviews from a sample of women (n=254) who had a stillbirth 6 months to 3 years prior. PTS symptoms were measured using the Impact of Events Scale (IES). Feeling blamed by others for the loss of the baby was found to significantly influence the relationship between staff support and PTS, with support received in hospital decreasing PTS symptoms more in women who felt blamed by others. Among women aged 25-34, reported in-hospital support was associated with a -8.22 (95% CI: -15.9, -0.5) reduction in IES scores for women who did not feel blamed and a -18.8 (95% CI: -31.7, -5.9) reduction in women who felt blamed. The association was not significant among women aged under 25 and was only significant for women 35 or older who felt blamed for their loss. While support received from hospital staff was not associated with lower PTS symptoms among all ages, it was significantly related to a reduction of PTS symptoms in women aged 25-34 and in women who felt blamed by others for the stillbirth. These findings indicate that receiving support in the hospital from nurses and other staff is especially effective among certain populations of bereaved mothers and can contribute to a reduction in PTS symptoms.

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Background

Posttraumatic Stress Disorder

Posttraumatic stress disorder (PTSD) affects about 3.5% of adults living in the United States every year, and it is associated with the development of other mental disorders, such as substance use disorders and mood disorders (1, 2). It causes as much or greater impairment than other seriously impairing mental disorders and can result in significant work loss and increased risk of suicidal thoughts and behaviors (2, 3). PTSD is estimated to cost an individual between $600 and $2,000 a year in mental health-related healthcare costs, which is at least 4% higher than healthcare costs for individuals with Major Depressive Disorder (4).

Most people experience at least one potentially traumatic event in their lifetimes, yet not all those who experience a traumatic event will develop PTSD (5). Typically, at-risk populations for developing PTSD after experiencing a traumatic event include those with lower education, female gender, social disadvantage, psychiatric history, and previous adversity as well as those with greater perceived life threat and lower perceived social support during and after the traumatic event (6, 7).

Diagnostic Criteria

The DSM-V provides the most current criteria for diagnosing PTSD and is widely used in the United States. According to the DSM-V, to have a diagnosis of PTSD, an individual must have been exposed to “actual or threatened death, serious injury, or sexual violence” by 1) direct experience, 2) witnessing the event, 3) learning of the violent or accidental actual or threatened death of a close family

member or close friend, or 4) experiencing repeated or extreme exposure to the details of traumatic events (8).

The criteria for diagnosing PTSD also stipulate that an individual must be experiencing symptoms related to trauma exposure from four clusters (9). The first cluster, intrusion symptoms, refers to recurrent and involuntary distressing memories of the traumatic event and can be in the form of dreams, flashbacks, or intense distress or physiological reactions from internal or external cues (8). Avoidance, the second cluster, denotes the effort to avoid distressing memories, thoughts, or feelings as well as external reminders of the traumatic event, such as people, places, or activities (8). The third symptom cluster is negative alterations in cognitions or mood associated with the traumatic event, and an individual must have two or more of the following symptoms: dissociative amnesia, exaggerated negative beliefs or expectations about oneself, others, or the world, distorted cognitions about the event that leads to misdirected blame, persistent negative emotional state, diminished interest in significant activities, feeling of detachment, and inability to experience positive emotions (8). Fourth, PTSD diagnosis requires two or more symptoms of marked alterations in arousal and reactivity associated with the traumatic event: irritable behavior and angry outbursts, reckless or self-destructive behavior, hypervigilance, exaggerated startle response, problems with concentration, and sleep disturbance (8).

The duration of the symptoms must be more than one month, and they must cause significant distress or impairment in functioning (8). In this way, the criteria exclude those whose symptoms are short-term and not severe enough to meaningfully impact an individual's day-to-day activities. This controls for the

large proportion of individuals who experienced a traumatic event but did not develop PTSD.

However, some research suggests that subthreshold PTSD may be a significant contributor to impairment, and therefore measuring only the diagnosis of PTSD may be missing an important population (10-12).

Impact of Events Scale

There are various validated instruments for the measurement of PTSD. In this study, investigators used the Impact of Events Scale (IES) developed by Horowitz et al. (1979) (13). It is a 15-item scale measuring current self-reported distress related to a specific event, with 7 items on intrusion symptoms and 8 items on avoidance symptoms. While it does not measure hyperarousal symptoms, this is seen as a potential benefit for studies investigating perinatal trauma as hyperarousal may be considered an adaptive change in mothers for the care of their infants (14). Total possible scores range from 0 to 75, with higher number indicating more frequent occurrence of posttraumatic stress symptoms.

Studies have found that the IES is a valid instrument for the measurement of posttraumatic stress symptoms and that it measures case-level PTSD at least as well as other validated instruments (15, 16). As the IES measures posttraumatic stress symptoms on a continuous scale, several cut-off points have been suggested to determine case-level PTSD, ranging from a score of 19 to 35 (16). Horowitz has suggested that a score of more than 19 on either scale (intrusion or avoidance) indicates high distress from a traumatic event (13). Similarly, many studies on perinatal PTSD have classified a score of 20 or above as a case of clinical concern (17-19). Two studies evaluating the usefulness of IES

for PTSD screening had varying results, indicating that the use of any cut-off between 19 and 35 is has at least fair to moderate agreement (15, 16). Many studies have simply used the IES as a continuous measure of posttraumatic stress symptoms (20).

Risk Factors

Past research has identified many major and minor risk factors of PTSD. Two extensive meta-analyses recognize distal factors as having a weak association and proximal factors as having a stronger association with PTSD (6, 7).

In Brewin et al.'s meta-analysis, including 77 articles relating to predictive or risk factors of PTSD, it was found that some factors predicted PTSD consistently across different study populations and methodologies, while other factors did not (6). The risk factors that increased PTSD only in certain populations or with the use of a specific methodology included female gender, younger age, minority race, lower education, previous trauma, and general childhood adversity (6). Psychiatric history, reported childhood abuse, and family psychiatric history were significant predictors across more studies than the previously listed risk factors, but the strongest predictors of PTSD across all studies were trauma severity, lack of social support, and life stress (6).

Similarly, Ozer et al.'s meta-analysis of 68 articles using quantitative methods to identify predictors of PTSD recognized psychological processes occurring around the time of the trauma as the strongest predictors of PTSD (7). This analysis only looked at 7 predictors- prior trauma, prior psychological adjustment, family history of psychopathy, perceived life threat during the trauma, posttrauma social support, peritraumatic emotional responses, and

peritraumatic dissociation-, with the latter four factors occurring during and after the traumatic event and being the strongest predictors of PTSD (7). Distal factors had average correlation coefficients smaller than 0.20, while the four proximal factors observed in this meta-analysis had average coefficients greater than 0.20 (7).

In all, both meta-analyses found that factors occurring around and soon after a traumatic event were more predictive of PTSD than were distal factors such as gender, race, and psychiatric history.

PTSD has also been shown to be related to basic personality traits. A systematic review found that PTSD was positively correlated with the personality dimensions negative emotionality, neuroticism, harm avoidance, novelty-seeking, and self-transcendence as well as with traits of hostility/anger and anxiety, and PTSD is negatively associated with the dimensions extraversion, conscientiousness, self-directedness, and the combination of high positive and low negative emotionality, as well as the traits of hardiness and optimism (21).

Another risk factor is gender, as women are more likely to develop PTSD than men, with over 2 times the prevalence of PTSD than men (1, 6, 22, 23). Further, pregnant women are more at risk for PTSD than non-pregnant women (24, 25). This may be due to the psychological and physiological aspects of pregnancy triggering PTSD, normal psychosomatic phenomena of pregnancy being reported as psychiatric symptoms, or the pregnancy exacerbating preexisting psychiatric symptoms (24).

A recent meta-analysis by Yildiz et al. (2017) found that the mean prevalence of PTSD in women after childbirth was 4.0% in community samples

and 18.5% in high risk samples (26). Similarly, a meta-analysis of 78 studies conducted by Grekin & O'Hara (2014) estimated that about 3.1% of pregnant women develop postpartum PTSD, and this percentage was five times higher for women in at-risk samples (27). This review also identified multiple risk factors for postpartum PTSD. In community samples, current depression, labor experiences, and history of psychopathology were correlated with developing PTSD after childbirth, and in at-risk samples, current depression and infant complications were correlated with PTSD (27).

A recent meta-analysis of 50 studies by Ayers et al. (2016) identified similar predictors significantly associated with PTSD (28). Pre-birth risk factors of PTSD included depression in pregnancy, fear of childbirth, poor health or pregnancy complications, and a history of PTSD, and birth risk factors included subjective birth experiences, having an operative birth, lack of support, and dissociation (28). PTSD was associated with poor coping and stress after birth and was highly co-morbid with depression (28). Like Grekin & O'Hara, Ayers et al. found effect size differed for certain factors between general and at-risk samples, with the effect of poor health and complications in pregnancy more highly correlated to development of postpartum PTSD in at-risk women (28).

Further, while childbirth can be a risk factor for PTSD, women who have had a pregnancy loss are more likely to have PTSD than women who had a livebirth (29-31). It is important to note that while PTSD after the death of a loved one may share many similarities to grief, research has distinguished between the two (32, 33). Grief and PTSD differ in the emotional valence of

intrusion symptoms as well as in the presence of hyperarousal symptoms, and studies have been able to measure the two separately (32, 33).

However, the point at which a "normal" state of mourning in bereaved individuals becomes "pathological" has been widely debated (32). The DSM-V includes Persistent Complex Bereavement Disorder in its section for disorders under consideration and states that, in order to distinguish it from uncomplicated grief, severe grief symptoms must persist for at least 12 months in adults, whereas previous studies have suggested a minimum of 6 months (8, 32). In contrast, the minimum duration for symptoms of PTSD is one month. As both grief and PTSD have been shown to decrease over time, the amount of time elapsed since loss is an important factor to consider in the relationship between pregnancy loss and posttraumatic stress symptoms.

For example, a systematic review by Christiansen et al. (2017) shows that prevalence of PTSD in mothers is between 23-49.1% in the first three months of loss and between 0.6-37% in 3 to 12 months post-loss (20). Similarly, another systematic review by Daugirdaite et al. (2015) found that both posttraumatic stress and PTSD decreased over time (34).

Posttraumatic Growth

Past research has identified posttraumatic growth (PTG) as a possible mediator of the relationship between a traumatic event, such as childbirth, and PTSD. PTG is the tendency of people to develop beyond their previous level of psychological functioning after experiencing a stressful or traumatic event (21, 35). It is different from resilience in that it focuses on reaching a greater level of

psychological functioning after a traumatic event rather than returning to or maintaining the same level of functioning one had before the event (36).

The development of growth involves conscious cognitive processes, such as rumination or deliberate thinking, meaning making, or cognitive appraisal (36). PTG is positively correlated with social support as well as with certain personality constructs, such as extraversion, openness to experience, agreeableness, conscientiousness, self-efficacy, self-esteem, and optimism (21, 36).

Posttraumatic growth is commonly measured by the Posttraumatic Growth Inventory (PGI), a 21-item scale developed by Tedeschi and Calhoun (1996) (37). It evaluates positive outcomes from 5 different categories: appreciation of life, relationships with others, personal strength, recognition of new possibilities, and spiritual development (37).

PTG is described by conflicting theories. One theory argues that PTG is a beneficial outcome, while the other suggests that it is an illusion used by an individual as an avoidant strategy in the aftermath of a negative experience (38). The 'Janus-Face of PTG' model, developed by Maercker & Zoellner, hypothesizes that both these theories are true in that positive illusions can be beneficial coping strategies immediately after an event but can later hinder an individual from coping completely with trauma (38).

Similarly, some studies have considered a quadratic relationship between PTG and PTSD symptom severity, in which it is assumed that growth is hindered at a point of extreme symptom severity and that this point- where the curve begins to slope downward- is the critical point for PTSD diagnosis (36, 39). This would indicate that there is point where PTSD symptoms inhibit the cognitive

processes necessary for the development of growth. A recent meta-analysis found strong evidence supporting this quadratic relationship, finding both a linear relationship and a stronger curvilinear relationship between PTG and PTSD symptoms that varied by trauma type and age (39).

Results from a systematic review of 19 studies found that PTG is associated with PTSD, such that trauma survivors with PTSD exhibit more PTG than those without PTSD (36). The study also found that PTG can be intensified through therapy for PTSD, but it is unclear whether this is a desirable outcome as there is no conclusive evidence that PTG results in a reduction of symptoms of PTSD (36). Overall, the evidence investigating the relationship of PTG and PTSD is contradictory. This discrepancy may be accounted for by the hypothesized curvilinear relationship between PTG and PTSD symptoms and the Janus-Face Model of PTG that theorizes both a beneficial and detrimental influence of PTG on PTSD symptoms (36, 38, 40).

Because childbirth is correlated with an increased risk of PTSD, it provides a unique opportunity to measure factors prospectively- before, during, and after the potentially traumatic event occurs. Studies on psychological growth have indicated that about 47.9% percent of women experience at least a small degree of positive change after childbirth and that PTG after childbirth is associated with operative delivery, posttraumatic stress symptoms during pregnancy, higher resilience, and low fear at childbirth (41, 42). Contrary to other studies citing social support as an important predictor of PTG, studies on PTG after childbirth have found no relation between social support and PTG (41, 43). In regards to pregnancy loss, studies on posttraumatic growth have found moderate levels of

growth after loss and that growth is positively correlated with grief, mainly in the subdomains of appreciation of life, personal strength, and relating to others (44).

Stillbirth

While pregnancy is associated with higher rates of PTSD, pregnancy loss can be further traumatizing. Perinatal loss is a life event that has a deep and lasting impact on mothers and families. Multiple studies have found that perinatal loss results in psychological morbidity, including posttraumatic stress symptoms, depression, and anxiety, which can last for many years after loss (45-47). A systematic review by Christiansen et al. (2017) shows that prevalence of PTSD in mothers is between 23-49.1% in the first three months of loss and between 0.6-37% in 3 to 12 months post-loss, which is incrementally higher than the US population prevalence rates (20).

About 50% of perinatal deaths in the United States are stillbirths- fetal deaths occurring 20 or more weeks gestation- totaling 23,595 stillbirths in 2013, which is 5.96 stillbirths per 1,000 pregnancies (48). Thus far, most studies have focused on PTSD after termination of pregnancy or miscarriage rather than stillbirth (34).

A longitudinal study conducted by Gold et al. (2016) compared mothers who had experienced a stillbirth or infant death to mothers with live births and found that the bereaved mothers had nearly 4 times the odds of depression and 7 times the odds of posttraumatic stress disorder than the live-birth mothers at 6 months and later postloss (30). Similarly, Jind et al. (2010) found higher

posttraumatic stress symptoms among parents who experienced perinatal death than among parents with live babies at 15 to 61 weeks postloss, but neither of these studies focused solely on stillbirth (31).

Another study by Chung et al. (2016) limited its index group to mothers with stillbirth, and while this study showed these mothers were 5 times as likely to report postnatal depression than mothers who had live births, the study did not compare the posttraumatic stress symptoms of the two groups (29). In contrast, a similar study by Turton et al. (2009) conducted at 7 years or more after the index birth found no difference in posttraumatic stress symptoms between mothers with stillbirth and mothers with live birth, which is consistent with literature in that posttraumatic stress symptoms have been shown to subside with time (34, 49). However, the study found that the mothers with PTSD during the pregnancy subsequent to the stillbirth continued to have significantly higher posttraumatic stress symptoms than the control group 7 years later (49).

Other studies of interest have shown similar increased psychological morbidity in mothers who are currently pregnant but have experienced a prior pregnancy loss as compared to pregnant mothers who have not experienced pregnancy loss (50). A relatively large prospective cohort study by Chojenta et al. (2014) showed that women with previous pregnancy loss were almost two times as likely as women without pregnancy loss to experience symptoms of depression and anxiety during a subsequent pregnancy, but not during the postpartum period (50). On the contrary, a previous, larger cohort study by Blackmore et al.

(2011) demonstrated that depression and anxiety symptoms are higher in bereaved mothers during and after a subsequent pregnancy, and other studies have shown that mothers who conceived their new child sooner after pregnancy loss had more depressive and posttraumatic stress symptoms during and after subsequent pregnancy than mothers who conceived later following their loss (51-53).

In addition to these studies, there are many studies that investigate incidence, risk factors, and mediating factors of posttraumatic stress symptoms in relation to stillbirth and pregnancy loss. Many studies show that time since the loss of the baby is a significant mediating factor, with posttraumatic stress symptoms being the highest right after the loss (34, 45, 54, 55). Other risk factors for posttraumatic stress in mothers after pregnancy loss include younger age, lower income, lower education level, lower perceived social support, and psychiatric history (18, 30, 34, 54, 56). Some studies suggest that a mother holding the deceased infant is associated with more posttraumatic stress symptoms, but other studies state the opposite (57, 58). Further research is needed to determine the results of a mother's contact with her stillborn infant as well as other forms of memory-making.

Methods

Hypothesis

This study investigates the relationship between reported in-hospital support and posttraumatic stress (PTS) symptoms, with the hypothesis that more

in-hospital support is associated with a reduction in posttraumatic stress symptoms. A secondary hypothesis posits that various mediators will influence this relationship, with grief, current depression, current pregnancy, no successful births since stillbirth, blame, and partnership breakdown increasing posttraumatic symptoms and with time since loss, successful livebirth after stillbirth, and better perceived social support after stillbirth decreasing posttraumatic stress symptoms.

Study Design

The Stillbirth Collaborative Research Network (SCRN) conducted a population-based case-control study at multiple sites with prospective enrollment of stillbirths and livebirths at the time of delivery occurring between March 2006 and September 2008. The investigators chose 59 hospitals associated with five clinical sites to gain access to at least 90% of all stillbirths and livebirths of residents in defined geographical catchment areas in Rhode Island, Massachusetts, Georgia, Texas, and Utah. Investigators collected data from maternal interviews, medical record abstraction, placental pathology, biospecimen testing, and post-mortem examination.

A follow-up study, SCRN- Outcomes after Study Index Stillbirth (OASIS), was conducted at all study sites, and women were contacted 6 months to 3 years after index delivery if they had provided written consent for further contact. Participants were sent a letter requesting permission to conduct a telephone interview, and if the letter was not returned, study site staff attempted to phone the participant.

Women available for contact were provided with a description of study procedures and gave verbal consent for the telephone interview, in either English or Spanish. Due to the sensitive nature of some interview questions, interviewers were trained to recognize symptoms of distress in the participant and to follow a referral protocol.

Eligibility and Inclusion/Exclusion Criteria

Eligible women for screening in the original SCRN study were those who had a fetal death at ≥18 weeks of clinical gestational age or those who delivered a livebirth at ≥20 gestation at one of the recruitment hospitals. Women were excluded if the delivery resulted from termination of a living fetus. To be enrolled in the study, women had to be at least 13 years of age, a resident at time of delivery of one of the geographical catchment areas, identified for participation prior to hospital discharge, able to give informed consent, and not currently incarcerated.

Upon enrollment, each delivery was carefully reviewed, and an Apgar score >0 at 1 and/or 5 minutes after delivery or signs of life by direct observation were used to confirm birth status as livebirth or stillbirth.

Livebirths at 20-31 weeks gestation and livebirths ≥32 weeks gestation of African American women were oversampled to account for differences in distribution between stillbirths and livebirths and to maintain a ratio of at least 2:1 livebirths to stillbirths.

The original study had a sample of 597 cases and 1,712 controls, and there was substantial loss to follow-up, with only 46.9% of cases and 41.7% of controls participating in the follow-up study (Figure 1). For the present study, 18 of the

265 followed case participants were missing study variables, leaving a study sample of 247, only 35.8% of the original sample of cases used in SCRN.

Measures

Stillbirth and sociodemographic variables were pulled from the original SCRN study, using data from maternal interviews and medical chart abstraction. All potential mediators and main exposure and outcome variables were taken from OASIS follow-up interviews.

The interview item used to measure in-hospital support asked "Were there individuals or groups who you found helpful or supportive after your delivery, while you were still in the hospital?" and then listed specific types individuals, including hospital staff, family, and friends. If the respondent answered yes to the primary question and then indicated yes to nurses, doctors, or hospital grief personnel, then they were coded as reporting support. Those who answered no to the primary question or who answered no to receiving support from nurses, doctors, or hospital grief personnel were coded as reporting no support.

Posttraumatic Stress

The follow-up OASIS study included the Impact of Events Scale (IES), developed by Horowitz et al. (1979), to measure posttraumatic stress symptoms (13). The instrument consists of 15 items, 7 items on intrusion symptoms and 8 on avoidance symptoms, and respondents can mark the frequency of symptom occurrence as not at all {1}, rarely {2}, sometimes {3}, and often {4}. The total possible range of scores in this study is 15 to 60, with a higher score indicating higher frequency of posttraumatic stress symptoms. Previous studies have used a scale of not at all {0}, seldom {1}, sometimes {3}, and often {5}, and these studies

defined possible cases of PTSD as a score of 20 or higher or as a score of 35 or higher (13, 17-19). However, these studies miss subclinical cases in which symptoms may not be frequent enough to meet the case definition but still can cause meaningful impairment in functioning. This study will include these subclinical cases by treating the scale as continuous, similar to other studies looking at risk factors of posttraumatic stress symptoms (59, 60).

Psychometric analyses were conducted using subsamples of OASIS study population, defined by race/ethnicity, language, and pregnancy outcome. These analyses showed good internal consistency reliability (Cronbach alpha= 0.89 to 0.91) and at least marginal fit when separated into two factors: intrusion symptoms and avoidance symptoms (See Appendix)(61).

Posttraumatic Growth

Posttraumatic growth (PTG) is measured using the Posttraumatic Growth Inventory (PGI) by Tedeschi and Calhoun (1996) (37). It has 21 items asking about changes women may have experienced as a result of the stillbirth with answers ranging from 1- "did not experience this change" to 6- "experienced this change to a very great degree." Previous studies have used PGI total score in addition to scores for 5 different subscales of PTG: appreciation of life, relationships with others, personal strength, recognition of new possibilities, and spiritual development (36, 42, 44).

In the present study, each subscale showed good internal consistency with Cronbach alphas greater than 0.80, but the Appreciation of Life subscale had a lower alpha (α=0.64) (See Appendix)(61). In confirmatory factor analyses, factor loadings for the item "changed my priorities" was low, especially for certain

subgroups, but the removal of this item did not change the internal consistency for the scale as a whole.

Depression

To measure depression, this study used the Edinburgh Depression Scale (EDS), developed by Cox, Holden, & Sagovsky (1987) (62). The scale consists of 10 Likert-like items, each with 4 options and with a total possible score from 0-30, and a score of greater than 12 indicates current major depression (63, 64). Previous studies have shown that the scale has good sensitivity and specificity for detecting major depression in postnatal and non-postnatal samples (64, 65).

Psychometric analyses showed good internal consistency (Cronbach alpha= 0.79 to 0.82) and acceptable model fit for the overall sample as well as all subgroups (See Appendix)(61).

Grief

The Perinatal Grief Scale (PGS) was developed by Toedter, Lasker, & Alhadeff (1988) to measure the different dimensions of grief after perinatal loss (66). This study utilized the short version of this scale, consisting of 33 Likert-scale items (67). Each item could be answered with 1- strongly agree to 4- strongly disagree, with a total possible score ranging from 33 to 132. The scale measures three subscales: active grief, difficulty coping, and despair.

A review of studies using PGS-short version showed that 95% of the time, scores fall in the range of 78 to 91, suggesting that a score above 91 would indicate a high degree of grief (68). Psychometric analyses from the present study demonstrated good internal consistency (Cronbach alpha= 0.86 to 0.95) and model fit among subgroups (See Appendix)(61).

Analysis

All analyses were conducted using SAS 9.4 (SAS Systems, Cary, NC). To account for the substantial loss to follow-up (56.1%), propensity scores were constructed using logistic regression models to create stabilized inverse probability weights based on sociodemographic characteristics of the original study sample: maternal age, race and ethnicity, education, marital status, health insurance, prenatal care, history of depression, wanted pregnancy, trait anxiety, and trait anger. In addition, data weights constructed during the initial study were also used to account for women who refused or were unable to participate in the original study.

For the scales IES and PGS, one missing item was allowed per subscale, and the missing item was replaced with the subscale mean for that participant. Because PGI has smaller subscales and because EDS is relatively short, these scales were allowed one missing item total, also using mean substitution methods.

Correlation analyses using Pearson correlation coefficients tested the relationship between the subscales and total scores of IES, EDS, PGI, and PGS. Relationships between the scales showed no major violations of linearity. Initial comparisons of sociodemographic characteristics and potential mediators and IES scores with levels of reported in-hospital support were conducted using Pearson chi-square tests and T-tests as appropriate.

Current pregnancy and family and professional support after stillbirth were dropped from consideration as potential mediators due to a large number of missing observations (n=15). Initial analyses suggest that neither current

pregnancy nor support after stillbirth were mediators of the association between in-hospital support and PTS.

A generalized linear model was constructed to assess the relationship between reported in-hospital support and posttraumatic stress symptoms, controlling for the same sociodemographic characteristics used to calculate propensity scores. All assumptions for linear modeling were met, and collinearity assessment yielded no major problems between variables.

Interaction was considered for all sociodemographic characteristics included in the model, and stratified effect sizes were presented for all categories of maternal age, the only interaction term found to be significant in the model. Sociodemographic characteristics affecting the relationship between in-hospital support and PTS by at least 10% were kept in the model as confounders, and those included maternal education, marital status, trait anger, and time since loss.

Baron & Kenny (1986) list three criteria for identifying a mediator: a) the exposure significantly predicts the outcome, b) the exposure significantly predicts the mediator, and c) the mediator significantly predicts the outcome while controlling for the exposure (69). Kraemer et al. (2002) modifies this approach to assessing mediation, suggesting that a factor is a mediator if: a) the exposure precedes the mediator in time, b) the exposure significantly predicts the mediator, and c) the mediator has a main or interactive effect on the outcome (70). This study uses the criteria described in Kraemer et al. (2002), as it is more sensitive.

Thus, to assess for mediation, logistic regression models were constructed for each mediator, with in-hospital supporting predicting the potential mediator, controlling for maternal age, education, marital status, trait anger, and time since loss. General linear models were also constructed to test the association of potential mediators and PTS, controlling for in-hospital support in addition to the same confounders. If a potential mediator showed a significant association with in-hospital support, it was then included in a general linear model of in-hospital support predicting PTS with an interaction term to assess for an interactive effect. Any potential mediator that had a significant main effect or significant interactive effect on PTS, in addition to a significant association with in-hospital support, was then included in the final model with a corresponding interaction term, in accordance with methods described by Kraemer et al. (2002) (70).

Due to the cross-sectional nature of this study, it cannot be definitively determined whether support received from hospital staff preceded the potential mediator or whether the potential mediator preceded the support, in which case it would be a moderator of the relationship of interest rather than a mediator. For either a mediator or a moderator, Kraemer (2002) recommends including an interaction term in the final model and presenting results accordingly, and thus, for the purposes of this study, the intervening variables will continue to be called mediators.

Results

The participants lost to follow-up (n=284) differed significantly in terms of maternal race, education, marital status, health insurance, and trait anxiety

(Table 1). These differences were controlled for using propensity score weighting. Further participants were not included in the model (n=11) due to missing study variables, but they did not differ significantly from the sample used in the model.

Descriptive Statistics

Women were asked at follow-up about the types of people they received support from in the hospital directly after their stillbirth. A total of 230 (90.6%) women reported receiving support from any person, with 211 (83.1%) reporting support from hospital staff, and 24 (9.4%) women reported receiving no support at all while still in the hospital (Table 2). Of women reporting no support from hospital staff, 44.2% reported receiving support from others, such as father of the baby (78.9%), family members (84.2%), or friends (57.9%).

The weighted frequencies and means of sociodemographic characteristics and potential mediators by reported in-hospital support are shown in Table 3 (See appendix for unweighted frequencies). In the weighted sample, bivariate analyses showed that in-hospital support was associated with being given mementos from hospital staff (p=0.015) and with support after the hospital (p=0.016), with a higher percentage of women who were given mementos and who later received professional or family support reporting receiving support from hospital staff.

Surprisingly, seeing and holding the baby was not associated with reported in-hospital support (p=0.391), though only 64.2% of women reporting no support from nurses held their babies compared to 74.3% of women reporting support.

The average IES score for participants reporting no support was 31.4 (std=17.5), compared to 27.1 (16.1) among those reporting support from nurses

and other hospital staff (Table 3). The means did not differ significantly (p=0.111).

Some factors were significantly associated with having higher posttraumatic stress symptom scores when assessed individually: maternal age less than 25 years (p=0.001), less than a college education (p=0.001), not married (p=0.001), history of depression (p=0.034), high trait anxiety (p=0.005), and less than a year since loss (p=0.006) (See Appendix).

Correlation between scales

IES scores were positively correlated with EDS (r=0.59) and PGS scores (r=0.56) (Table 4). Posttraumatic growth measured by PGI was not significantly correlated with IES, EDS, or PGS scores. However, the IES avoidance subscale was negatively correlated with the PGI Relating to Others subscale (r=-0.15). PGS was positively associated with IES Avoidance (r=0.45) and Intrusion (r=0.54) subscales as well as with EDS (r=0.66), and it was negatively associated with the PGI Personal Strength (r=-0.17) subscale.

Mediation Assessment

Associations with in-hospital support

Criteria for identifying mediators stipulates that the exposure must significantly predict in-hospital support. In logistic regression models controlling for confounders, only posttraumatic growth, feeling blamed by others, and being given mementos were significantly related to in-hospital support (Table 5). Reporting support from hospital was associated with an average 4.1 (95% CI: 0.3, 16.4) point increase in PGI score compared to those not reporting support from staff, and those reporting support were 4.3 (1.4, 13.2) times as likely to feel

blamed by others and 3.5 (1.1, 11.1) times as likely to have been given mementos by staff than those reporting no staff support.

Associations with posttraumatic stress symptoms

A simple linear model yielded a non-significant relationship between in-hospital support and posttraumatic stress symptoms, with women reporting support from nurses and staff having average lower IES scores by 4.4 points (-10.6, 1.9) than those reporting no staff support (Table 6). In the model controlling for confounding factors and interaction with age, the relationship was similar, non-significant among all three age groups.

Models were constructed to include each mediator that had a significant association with in-hospital support and to test the significance of the interaction between the mediator and support. None of the interaction terms were significant (Table 6). As PTG and being given mementos did not have a main or interactive effect on IES scores, they were not considered mediators.

Multivariate analysis

The only variable that was associated with in-hospital support from staff and that had a main effect on PTS was feeling blamed by others, with in-hospital support negatively associated with PTS among women who felt blamed by others (Figure 2). Blame and an interaction term for blame and support were included in the final model.

Among women 25 to 34 years old, there was a significant effect, with women reporting in-hospital support from staff have an average of 8.2 (-15.9, -0.5) lower IES scores than women reporting no support among women who did not feel others blamed them for the loss of their baby and an average of 18.8 (-

31.7, -5.9) lower IES scores among women who felt that others blamed them (Table 7) (Figure 3A-B). There was also a significant reduction of IES scores in women aged 35 and older who felt blamed by others, but the sample for this group was very small (n=3). In women aged 25 or less, there was no significant association, but for those who did not feel blamed, support from hospital staff appeared to be positively correlated with IES scores. Every other subgroup, though, showed a negative association, and it is worth noting that all effect sizes had wide confidence intervals.

Discussion

A stillbirth is a potentially traumatic event, and the support received in the direct aftermath of trauma can have a significant impact on later development of posttraumatic stress disorder (7). Nurses, doctors, and hospital grief personnel are in a unique position to influence a bereaved mother's experience and psychological processes immediately after a stillbirth.

About 46% of women in the study sample were aged 25 to 34 years at the time of their stillbirth, and among these women, support received from hospital staff was correlated with lower PTS symptoms. In-hospital support was associated with an even greater reduction in PTS among 25 to 34-year-old women who felt blamed for the loss of their baby. Similarly, for women of other ages, receiving support from staff in addition to feeling blamed for the loss meaningfully, though not significantly, decreased PTS.

As mentioned previously, due to the cross-sectional nature of this study, it is unclear whether blame would be considered a mediator of the relationship between in-hospital support and PTS or whether support would be considered a

mediator of the relationship between blame and PTS. It is dependent upon the association between blame and in-hospital support and the timing of these factors. If blame occurred before support- mothers who felt blamed by others at the time of their stillbirth were more likely to subsequently receive more support from hospital staff- then blame moderated the association. However, if blame occurred after the support- mothers who received support from hospital staff were more likely to later feel blamed for the loss of their baby by others- then blame mediated the association. This explanation does not seem plausible unless there is some unmeasured confounding of this relationship. In either case, feeling blamed for the stillbirth significantly influenced the relationship between in-hospital support and PTS, and this suggests that support from hospital staff is especially important in situations where mothers feel blamed or at fault for their stillbirth. Future studies should consider which factors of support best ameliorate a bereaved mother's feelings of blame or culpability, as this is a common phenomenon in women experiencing stillbirth (71).

Another interesting finding is the differences in effect sizes among women of different ages. Age is a known risk factor of PTS, with younger women more likely to develop PTSD (6). Interestingly, in the youngest mothers, support from hospital staff was not associated with a decrease in PTS; in fact, it seemed to be associated with an increase in symptoms. While this result was not significant, further investigation is needed to determine the underlying mechanisms resulting in the differences between bereaved mothers of different ages and how support receive might be targeted toward each age group.

Another finding of interest was that support from nurses was not associated with bereaved mothers seeing and holding their babies, nor was it associated with an increase or reduction in PTS, as other studies have suggested (57, 58). This may be due to a mother's perception that, even though she was able to see and hold her baby, there was more that could have been done by nurses and hospital staff (72).

Strengths

A major strength of this study was the prospective cohort design of OASIS as a follow-up to the original study, enabling researchers to follow cases and controls over time and to utilize the wide range of data collected previously. The large sample size of the original study also allowed for a large enough sample size even when factoring in the substantial loss to follow-up.

Weaknesses

As mentioned previously, there was considerable loss to follow-up. This was accounted for in the present study through propensity weighting, which approximates the results as if there had not been loss to follow-up, yet there is no way to determine how the results may be skewed due to this loss.

Another weakness is that the two main variables of interest- reported in-hospital support and posttraumatic stress- were both evaluated in the follow-up interview. Though in-hospital support refers to the time when participants were still in the hospital directly after the index delivery, this variable was recorded in the follow-up interview along with the other variables assessed in the study. This could result in bias away from the null, in that women who perceived their stillbirth to be more traumatic may tend to report more negative hospital

experiences than women who were not as traumatized. For this reason, this variable should not be used as measure of support actually received, but rather as a bereaved mother's opinion of the support she received from hospital staff. While this factor cannot be used as an indicator of lack of care provided by hospital staff, it indicates the importance of the recognition of a bereaved mother's mental state and her perceptions of the care she receives while still at the hospital.

Future Directions

In the United States alone, stillbirth bereaves about 24,000 mothers every year, not including the grieving fathers, grandparents, and other loved ones affected by the death of a child (48). While advances in medicine have resulted in decreased stillbirths in the past century, fetal mortality rates have remained essentially unchanged since 2006 (48). Western society tends to belittle the impact of fetal loss, whether through simple lack of awareness of its prevalence or through hurtful beliefs such as that it was the "mother's sins or fault," that "the baby was never supposed to live," or that losing a baby before it was born is not the same as losing a child (71, 73). These uncertainties and false perceptions surrounding stillbirth make it all the more important to investigate not only the causes of stillbirth but also the psychological sequelae affecting bereaved parents and families.

This study sought to identify factors that influence a bereaved mother's symptoms of posttraumatic stress after a stillbirth, focusing on the support a mother reported receiving from hospital staff in the direct aftermath of the death of her baby. The results indicated that some factors may be important to

consider for nurses and other hospital staff providing care to bereaved mothers, such as the age of the mothers and whether or not the mother feels blamed for the loss of her baby. The impact of blame on posttraumatic stress symptoms may be influenced by cultural background and beliefs surrounding pregnancy and may reflect the macro-level issues of stigma and false beliefs regarding pregnancy and stillbirth (71). The finding that support from hospital staff may meliorate posttraumatic stress symptoms among women who feel blamed for the loss of their child holds implications for the future care of bereaved mothers.

Future studies might investigate specific factors of in-hospital support received by mothers, such as managing harmful beliefs and stigma, in order to better ascertain effective strategies for working with bereaved mothers after stillbirth.

References

1. Kessler RC, Chiu WT, Demler O, et al. Prevalence, Severity, and Comorbidity of Twelve-month DSM-IV Disorders in the National Comorbidity Survey Replication (NCS-R). *Archives of general psychiatry* 2005;62(6):617-27.
2. Kessler RC. Posttraumatic stress disorder: the burden to the individual and to society. *J Clin Psychiatry* 2000;61 Suppl 5:4-12; discussion 3-4.
3. Kessler RC, Frank RG. The impact of psychiatric disorders on work loss days. *Psychological Medicine* 1997;27(4):861-73.
4. Ivanova JI, Birnbaum HG, Chen L, et al. Cost of post-traumatic stress disorder vs major depressive disorder among patients covered by medicaid or private insurance. *Am J Manag Care* 2011;17(8):e314-23.
5. Ogle CM, Rubin DC, Berntsen D, et al. The Frequency and Impact of Exposure to Potentially Traumatic Events Over the Life Course. *Clin Psychol Sci* 2013;1(4):426-34.
6. Brewin CR, Andrews B, Valentine JD. Meta-analysis of risk factors for posttraumatic stress disorder in trauma-exposed adults. *Journal of Consulting and Clinical Psychology* 2000;68(5):748-66.
7. Ozer EJ, Best SR, Lipsey TL, et al. Predictors of posttraumatic stress disorder and symptoms in adults: a meta-analysis. *Psychol Bull* 2003;129(1):52-73.
8. American Psychiatric Association. *Diagnostic and statistical manual of mental disorders : DSM-5*. 5th ed. Washington, DC: American Psychiatric Association; 2013.
9. Greenberg N, Brooks S, Dunn R. Latest developments in post-traumatic stress disorder: diagnosis and treatment. *Br Med Bull* 2015;114(1):147-55.
10. Breslau N, Lucia VC, Davis GC. Partial PTSD versus full PTSD: An empirical examination of associated impairment. *Psychological Medicine* 2004;34(7):1205-14.
11. Grubaugh AL, Magruder KM, Waldrop AE, et al. Subthreshold PTSD in primary care: Prevalence, psychiatric disorders, healthcare use, and functional status. *Journal of Nervous and Mental Disease* 2005;193(10):658-64.
12. Marshall RD, Olfson M, Hellman F, et al. Comorbidity, impairment, and suicidality in subthreshold PTSD. *American Journal of Psychiatry* 2001;158(9):1467-73.
13. Horowitz M, Wilner N, Alvarez W. Impact of Event Scale: a measure of subjective stress. *Psychosom Med* 1979;41(3):209-18.
14. Slade P. Towards a conceptual framework for understanding post-traumatic stress symptoms following childbirth and implications for further research. *Journal of Psychosomatic Obstetrics & Gynecology* 2006;27(2):99-105.
15. Coffey SF, Gudmundsdottir B, Beck G, et al. Screening for PTSD in motor vehicle accident survivors using the PSS-SR and IES. *Journal of traumatic stress* 2006;19(1):119-28.

16. Wohlfarth TD, van den Brink W, Winkel FW, et al. Screening for Posttraumatic Stress Disorder: an evaluation of two self-report scales among crime victims. *Psychol Assess* 2003;15(1):101-9.
17. Furuta M, Sandall J, Cooper D, et al. The relationship between severe maternal morbidity and psychological health symptoms at 6–8 weeks postpartum: a prospective cohort study in one English maternity unit. *BMC Pregnancy & Childbirth* 2014;14(1):1-25.
18. Gravensteen IK, Helgadottir LB, Jacobsen EM, et al. Women's experiences in relation to stillbirth and risk factors for long-term post-traumatic stress symptoms: a retrospective study. *BMJ Open* 2013;3(10):e003323.
19. Broen AN, Moum T, Bodtker AS, et al. Psychological impact on women of miscarriage versus induced abortion: a 2-year follow-up study. *Psychosom Med* 2004;66(2):265-71.
20. Christiansen DM. Posttraumatic stress disorder in parents following infant death: A systematic review. *Clinical Psychology Review* 2017;51:60-74.
21. Jaksic N, Brajkovic L, Ivezic E, et al. The role of personality traits in posttraumatic stress disorder (PTSD). *Psychiatr Danub* 2012;24(3):256-66.
22. Kessler RC, Sonnega A, Bromet E, et al. Posttraumatic stress disorder in the national comorbidity survey. *Archives of General Psychiatry* 1995;52(12):1048-60.
23. Kessler RC, Berglund P, Demler O, et al. Lifetime prevalence and age-of-onset distributions of dsm-iv disorders in the national comorbidity survey replication. *Archives of General Psychiatry* 2005;62(6):593-602.
24. Seng JS, Rauch SAM, Resnick H, et al. Exploring posttraumatic stress disorder symptom profile among pregnant women. *Journal of psychosomatic obstetrics and gynaecology* 2010;31(3):176-87.
25. Seng JS, Low LMK, Sperlich M, et al. Prevalence, trauma history, and risk for posttraumatic stress disorder among nulliparous women in maternity care. *Obstetrics and gynecology* 2009;114(4):839-47.
26. Yildiz PD, Ayers S, Phillips L. The prevalence of posttraumatic stress disorder in pregnancy and after birth: A systematic review and meta-analysis. *Journal of Affective Disorders* 2017;208:634-45.
27. Grekin R, O'Hara MW. Prevalence and risk factors of postpartum posttraumatic stress disorder: a meta-analysis. *Clin Psychol Rev* 2014;34(5):389-401.
28. Ayers S, Bond R, Bertullies S, et al. The aetiology of post-traumatic stress following childbirth: a meta-analysis and theoretical framework. *Psychological Medicine* 2016;46(6):1121-34.
29. Chung MC, Reed J. Posttraumatic Stress Disorder Following Stillbirth: Trauma Characteristics, Locus of Control, Posttraumatic Cognitions. *Psychiatr Q* 2016.
30. Gold KJ, Leon I, Boggs ME, et al. Depression and Posttraumatic Stress Symptoms After Perinatal Loss in a Population-Based Sample. *J Womens Health (Larchmt)* 2016;25(3):263-9.

31. Jind L, Elklit A, Christiansen D. Cognitive schemata and processing among parents bereaved by infant death. *J Clin Psychol Med Settings* 2010;17(4):366-77.
32. Maercker A, Znoj H. The younger sibling of PTSD: similarities and differences between complicated grief and posttraumatic stress disorder. *European Journal of Psychotraumatology* 2010;1:10.3402/ejpt.v1i0.5558.
33. Golden A-MJ, Dalgleish T. Is prolonged grief distinct from bereavement-related posttraumatic stress? *Psychiatry Research* 2010;178(2):336-41.
34. Daugirdaite V, van den Akker O, Purewal S. Posttraumatic stress and posttraumatic stress disorder after termination of pregnancy and reproductive loss: a systematic review. *J Pregnancy* 2015;2015:646345.
35. Tedeschi RG, Calhoun LG. Posttraumatic Growth: Conceptual Foundations and Empirical Evidence. *Psychological Inquiry* 2004;15(1):1-18.
36. Schubert CF, Schmidt U, Rosner R. Posttraumatic Growth in Populations with Posttraumatic Stress Disorder—A Systematic Review on Growth-Related Psychological Constructs and Biological Variables. *Clinical Psychology & Psychotherapy* 2016;23(6):469-86.
37. Tedeschi RG, Calhoun LG. The Posttraumatic Growth Inventory: measuring the positive legacy of trauma. *J Trauma Stress* 1996;9(3):455-71.
38. Zoellner T, Maercker A. Posttraumatic growth in clinical psychology - a critical review and introduction of a two component model. *Clin Psychol Rev* 2006;26(5):626-53.
39. Shakespeare-Finch J, Lurie-Beck J. A meta-analytic clarification of the relationship between posttraumatic growth and symptoms of posttraumatic distress disorder. *Journal of Anxiety Disorders* 2014;28(2):223-9.
40. Hagenaars MA, van Minnen A. Posttraumatic growth in exposure therapy for PTSD. *Journal of Traumatic Stress* 2010;23(4):504-8.
41. Sawyer A, Ayers S, Young D, et al. Posttraumatic growth after childbirth: A prospective study. *Psychology & Health* 2012;27(3):362.
42. Nishi D, Usuda K. Psychological growth after childbirth: an exploratory prospective study. *J Psychosom Obstet Gynaecol* 2016:1-7.
43. Sawyer A, Ayers S. Post-traumatic growth in women after childbirth. *Psychology & Health* 2009;24(4):457.
44. Krosch DJ, Shakespeare-Finch J. Grief, Traumatic Stress, and Posttraumatic Growth in Women Who Have Experienced Pregnancy Loss. *Psychol Trauma* 2016.
45. Murphy S, Shevlin M, Elklit A. Psychological Consequences of Pregnancy Loss and Infant Death in a Sample of Bereaved Parents. *Journal of Loss and Trauma* 2014;19(1):56-69.
46. Engelhard IM, van den Hout MA, Arntz A. Posttraumatic stress disorder after pregnancy loss. *Gen Hosp Psychiatry* 2001;23(2):62-6.

47. Schwerdtfeger KL, Shreffler KM. Trauma of Pregnancy Loss and Infertility for Mothers and Involuntarily Childless Women in the Contemporary United States. *J Loss Trauma* 2009;14(3):211-27.
48. MacDorman MF, Gregory, Elizabeth C.W. Fetal and Perinatal Mortality: United States 2013. *National Vital Statistics Reports*. Hyattsville, MD: National Vital Statistics Reports, 2015.
49. Turton P, Evans C, Hughes P. Long-term psychosocial sequelae of stillbirth: phase II of a nested case-control cohort study. *Arch Womens Ment Health* 2009;12(1):35-41.
50. Chojenta C, Harris S, Reilly N, et al. History of pregnancy loss increases the risk of mental health problems in subsequent pregnancies but not in the postpartum. *PLoS One* 2014;9(4):e95038.
51. Blackmore ER, Cote-Arsenault D, Tang W, et al. Previous prenatal loss as a predictor of perinatal depression and anxiety. *Br J Psychiatry* 2011;198(5):373-8.
52. Hughes PM, Turton P, Evans CD. Stillbirth as risk factor for depression and anxiety in the subsequent pregnancy: cohort study. *BMJ* 1999;318(7200):1721-4.
53. Turton P, Hughes P, Evans CDH, et al. Incidence, correlates and predictors of post-traumatic stress disorder in the pregnancy after stillbirth. *The British Journal of Psychiatry* 2001;178:556-60.
54. Horsch A, Jacobs I, McKenzie-McHarg K. Cognitive predictors and risk factors of PTSD following stillbirth: a short-term longitudinal study. *J Trauma Stress* 2015;28(2):110-7.
55. Christiansen DM, Elklit A, Olff M. Parents bereaved by infant death: PTSD symptoms up to 18 years after the loss. *Gen Hosp Psychiatry* 2013;35(6):605-11.
56. Engelhard IM, van den Hout MA, Schouten EG. Neuroticism and low educational level predict the risk of posttraumatic stress disorder in women after miscarriage or stillbirth. *Gen Hosp Psychiatry* 2006;28(5):414-7.
57. Hennegan JM, Henderson J, Redshaw M. Contact with the baby following stillbirth and parental mental health and well-being: a systematic review. *BMJ Open* 2015;5(11):e008616.
58. Redshaw M, Hennegan JM, Henderson J. Impact of holding the baby following stillbirth on maternal mental health and well-being: findings from a national survey. *BMJ Open* 2016;6(8):e010996.
59. Furuta M, Sandall J, Cooper D, et al. Predictors of birth-related post-traumatic stress symptoms: secondary analysis of a cohort study. *Arch Womens Ment Health* 2016.
60. Garthus-Niegel S, von Soest T, Vollrath ME, et al. The impact of subjective birth experiences on post-traumatic stress symptoms: a longitudinal study. *Arch Womens Ment Health* 2013;16(1):1-10.
61. Unpublished analyses conducted by Dr. Carla Bann, RTI International, Research Triangle Park, NC.

62. Cox JL, Holden JM, Sagovsky R. Detection of postnatal depression. Development of the 10-item Edinburgh Postnatal Depression Scale. *Br J Psychiatry* 1987;150:782-6.
63. Gibson J, McKenzie-McHarg K, Shakespeare J, et al. A systematic review of studies validating the Edinburgh Postnatal Depression Scale in antepartum and postpartum women. *Acta Psychiatr Scand* 2009;119(5):350-64.
64. Ji S, Long Q, Newport DJ, et al. Validity of Depression Rating Scales during Pregnancy and the Postpartum Period: Impact of Trimester and Parity. *Journal of psychiatric research* 2011;45(2):213-9.
65. Cox JL, Chapman G, Murray D, et al. Validation of the Edinburgh Postnatal Depression Scale (EPDS) in non-postnatal women. *J Affect Disord* 1996;39(3):185-9.
66. Toedter LJ, Lasker JN, Alhadeff JM. The Perinatal Grief Scale: development and initial validation. *Am J Orthopsychiatry* 1988;58(3):435-49.
67. Potvin L, Lasker J, Toedter L. Measuring grief: A short version of the perinatal grief scale. *Journal of Psychopathology and Behavioral Assessment* 1989;11(1):29-45.
68. Toedter LJ, Lasker JN, Janssen HJ. International comparison of studies using the perinatal grief scale: a decade of research on pregnancy loss. *Death Stud* 2001;25(3):205-28.
69. Baron RM, Kenny DA. The moderator-mediator variable distinction in social psychological research: conceptual, strategic, and statistical considerations. *J Pers Soc Psychol* 1986;51(6):1173-82.
70. Kraemer HC, Wilson GT, Fairburn CG, et al. Mediators and moderators of treatment effects in randomized clinical trials. *Arch Gen Psychiatry* 2002;59(10):877-83.
71. Froen JF, Cacciatore J, McClure EM, et al. Stillbirths: why they matter. *Lancet* 2011;377(9774):1353-66.
72. Cacciatore J, Bushfield S. Stillbirth: the mother's experience and implications for improving care. *J Soc Work End Life Palliat Care* 2007;3(3):59-79.
73. Heazell AEP, Siassakos D, Blencowe H, et al. Stillbirths: economic and psychosocial consequences. *The Lancet*;387(10018):604-16.

Tables

Table 1. Sociodemographic characteristics of participants by loss to follow-up.

Characteristics	Lost to Follow-up n (%)	Follow-up Interview Available n (%)	X^2	p value
N	284 (51.73)	265 (48.27)		
Maternal age			5.36	0.0687
<25	119 (41.90)	87 (32.83)		
25-34	128 (45.07)	132 (49.81)		
>35	37 (13.03)	46 (17.36)		
Maternal race/ethnicity			32.59	<.0001*
Non-Hispanic white	72 (25.35)	129 (48.68)		
Non-Hispanic black	82 (28.87)	48 (18.11)		
Hispanic	108 (38.03)	72 (27.17)		
Other	22 (7.75)	16 (6.04)		
Maternal education			28.74	<.0001*
No high school diploma	84 (29.58)	34 (12.83)		
High school diploma	86 (30.28)	73 (27.55)		
College degree or higher	114 (40.14)	158 (59.62)		
Marital status at stillbirth			23.59	<.0001*
Not married or cohabiting	86 (30.28)	46 (17.36)		
Cohabiting but not married	83 (29.23)	58 (21.89)		
Married	115 (40.49)	161 (60.75)		
Health insurance	253 (89.08)	250 (94.34)	4.93	0.0264*
Received prenatal care	266 (93.66)	254 (95.85)	3.63	0.0567
History of depression	156 (54.93)	124 (46.79)	3.63	0.0567
Ever wanted a pregnancy	270 (95.07)	252 (95.09)	0.00	0.9897
High trait anxiety	86 (30.28)	55 (20.75)	6.52	0.0107*
High trait anger	56 (19.72)	40 (15.09)	2.03	0.1541

* *< 0.05*

Table 2. Reported support received in-hospital after stillbirth and stratified by reported hospital staff support.

	Support from hospital staff			No support from hospital staff		
Types of people	**Total n**	**Support n (%)**	**No support n (%)**	**Total n**	**Support n (%)**	**No support n (%)**
Doctors	210	160 (75.83)	50 (23.70)	19	0 (0)	19 (100.00)
Hospital nursing staff	211	198 (93.84)	13 (6.16)	19	0 (0)	19 (100.00)
Hospital grief personnel	202	134 (63.51)	68 (32.23)	19	0 (0)	19 (100.00)
Pastor/religious counselor	203	131 (62.09)	72 (34.12)	19	4 (21.05)	15 (78.95)
Support group	197	40 (18.96)	157 (74.41)	19	1 (5.26)	18 (94.74)
Father of the baby	211	177 (83.89)	34 (16.11)	19	15 (78.95)	4 (21.05)
Partner, other than FOB	108	24 (11.37)	84 (39.81)	12	3 (15.79)	9 (47.37)
Family member	211	192 (91.00)	19 (9.00)	19	16 (84.21)	3 (15.79)
Friend(s)	211	169 (80.09)	42 (19.91)	19	11 (57.89)	8 (42.11)
Other	208	61 (28.91)	147 (69.67)	19	3 (15.79)	16 (84.21)
	Total n	**Reporting any support n (%)**	**Reporting no support at all n (%)**	**Total n**	**Reporting any support n (%)**	**Reporting no support at all n (%)**
Total	211	211 (100.00)	0 (0)	43	19 (44.19)	24 (55.81)

Table 3. Weighted frequencies of sample by sociodemographic characteristics and in-hospital support received from hospital staff.

	Weighted sample, N=252			
Characteristics	**No support n (%)**	**Support n (%)**	**X^2**	**pvalue**
Total	43 (17.11)	209 (82.89)		
Maternal age			5.95	0.0512
<25	10 (23.82)	87 (41.86)		
25-34	27 (61.97)	89 (42.64)		
35+	6 (14.21)	32 (15.5)		
Maternal race/ethnicity			0.35	0.5523
Non-Hispanic White	13 (29.78)	72 (34.31)		
Non-Hispanic Black	10 (23.18)	51 (24.54)		
Hispanic	18 (41.36)	72 (34.64)		
Other	2 (5.68)	14 (6.51)		
Maternal education			1.42	0.4916
No high school diploma	9 (20.17)	46 (22.19)		
High school diploma	16 (37.91)	60 (28.8)		
College degree or higher	18 (41.92)	102 (49.01)		
Marital status at stillbirth			1.55	0.4618
Not married or cohabiting	8 (18.02)	57 (27.07)		
Cohabiting but not married	13 (29.33)	54 (25.75)		
Married	23 (52.65)	99 (47.18)		
Health insurance	42 (96.95)	187 (89.61)	2.31	0.1287
Received prenatal care	42 (97.78)	196 (93.6)	1.16	0.281
History of depression	19 (43.96)	109 (52.11)	0.95	0.3301
Ever wanted a pregnancy	42 (96.49)	197 (94.07)	0.40	0.5275
High trait anxiety	12 (28.87)	55 (26.27)	0.12	0.7252
High trait anger	11 (25.63)	33 (16)	2.28	0.131
Current depression	8 (17.98)	38 (18.13)	0.00	0.9816
Time since loss			5.36	0.0687
<1 year	5 (12.61)	8 (3.91)		
1-2 years	16 (37.86)	82 (39.39)		
>2 years	21 (49.54)	118 (56.7)		
Completed pregnancy	15 (33.67)	91 (43.4)	1.39	0.238
Current pregnancy	7 (16.02)	31 (14.73)	0.03	0.8589
Partner status change			0.76	0.3831

Positive change	4 (10.22)	38 (18.22)		
No change	34 (78.39)	147 (70.16)		
Negative change	5 (11.39)	24 (11.63)		
Blame	4 (8.72)	41 (19.68)	2.92	0.0873
Reported social support after stillbirth			8.26	0.0161*
No support	9 (21.94)	17 (8.15)		
Family support only	24 (56.79)	143 (68.68)		
Both professional and family support	7 (15.28)	47 (22.32)		
Saw or held baby			0.74	0.3910
Did not see or hold baby	3 (6.59)	16 (7.83)		
Saw baby but did not hold	13 (29.22)	37 (17.87)		
Held baby	28 (64.19)	155 (74.3)		
Given mementos	37 (86.08)	200 (95.68)	5.88	0.0153*
Held memorial service	26 (60.66)	126 (60.11)	0.00	0.9467
	Mean (std)	**Mean (std)**	**t**	**p value**
Posttraumatic stress score	31.43 (17.50)	27.06 (16.11)	1.60	0.1112
Avoidance	16.72 (11.10)	12.96 (9.71)	2.26	0.0246*
Intrustion	14.71 (8.56)	14.1 (8.91)	0.41	0.6825
Posttraumatic growth score	79.61 (24.02)	88.09 (19.33)	-2.51	0.0126*
Relating to others	26.91 (8.54)	31.07 (7.43)	-3.25	0.0013*
New possibilities	19.22 (7.11)	20.4 (5.79)	-1.17	0.2432
Personal strength	16.47 (5.26)	18.36 (4.11)	-2.23	0.0303*
Spiritual change	8.06 (3.12)	8.56 (3.05)	-0.99	0.3222
Appreciation of life	8.95 (2.72)	9.7 (2.30)	-1.89	0.0601
Grief score	69.16 (19.64)	66.71 (16.23)	0.87	0.3851
Active Grief	27.64 (7.26)	27.56 (6.35)	0.08	0.9402
Difficulty Coping	20.69 (7.09)	19.76 (5.94)	0.90	0.3702
Despair	20.83 (6.90)	19.38 (6.12)	1.38	0.1677

* *<0.05*

Table 4. Weighted logistic regression models of in-hospital support predicting potential mediators.

	In-hospital support			
Potential mediators	**Estimate (95% CI)**	**p value**	**OR**	**95% CI**
PGI score	8.37 (0.31, 16.44)	0.0418*		
Relating to others	4.12 (1.32, 6.93)	0.0040*		
New possibilities	1.14 (-1.21, 3.48)	0.3414		
Personal strength	1.87 (0.15, 3.58)	0.0327*		
Spiritual change	0.38 (-0.76, 1.51)	0.5136		
Appreciation of life	0.87 (-0.06, 1.8)	0.0665		
PGS score	-0.88 (-6.83, 5.07)	0.7728		
Active Grief	0.55 (-1.82, 2.92)	0.6480		
Difficulty Coping	-0.57 (-2.71, 1.57)	0.6003		
Despair	-0.86 (-2.93, 1.22)	0.4187		
Current depression	0.31 (-0.63, 1.26)	0.5191	1.37	(0.53, 3.52)
Completed pregnancy	0.32 (-0.46, 1.1)	0.4181	1.38	(0.63, 3)
Partner status change	-0.33 (-1.16, 0.51)	0.4436	0.72	(0.31, 1.66)
Blame	1.46 (0.33, 2.58)	0.0110*	4.29	(1.4, 13.17)
Saw or held baby	0.41 (-0.37, 1.18)	0.3026	1.50	(0.69, 3.26)
Given mementos	1.24 (0.08, 2.41)	0.0365*	3.46	(1.08, 11.08)
Held memorial service	0.02 (-0.78, 0.83)	0.9595	1.02	(0.46, 2.28)

*NOTE: Logistic regression models were constructed for each potential mediator, with in-hospital support predicting the mediator, controlling for maternal age, education, marital status, trait anger, and time since loss; PGI= Posttraumatic Growth Inventory; PGS= Perinatal Grief Scale; *<0.05.*

Table 5. Weighted general linear regression models of a potential mediator predicting Impact of Events Scale (IES) scores.

	IES score	
Potential mediators	**Estimate (95% CI)**	**p value**
Posttraumatic growth score	-0.03 (-0.14, 0.08)	0.5801
Relating to others	-0.11 (-0.4, 0.18)	0.4524
New possibilities	0.1 (-0.24, 0.44)	0.5767
Personal strength	-0.31 (-0.83, 0.21)	0.2422
Spiritual change	-0.14 (-0.83, 0.56)	0.7015
Appreciation of life	-0.4 (-1.28, 0.48)	0.3718
Grief score	0.51 (0.4, 0.61)	<.0001*
Active Grief	1.04 (0.72, 1.36)	<.0001*
Difficulty Coping	1.22 (0.9, 1.54)	<.0001*
Despair	1.27 (0.99, 1.55)	<.0001*
Current depression	19.8 (15.51, 24.09)	<.0001*
Completed pregnancy	1.15 (-3.7, 5.99)	0.6421
Partner status change		
Positive change		
No change	1.89 (-5.59, 9.38)	0.6199
Negative change	12.82 (3.82, 21.82)	0.0052*
Blame	6.03 (0.11, 11.95)	0.0457*
Saw or held baby		
Did not see or hold baby		
Saw baby but did not hold	0.24 (-9.94, 10.43)	0.9624
Held baby	-0.31 (-9.55, 8.93)	0.9477
Given mementos	0.94 (-8.74, 10.62)	0.8489
Held memorial service	0.37 (-4.06, 4.79)	0.8716

*NOTE: General linear regression models were constructed for each potential mediator, with the mediator predicting IES scores, controlling for in-hospital support, maternal age, education, marital status, trait anger, and time since loss; IES= Impact of Events Scale; PGI= Posttraumatic Growth Inventory; PGS= Perinatal Grief Scale; *<0.05.*

Table 6. Weighted general linear regression models of in-hospital support predicting Impact of Events Scale (IES) score adjusting for a potential mediator.

	Impact of Events Scale (IES) Score					
	Total sample					
Models	**Estimate (95% CI)**	**p value**				
Model 1						
In-hospital support	-4.37 (-10.59, 1.85)	0.1684				
Model 2 (with control variables)†						
In-hospital support	2.73 (-7.48, 12.94)	0.5999				
Model 3†						
In-hospital support	-1.4 (-25.86, 23.06)	0.9106				
PGI score	-0.06 (-0.3, 0.17)	0.5963				
Support*PGI	0.05 (-0.21, 0.31)	0.7132				
Model 4†						
In-hospital support	3.59 (-7.04, 14.23)	0.5082				
Blame	16.78 (4.83, 28.72)	0.0059*				
Support*blame	-10.58 (-23.97, 2.8)	0.1212				
Model 5†						
In-hospital support	-6.48 (-27.55, 14.6)	0.5471				
Given mementos	-3.97 (-18.61, 10.68)	0.5955				
Support*mementos	9.82 (-8.77, 28.41)	0.3006				
	Maternal age <25		**Maternal age 25-34**		**Maternal age 35+**	
Models	**Estimate (95% CI)**	**p value**	**Estimate (95% CI)**	**p value**	**Estimate (95% CI)**	**p value**
Model 1						
In-hospital support						
Model 2 (with control variables)†						
In-hospital support	2.73 (-7.48, 12.94)	0.5999	-7.68 (-15.55, 0.19)	0.0559	-5.59 (-15.02, 3.84)	0.2452
Model 3†						
In-hospital support	2.85 (-7.32, 13.03)	0.5825	-7.31 (-15.18, 0.56)	0.0688	-5.83 (-15.21, 3.54)	0.2228
Posttraumatic growth score						
Support*PGI						
Model 4†						
In-hospital support	2.13 (-8.02, 12.29)	0.6804	-9.04 (-16.48, -1.6)	0.0172*	-6.81 (-16.38, 2.77)	0.1635
Blame						

Support*blame						
Model 5†						
In-hospital support	2.57 (-7.44, 12.58)	0.6148	-7.97 (-16.05, 0.11)	0.0533	-5.62 (-15.05, 3.81)	0.2427
Given mementos						
Support*mementos						

*†Models with control variables (maternal age, education, marital status, trait anger, time since loss, interaction between in-hospital support and age); PGI=Posttraumatic Growth Inventory; *<0.05*

Table 7. Weighted linear regression models of in-hospital support predicting Impact of Events Scale (IES) score adjusting for sociodemographic factors.

	Impact of Events Scale (IES) Score		
	Total weighted sample, n=252		
Final model†	N	Adjusted mean estimate (95% CI)	p value
In-hospital support	252	-9.14 (-16.02, -2.26)	0.0092*
Blame	252	11.49 (4.69, 18.28)	0.0173*

Total sample

	Not blamed for loss			**Blamed for loss**		
	N	Adjusted mean estimate (95% CI)	p value	N	Adjusted mean estimate (95% CI)	p value
In-hospital support	207	-3.85 (-9.26, 1.56)	0.1632	45	-14.43 (-26.87, -1.99)	0.0230*

Among age <25

	Not blamed for loss			**Blamed for loss**		
	N	Adjusted mean estimate (95% CI)	p value	N	Adjusted mean estimate (95% CI)	p value
In-hospital support	79	3.59 (-7.04, 14.23)	0.5082	18	-6.99 (-20.52, 6.53)	0.3110

Among age 25-34

	Not blamed for loss			**Blamed for loss**		
	N	Adjusted mean estimate (95% CI)	p value	N	Adjusted mean estimate (95% CI)	p value
In-hospital support	92	-8.22 (-15.89, -0.54)	0.0359*	24	-18.80 (-31.67, -5.93)	0.0042*

Among age >35

	Not blamed for loss			**Blamed for loss**		
	N	Adjusted mean estimate (95% CI)	p value	N	Adjusted mean estimate (95% CI)	p value
In-hospital support	36	-6.92 (-16.58, 2.75)	0.1608	3	-17.50 (-34.64, -0.36)	0.0453*

*†Final model controls for variables: maternal age, education, marital status, trait anger, time since loss, and interaction of in-hospital support with age and with blame; *<0.05*

Figures

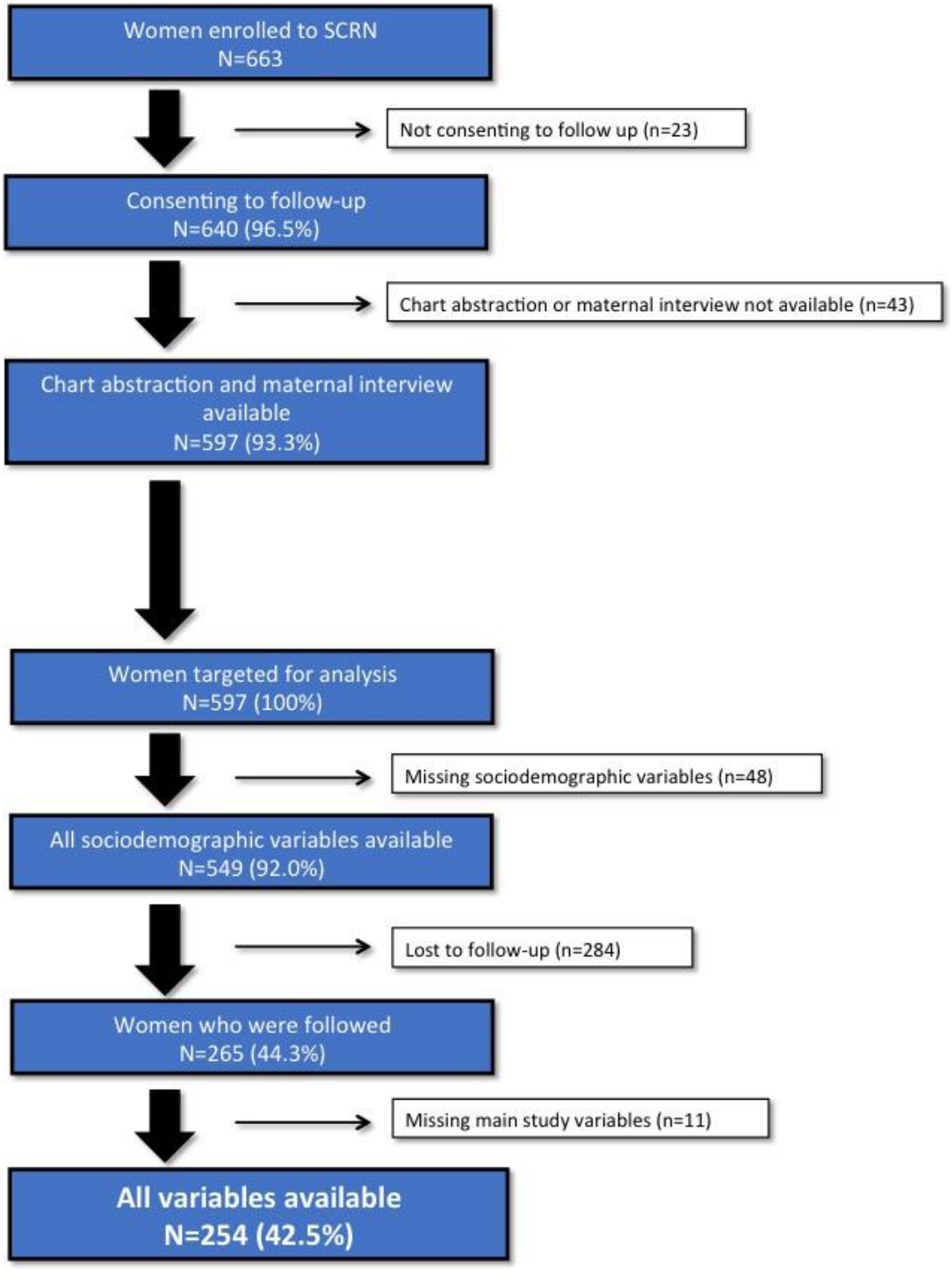

Figure 1. Study enrollment and inclusion in analysis.

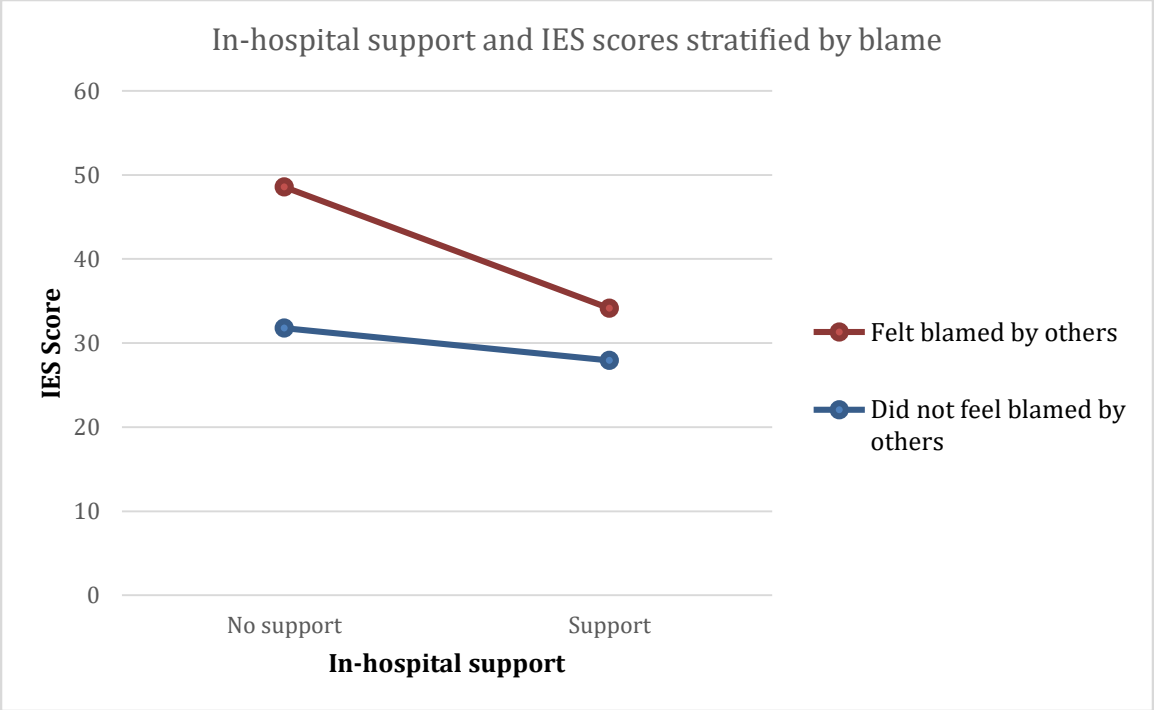

Figure 2. Adjusted mean change in IES score attributable to reporting in-hospital support stratified by blame.

Figure 3A. Adjusted mean change in IES score attributable to reporting in-hospital support among women who felt blamed by others for their stillbirth.

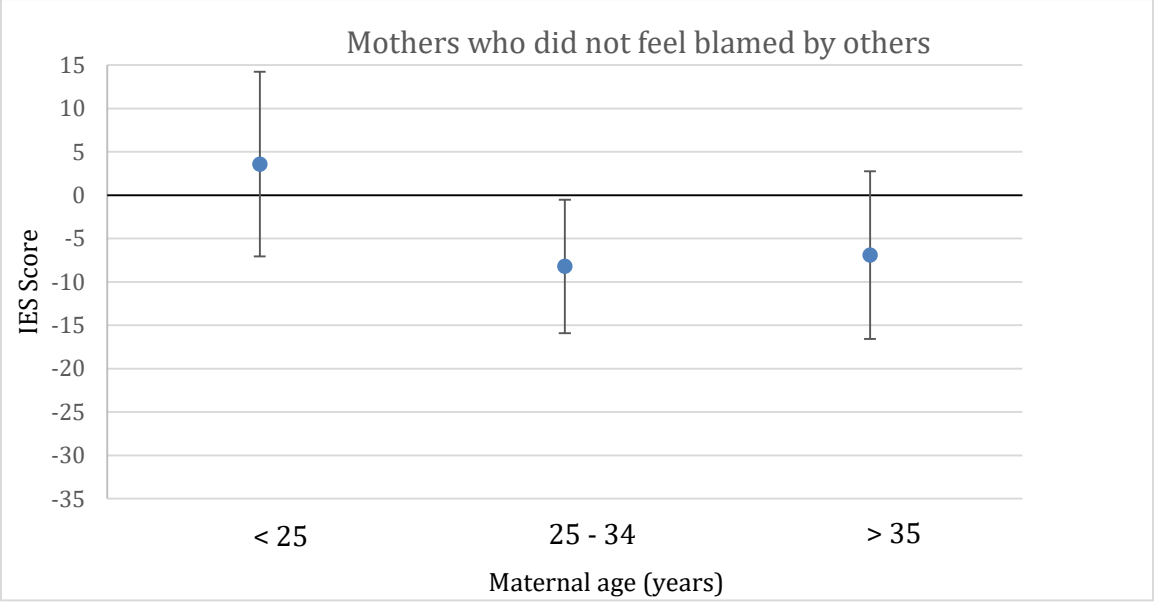

Figure 3B. Adjusted mean change in IES score attributable to reporting in-hospital support among women who did not feel blamed by others for their stillbirth.

Appendix

Appendix 1. Impact of Events Scale (IES) psychometric analyses (61).

Table 1. Descriptive Statistics of Items on Impact of Events Scale

Item	N	Mean	SD	Item-Total Correlation	Alpha if item removed
G14a. Any reminder brought back feelings about it	971	2.52	1.14	0.60	0.90
G14b. I had trouble falling asleep or staying asleep because of thoughts about it that came into my mind	971	1.72	1.01	0.61	0.90
G14c. Other things kept making me think about it	971	2.16	1.10	0.63	0.90
G14d. I avoided letting myself get upset when I thought about it or was reminded of it	971	2.36	1.15	0.48	0.91
G14e. I thought about it when I didn't mean to	971	2.21	1.08	0.67	0.90
G14f. I felt as if it hadn't happened or wasn't real	971	1.74	1.05	0.54	0.90
G14g. I stayed away from reminders about it	971	1.98	1.14	0.56	0.90
G14h. Pictures about it popped into my mind	971	2.28	1.13	0.64	0.90
G14i. I tried not to think about it	971	2.31	1.21	0.66	0.90
G14j. I was aware that I still had a lot of feelings about it, but I didn't deal with them	971	2.05	1.11	0.68	0.90
G14k. My feelings about it were kind of numb	971	1.95	1.09	0.52	0.90
G14l. I had waves of strong feelings about it	971	2.21	1.15	0.65	0.90
G14m. I tried to remove it from my memory	971	1.86	1.17	0.58	0.90
G14n. I had dreams about it	971	1.67	1.01	0.53	0.90
G14o. I tried not to talk about it	971	1.96	1.15	0.62	0.90

Table 2. Cronbach's Alphas of Impact of Events Scale

Group	N	Alpha
All	971	0.91
Language		
English	903	0.91
Spanish	68	0.91
Race/Ethnicity		
Hispanic	249	0.90
Black	175	0.89
White	479	0.91
Birth		
Stillbirth	288	0.89
Live birth	680	0.91

Table 3. Confirmatory Factor Analyses of Impact of Events Scale

Item	All	Race/Ethnicity			Pregnancy Outcome	
		Black	White	Hispanic	Stillbirth	Live Birth
G14a. Any reminder brought back feelings about it	0.71	0.72	0.78	0.62	0.66	0.72
G14b. I had trouble falling asleep or staying asleep because of thoughts about it that came into my mind	0.78	0.79	0.80	0.73	0.72	0.80
G14c. Other things kept making me think about it	0.77	0.73	0.79	0.75	0.72	0.79
G14d. I avoided letting myself get upset when I thought about it or was reminded of it	0.57	0.52	0.57	0.58	0.53	0.59
G14e. I thought about it when I didn't mean to	0.79	0.78	0.82	0.76	0.72	0.81
G14f. I felt as if it hadn't happened or wasn't real	0.67	0.62	0.69	0.60	0.66	0.68

G14g. I stayed away from reminders about it	0.59	0.53	0.59	0.54	0.60	0.59
G14h. Pictures about it popped into my mind	0.80	0.81	0.80	0.78	0.80	0.79
G14i. I tried not to think about it	0.67	0.58	0.66	0.69	0.62	0.71
G14j. I was aware that I still had a lot of feelings about it, but I didn't deal with them	0.79	0.72	0.81	0.78	0.70	0.83
G14k. My feelings about it were kind of numb	0.61	0.37	0.67	0.62	0.63	0.61
G14l. I had waves of strong feelings about it	0.79	0.72	0.83	0.76	0.79	0.79
G14m. I tried to remove it from my memory	0.59	0.44	0.58	0.60	0.51	0.64
G14n. I had dreams about it	0.70	0.69	0.70	0.69	0.61	0.73
G14o. I tried not to talk about it	0.63	0.50	0.60	0.68	0.62	0.65
Model Fit Indices						
CFI	0.94	0.94	0.95	0.96	0.91	0.95
TLI	0.92	0.92	0.93	0.94	0.89	0.94
RMSEA	0.11	0.09	0.11	0.09	0.12	0.10

Table 4. Exploratory Factor Analysis of Impact of Events Scale: Stillbirth Only

Item	Factor 1: Focus on	Factor 2: Avoidance
G14a. Any reminder brought back feelings about it	**0.82**	-0.07
G14b. I had trouble falling asleep or staying asleep because of thoughts about it that came into my mind	**0.72**	0.05
G14c. Other things kept making me think about it	**0.88**	-0.09

G14d. I avoided letting myself get upset when I thought about it or was reminded of it	0.27	0.36
G14e. I thought about it when I didn't mean to	**0.69**	0.15
G14f. I felt as if it hadn't happened or wasn't real	0.24	**0.46**
G14g. I stayed away from reminders about it	-0.05	**0.79**
G14h. Pictures about it popped into my mind	**0.81**	0.00
G14i. I tried not to think about it	0.09	**0.75**
G14j. I was aware that I still had a lot of feelings about it, but I didn't deal with them	0.31	**0.55**
G14k. My feelings about it were kind of numb	0.03	**0.66**
G14l. I had waves of strong feelings about it	**0.71**	0.11
G14m. I tried to remove it from my memory	-0.12	**0.87**
G14n. I had dreams about it	**0.60**	0.09
G14o. I tried not to talk about it	0.01	**0.79**

Note: Loadings ≥ 0.40 are shown in bold.

Appendix 2. Posttraumatic Growth Inventory (PGI) psychometric analyses (61).

Table 11. Descriptive Statistics of Items on Posttraumatic Growth Inventory

Item	N	Mean	SD	Item-Total Correlation	Alpha if item removed
G15a. I changed my priorities about what is important in life	975	4.34	1.69	0.35	0.94
G15b. I have a greater appreciation for the value of my own life	975	4.98	1.35	0.55	0.93
G15c. I developed new interests	975	3.81	1.71	0.59	0.93
G15d. I have a greater feeling of self-reliance	975	4.44	1.52	0.60	0.93
G15e. I have a better understanding of spiritual matters	975	4.37	1.63	0.61	0.93
G15f. I more clearly see that I can count on people in times of trouble	975	4.55	1.50	0.54	0.93
G15g. I established a new path for my life	975	4.27	1.67	0.64	0.93
G15h. I have a greater sense of closeness with others	975	4.36	1.51	0.64	0.93
G15i. I am more willing to express my emotions	975	3.92	1.64	0.65	0.93
G15j. I know better that I can handle difficulties	975	4.83	1.28	0.64	0.93
G15k. I am able to do better things with my life	975	4.52	1.48	0.76	0.93
G15l. I am better able to accept the way things work out	975	4.53	1.33	0.69	0.93
G15m. I can better appreciate each day	975	4.82	1.36	0.74	0.93
G15n. New opportunities are available which wouldn't have been otherwise	975	3.66	1.82	0.57	0.93
G15o. I have more compassion for others	975	4.75	1.42	0.64	0.93
G15p. I put more effort into my relationships	975	4.60	1.47	0.65	0.93

G15q. I am more likely to try to change things which need changing	975	4.57	1.36	0.67	0.93
G15r. I have a stronger religious faith	975	4.10	1.83	0.57	0.93
G15s. I discovered that I'm stronger than I thought I was	975	4.96	1.30	0.68	0.93
G15t. I learned a great deal about how wonderful people are	975	4.47	1.49	0.67	0.93
G15u. I better accept needing others	975	4.20	1.43	0.68	0.93

Table 12. Cronbach's Alphas of Posttraumatic Growth Inventory

Group	PGI Scale	
	N	Alpha
All	975	0.94
Language		
English	904	0.94
Spanish	71	0.92
Race/Ethnicity		
Hispanic	251	0.93
Black	175	0.93
White	484	0.93
Birth		
Stillbirth	288	0.94
Live birth	684	0.93

Table 13. Confirmatory Factor Analyses of Posttraumatic Growth Inventory

Subscale/Item	All	Race/Ethnicity			Pregnancy Outcome	
		Black	White	Hispanic	Stillbirth	Live Birth
New Possibilities						
G15c. I developed new interests	0.61	0.60	0.57	0.62	0.64	0.60
G15g. I established a new path for my life	0.69	0.70	0.67	0.64	0.70	0.70
G15k. I am able to do better things with my life	0.86	0.80	0.88	0.85	0.88	0.85

G15n. New opportunities are available which wouldn't have been otherwise	0.63	0.65	0.62	0.61	0.59	0.66
G15q. I am more likely to try to change things which need changing	0.71	0.69	0.68	0.68	0.72	0.71
Relationship to Others						
G15f. I more clearly see that I can count on people in times of trouble	0.61	0.47	0.67	0.61	0.65	0.59
G15h. I have a greater sense of closeness with others	0.72	0.77	0.76	0.59	0.76	0.70
G15i. I am more willing to express my emotions	0.72	0.68	0.72	0.65	0.74	0.70
G15o. I have more compassion for others	0.66	0.72	0.62	0.67	0.67	0.66
G15p. I put more effort into my relationships	0.68	0.67	0.67	0.68	0.72	0.66
G15t. I learned a great deal about how wonderful people are	0.73	0.67	0.75	0.74	0.70	0.75
G15u. I better accept needing others	0.75	0.71	0.78	0.69	0.77	0.75
Personal Strength						
G15d. I have a greater feeling of self-reliance	0.65	0.68	0.62	0.64	0.70	0.62
G15j. I know better that I can handle difficulties	0.74	0.69	0.79	0.72	0.78	0.73
G15l. I am better able to accept the way things work out	0.76	0.75	0.77	0.73	0.77	0.76
G15s. I discovered that	0.76	0.68	0.78	0.70	0.75	0.76

I'm stronger than I thought I was						
Appreciation of Life						
G15a. I changed my priorities about what is important in life	0.34	0.25	0.41	0.34	0.34	0.35
G15b. I have a greater appreciation for the value of my own life	0.61	0.54	0.67	0.53	0.71	0.57
G15m. I can better appreciate each day	0.86	0.85	0.86	0.84	0.85	0.87
Spiritual Change						
G15e. I have a better understanding of spiritual matters	0.88	0.77	0.90	0.90	0.89	0.87
G15r. I have a stronger religious faith	0.84	0.86	0.84	0.78	0.80	0.86
Model Fit Indices						
CFI	0.93	0.88	0.91	0.90	0.92	0.92
TLI	0.91	0.86	0.89	0.88	0.89	0.90
RMSEA	0.07	0.09	0.08	0.08	0.08	0.07

Appendix 3. Perinatal Grief Scale (PGS) psychometric analyses (61).

Table 8. Descriptive Statistics of Items on Perinatal Grief Scale

Item	N	Mean	SD	Item-Total Correlation	Alpha if item removed
E1a. I feel depressed	321	2.05	0.97	0.59	0.94
E1b. I feel empty inside	321	2.15	0.96	0.61	0.94
E1c. I feel a need to talk about the baby	321	2.71	0.87	0.33	0.95
E1d. I am grieving for the baby	321	2.72	0.86	0.55	0.94
E1e. I am frightened	321	2.01	0.95	0.52	0.94
E1f. I very much miss the baby	321	3.43	0.73	0.31	0.95
E1g. It is painful to recall memories of the loss	321	2.89	0.92	0.48	0.94
E1h. I get upset when I think about the baby	321	2.52	0.97	0.51	0.94
E1i. I cry when I think about him/her	321	2.74	0.91	0.53	0.94
E1j. Time passes so slowly since the baby died	321	1.93	0.83	0.53	0.94
E1k. I feel so lonely since he/she died	321	1.91	0.78	0.67	0.94
E1l. I find it hard to get along with certain people	321	1.98	0.92	0.54	0.94
E1m. I can't keep up with my usual activities	321	1.69	0.79	0.64	0.94
E1n. I have considered suicide since the loss	321	1.40	0.72	0.49	0.94
E1o. I feel I have adjusted well to the loss	321	1.91	0.77	0.47	0.94
E1p. I have let people down since the baby died	321	1.77	0.78	0.55	0.94
E1q. I get cross at my friends and relatives more than I should	321	1.86	0.78	0.62	0.94
E1r. Sometimes I feel like I need a professional counselor to help me get my life together again	321	1.98	0.94	0.72	0.94
E1s. I feel as though I am just existing and not really living since he/she died	321	1.70	0.73	0.76	0.94
E1t. I feel somewhat apart and	321	1.88	0.81	0.72	0.94

remote even among friends					
E1u. I find it difficult to make decisions since the baby died	321	1.73	0.74	0.74	0.94
E1v. It feels great to be alive	321	1.61	0.71	0.46	0.94
E1w. I take medicine for my nerves	321	1.54	0.79	0.43	0.95
E1x. I feel guilty when I think about the baby	321	2.00	0.90	0.60	0.94
E1y. I feel physically ill when I think about the baby	321	1.63	0.69	0.60	0.94
E1z. I feel unprotected in a dangerous world since he/she died	321	1.63	0.70	0.64	0.94
E1aa. I try to laugh but nothing seems funny anymore	321	1.57	0.65	0.71	0.94
E1bb. The best part of me died with the baby	321	1.75	0.77	0.60	0.94
E1cc. I blame myself for the baby's death	321	1.97	0.91	0.64	0.94
E1dd. I feel worthless since he/she died	321	1.59	0.67	0.72	0.94
E1ee. It is safer not to love	321	1.51	0.69	0.57	0.94
E1ff. I worry about what my future will be	321	2.20	1.01	0.60	0.94
E1gg. Being a bereaved parent means being a second-class citizen	321	1.61	0.73	0.63	0.94

Table 9. Cronbach's Alphas of Perinatal Grief Scale and Subscales

Group	PGS Scale		PGS Subscale: Active Grief		PGS Subscale: Difficulty Coping		PGS Subscale: Despair	
	N	Alpha	N	Alpha	N	Alpha	N	Alpha
All	321	0.95	334	0.86	332	0.90	336	0.89
Language								
English	296	0.94	308	0.84	306	0.90	311	0.89
Spanish	25	0.96	26	0.94	26	0.88	25	0.93
Race/Ethnicity								
Hispanic	96	0.94	101	0.86	98	0.87	99	0.89
Black	58	0.94	60	0.78	61	0.88	61	0.91
White	146	0.95	151	0.87	152	0.92	154	0.90
Birth								
Stillbirth	274	0.95	286	0.85	283	0.90	288	0.90

Live birth	47	0.95	48	0.89	49	0.89	48	0.89

Table 10. Confirmatory Factor Analyses of Perinatal Grief Scale

Subscale/Item	All	Race/Ethnicity	
		White	Hispanic
Active Grief			
E1a. I feel depressed	0.72	0.87	0.56
E1b. I feel empty inside	0.76	0.83	0.72
E1c. I feel a need to talk about the baby	0.45	0.40	0.66
E1d. I am grieving for the baby	0.69	0.75	0.66
E1e. I am frightened	0.66	0.69	0.59
E1f. I very much miss the baby	0.42	0.59	0.51
E1g. It is painful to recall memories of the loss	0.58	0.66	0.60
E1h. I get upset when I think about the baby	0.60	0.59	0.72
E1i. I cry when I think about him/her	0.66	0.58	0.78
E1j. Time passes so slowly since the baby died	0.71	0.78	0.64
E1k. I feel so lonely since he/she died	0.87	0.86	0.89
Difficulty Coping			
E1l. I find it hard to get along with certain people	0.67	0.68	0.69
E1m. I can't keep up with my usual activities	0.80	0.81	0.82
E1n. I have considered suicide since the loss	0.71	0.70	0.72
E1o. I feel I have adjusted well to the loss	0.58	0.75	0.16
E1p. I have let people down since the baby died	0.69	0.82	0.64
E1q. I get cross at my friends and relatives more than I should	0.75	0.78	0.75
E1r. Sometimes I feel like I need a professional counselor to help me get my life together again	0.82	0.85	0.84
E1s. I feel as though I am just existing and not really living since he/she died	0.91	0.90	0.94
E1t. I feel somewhat apart and remote even among friends	0.87	0.87	0.88
E1u. I find it difficult to make decisions since the baby died	0.89	0.87	0.95
E1v. It feels great to be alive	0.60	0.68	0.45
Despair			
E1w. I take medicine for my nerves	0.63	0.56	0.74
E1x. I feel guilty when I think about the baby	0.69	0.73	0.64
E1y. I feel physically ill when I think about the baby	0.74	0.76	0.70

E1z. I feel unprotected in a dangerous world since he/she died	0.79	0.75	0.86
E1aa. I try to laugh but nothing seems funny anymore	0.88	0.89	0.86
E1bb. The best part of me died with the baby	0.76	0.85	0.69
E1cc. I blame myself for the baby's death	0.73	0.73	0.71
E1dd. I feel worthless since he/she died	0.89	0.88	0.91
E1ee. It is safer not to love	0.76	0.75	0.81
E1ff. I worry about what my future will be	0.73	0.77	0.78
E1gg. Being a bereaved parent means being a second-class citizen	0.78	0.77	0.82
Model Fit Indices			
CFI	0.96	0.96	0.94
TLI	0.95	0.96	0.94
RMSEA	0.06	0.06	0.07

Appendix 4. Edinburgh Depression Scale (EDS) psychometric analyses (61).

Table 1. Descriptive Statistics of Items on Edinburgh Postnatal Depression Scale

Item	N	Mean	SD	Item-Total Correlation	Alpha if item removed
G1. I have been able to laugh and see the funny side of things.	1001	1.29	0.60	0.37	0.79
G2. I have looked forward with enjoyment to things.	1001	1.29	0.59	0.47	0.78
G3. I have blamed myself unnecessarily when things went wrong.	1001	2.28	0.88	0.42	0.79
G4. I have been anxious or worried for no good reason.	1001	2.24	1.03	0.45	0.79
G5. I have felt scared or panicky for no very good reason.	1001	1.67	0.88	0.47	0.78
G6. Things have been getting on top of me.	1001	1.89	0.83	0.54	0.77
G7. I have been so unhappy that I have had difficulty sleeping.	1001	1.55	0.87	0.56	0.77
G8. I have felt sad or miserable.	1001	1.72	0.80	0.61	0.76
G9. I have been so unhappy that I have been crying.	1001	1.53	0.67	0.58	0.77
G10. The thought of harming myself has occurred to me.	1001	1.12	0.44	0.32	0.80

Table 2. Cronbach's Alphas of Edinburgh Postnatal Depression Scale

Group	N	Alpha
All	1001	0.80
Language		
English	928	0.80
Spanish	73	0.79
Race/Ethnicity		
Hispanic	257	0.81
Black	178	0.79
White	496	0.80

Birth		
Stillbirth	291	0.82
Live birth	707	0.79

Table 3. Confirmatory Factor Analyses of Edinburgh Postnatal Depression Scale

Item	All	Race/Ethnicity			Pregnancy Outcome	
		Black	White	Hispanic	Stillbirth	Live Birth
G1. I have been able to laugh and see the funny side of things.	0.52	0.64	0.60	0.33	0.56	0.50
G2. I have looked forward with enjoyment to things.	0.64	0.73	0.70	0.57	0.69	0.60
G3. I have blamed myself unnecessarily when things went wrong.	0.53	0.56	0.54	0.49	0.64	0.48
G4. I have been anxious or worried for no good reason.	0.52	0.44	0.55	0.58	0.54	0.52
G5. I have felt scared or panicky for no very good reason.	0.57	0.68	0.53	0.58	0.57	0.56
G6. Things have been getting on top of me.	0.66	0.58	0.69	0.69	0.64	0.68
G7. I have been so unhappy that I have had difficulty sleeping.	0.75	0.72	0.79	0.77	0.76	0.75
G8. I have felt sad or miserable.	0.81	0.74	0.81	0.89	0.79	0.82
G9. I have been so unhappy that I have been crying.	0.79	0.73	0.82	0.79	0.79	0.79
G10. The thought of harming myself has occurred to me.	0.63	0.57	0.59	0.71	0.70	0.60

Model Fit Indices						
CFI	0.97	0.98	0.97	0.97	0.98	0.97
TLI	0.96	0.98	0.96	0.96	0.97	0.96
RMSEA	0.07	0.05	0.07	0.08	0.07	0.06

Appendix 5. Sociodemographic characteristics in unweighted sample stratified by in-hospital support.

	Not weighted N=254	
Characteristics	**No support n (%)**	**Support n (%)**
Total	43 (16.93)	211 (83.07)
Maternal age		
<25	10 (23.26)	75 (35.55)
25-34	27 (62.79)	97 (45.97)
35+	6 (13.95)	39 (18.48)
Maternal race/ethnicity		
Non-Hispanic White	19 (44.19)	104 (49.29)
Non-Hispanic Black	7 (16.28)	38 (18.01)
Hispanic	15 (34.88)	55 (26.07)
Other	2 (4.65)	14 (6.64)
Maternal education		
No high school diploma	6 (13.95)	26 (12.32)
High school diploma	15 (34.88)	55 (26.07)
College degree or higher	22 (51.16)	130 (61.61)
Marital status at stillbirth		
Not married or cohabiting	6 (13.95)	38 (18.01)
Cohabiting but not married	10 (23.26)	46 (21.80)
Married	27 (62.79)	127 (60.19)
Health insurance	42 (97.67)	198 (93.84)
Received prenatal care	42 (97.67)	202 (95.73)
History of depression	21 (48.84)	96 (45.50)
Ever wanted a pregnancy	42 (97.67)	199 (94.31)
High trait anxiety	12 (27.91)	40 (18.96)
High trait anger	10 (23.26)	29 (13.74)
Current depression	7 (16.28)	32 (15.17)
Time since loss		
<1 year	4 (9.30)	8 (3.79)
1-2 years	18 (41.86)	85 (40.28)
>2 years	21 (48.84)	118 (55.92)
Completed pregnancy	17 (39.53)	99 (46.92)

Current pregnancy	6 (13.95)	29 (13.74)
Partner status change		
Positive change	4 (9.30)	27 (12.80)
No change	35 (81.40)	164 (77.73)
Negative change	4 (9.30)	20 (9.48)
Blame	4 (9.30)	35 (16.59)
Reported social support after stillbirth		
No support	7 (16.28)	14 (6.64)
Family support only	26 (60.47)	148 (70.14)
Both professional and family support	7 (16.28)	47 (22.27)
Saw or held baby		
Did not see or hold baby	3 (6.98)	17 (8.06)
Saw baby but did not hold	11 (25.58)	40 (18.96)
Held baby	29 (67.44)	154 (72.99)
Given mementos	37 (86.05)	200 (94.79)
Held memorial service	28 (65.12)	133 (63.03)
	Mean (std)	**Mean (std)**
Posttraumatic stress score	31.14 (16.98)	24.81 (16.27)
Avoidance	16.26 (10.94)	11.53 (9.56)
Intrustion	14.88 (8.46)	13.29 (9.14)
Posttraumatic growth score	79.19 (23.63)	88.6 (19.56)
Relating to others	27.07 (8.75)	31.6 (7.35)
New possibilities	18.7 (7.12)	20.21 (5.91)
Personal strength	16.4 (5.21)	18.48 (4.18)
Spiritual change	8.23 (3.05)	8.57 (3.16)
Appreciation of life	8.79 (2.68)	9.73 (2.30)
Grief score	69.58 (19.10)	64.31 (16.00)
Active Grief	28.05 (6.85)	26.72 (6.23)
Difficulty Coping	20.79 (7.28)	19.05 (5.98)
Despair	20.74 (6.72)	18.54 (5.92)

Appendix 6. Correlation analysis of psychological measures.

	IES	IES-A	IES-I	**EDS**	**PGI**	PGI-R
IES	__					
IES-A	0.89**	__				
IES-I	0.85**	0.51**	__			
EDS	0.59**	0.47**	0.56**	__		
PGI	-0.02	-0.06	0.04	-0.08	__	
PGI-R	-0.06	-0.15*	0.06	-0.07	0.91**	__
PGI-N	0.1	0.08	0.10	0.03	0.9**	0.72**
PGI-P	-0.08	-0.07	-0.07	-0.16**	0.88**	0.72**
PGI-S	-0.03	-0.06	0.00	-0.06	0.72**	0.54**
PGI-A	-0.01	-0.04	0.03	-0.12*	0.8**	0.65**
PGS	0.56**	0.45**	0.54**	0.66**	-0.08	-0.08
PGS-A	0.46**	0.31**	0.51**	0.51**	0.01	0.03
PGS-C	0.51**	0.42**	0.47**	0.64**	-0.11	-0.12
PGS-D	0.53**	0.47**	0.45**	0.63**	-0.12	-0.13*

	PGI-N	PGI-P	PGI-S	PGI-A	**PGS**	PGI-A	PGI-C
IES							
IES-A							
IES-I							
EDS							
PGI							
PGI-R							
PGI-N	__						
PGI-P	0.73**	__					
PGI-S	0.61**	0.57**	__				
PGI-A	0.69**	0.74**	0.52**	__			
PGS	0.03	-0.17**	-0.11	-0.05	__		
PGS-A	0.08	-0.10	-0.06	0.04	0.85**	__	
PGS-C	0.02	-0.19**	-0.12	-0.10	0.91**	0.63**	__
PGS-D	-0.01	-0.19**	-0.12	-0.08	0.91**	0.64**	0.81**

**<0.05, **<0.01; IES= Impact of Events Scale, IES-A= IES Avoidance subscale, IES-I= IES Intrusion subscale, EDS= Edinburgh Depression Scale, PGI= Posttraumatic Growth Inventory, PGI-R= PGI Relating to Others subscale, PGI-N= PGI New Possibilities subscale, PGI-P= PGI Personal Strength subscale, PGI-S= PGI Spiritual Change subscale, PGI-A= PGI Appreciation of Life subscale, PGS= Perinatal Grief Scale, PGS-A= PGS Active Grief subscale, PGS-C= PGS Difficulty Coping subscale, PGS-D= PGS Despair subscale.*