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Relations Between Social and Institutional Support and Women's  
Adjustment Following Pregnancy Loss

by

Jessica P. Riedstra

A dissertation

submitted in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy in the Department of Psychology

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To the Graduate Faculty:

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Sincerely,

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## Table of Contents

List of Figures .....	x
Abstract .....	xi
Chapter I: Comprehensive Literature Review .....	1
Definitions, Rates, and Risk Factors for Stillbirth.....	6
Defining Stillbirths.....	6
Rates of Stillbirth .....	6
Types and Symptoms of Stillbirth .....	7
Causes and Risk Factors for Stillbirth .....	9
Psychosocial Outcomes Following Pregnancy Loss .....	10
Depression.....	11
Grief .....	13
Anxiety.....	14
Trauma .....	16
General Psychological Adjustment.....	17
Pregnancy Loss and Support.....	20
Impact of Support .....	21
Healthcare Support.....	22
Social and Partner Support.....	29
Present Study Objectives .....	31
Proposed Statistical Analyses and Hypotheses.....	32
Hypotheses 1a-d.....	34
Hypotheses 2a-d.....	34

Hypothesis 3.....	35
Hypothesis 4.....	35
Follow-up/Probing Analyses .....	36
Chapter II: Methodology.....	37
Participants.....	37
Measures .....	38
Sociodemographic Questionnaire .....	38
Gestational Age of Pregnancy Loss and Reproductive History.....	39
Grief.....	40
Depression.....	41
Anxiety.....	43
Trauma .....	44
Perceived Healthcare Support.....	46
Perceived Social Support .....	48
Covariates .....	49
Procedures.....	52
Privacy and Confidentiality .....	52
Recruitment.....	52
MTurk Participation.....	53
MTurk Timeline.....	55
MTurk Compensation .....	55
Debriefing .....	56
Data Disposal .....	56



Expected Outcomes and Implications.....	57
Chapter III: Results .....	59
Descriptive Statistics.....	59
Sample Sociodemographics .....	59
Reproductive History and Characteristics .....	59
Mental Health History.....	60
Healthcare Provider .....	60
MTurk Data Collection .....	61
Frequencies and Regression Assumptions.....	61
Correlations With Covariates.....	63
Differences in Recruitment.....	64
Primary Analyses.....	65
Hypothesis 1a.....	65
Hypothesis 1b.....	66
Hypothesis 1c.....	66
Hypothesis 1d.....	67
Hypothesis 2a.....	68
Hypothesis 2b.....	69
Hypothesis 2c.....	69
Hypothesis 2d.....	70
Hypothesis 3.....	71
Hypothesis 4.....	71
Moderation Follow-Up Analyses.....	72

Findings From Transformed Data Analyses .....	73
Findings From Raw Data Analyses .....	74
Chapter IV: Discussion .....	81
Study Findings .....	81
Sociodemographics .....	81
Reproductive History and Characteristics .....	83
Mental Health History .....	86
Healthcare Provider .....	89
Study Context and COVID-19 .....	90
Statistically Significant Relations Among Primary Variables and Covariates .....	92
Differences in Recruitment .....	95
Hypotheses 1 .....	96
Hypothesis 2 .....	104
Hypotheses 3 and 4 .....	108
Practical Implications .....	109
Study Limitations .....	113
Study Strengths .....	115
Additional Future Directions .....	116
Conclusion .....	121
References .....	124
Appendix A Sociodemographic Questionnaire .....	147
Appendix B Reproductive History Questionnaire .....	149
Appendix C The Perinatal Bereavement Grief Scale (PBGS) .....	152

Appendix D Center for Epidemiological Studies Depression Scale Revised.....	153
Appendix E Perinatal Anxiety Screening Scale (PASS) .....	155
Appendix F PTSD Checklist for DSM-5 (PCL-5).....	157
Appendix G Short-Form Patient Satisfaction Questionnaire (PSQ-18) .....	159
Appendix H Multidimensional Scale of Perceived Social Support .....	161
Appendix I Qualification Questions .....	163
Appendix J Informed Consent Version 1.....	164
Appendix K Informed Consent Version 2 .....	166
Appendix L Instructions and Instruction Questions .....	168
Appendix M Debrief Form .....	169
Appendix N Sociodemographic Data and Reproductive History .....	170
Appendix O Correlations among Primary Outcome Variables .....	172
Appendix P Relations among Predictor/Outcome Variables, Potential Covariates, and HPSA	173
Appendix Q Miscarriage versus Stillbirth Group Comparisons .....	174
Appendix R CONSORT Flowchart of Participants .....	175
Appendix S Descriptives of Primary Predictor and Outcome Variables .....	176
Appendix T Normality of Distributions.....	178

## List of Figures

Figure 1 Bronfenbrenner's Ecological Systems Theory Model .....	21
Figure 2 Moderation Model .....	33
Figure 3 Relation between Depression and Social Support Among Miscarriage and Stillbirth..	74
Figure 4 Relation between Grief and Social Support Among Miscarriage and Stillbirth .....	76
Figure 5 Relation between Trauma and Social Support Among Miscarriage and Stillbirth .....	77
Figure 6 Relation between Anxiety and Social Support Among Miscarriage and Stillbirth.....	79

Relations Between Social and Institutional Support and Women's  
Adjustment Following Pregnancy Loss

Dissertation Abstract – Idaho State University (2021)

Extant literature in the field of pregnancy loss has examined the relations between loss and psychological adjustment. Some evidence suggests that the gestational age of the lost pregnancy may impact social and institutional support, as well as women's experience of psychological symptoms following loss. The present study examined the potentially buffering role of perceived social and healthcare support on the relation between gestational age and symptoms of depression, grief, trauma, and anxiety. Sociodemographic and reproductive characteristics were also examined. Recruitment and data collection of 149 participants (76 experienced miscarriage, 73 stillbirth) occurred via Amazon Mechanical Turk. Among women who experienced miscarriage, moderation analyses revealed a buffering effect of perceived social support on all symptoms of psychological adjustment. No significant relations were found with regard to perceived healthcare support. Women who experienced miscarriage were older in age, and maternal age served as an important covariate in most study models. These findings highlight the need for broad screening of psychological symptoms following pregnancy loss, as well as the provision of social support to facilitate adjustment. Additional practical implications and directions for future research are highlighted.

*Key Words:* pregnancy loss; miscarriage; stillbirth; depression; grief; trauma; anxiety

## Chapter I: Comprehensive Literature Review

Several decades of research has supported that women who suffer one or more pregnancy losses experience symptoms of grief, depression, anxiety, trauma, guilt, feelings of uselessness/incompleteness/failure, isolation, loneliness, self-blame, fear, panic, a lack of understanding, loss of identity as a prospective mother, decreased confidence in subsequent pregnancies, jealousy of women who successfully conceive, and general distress (Bellhouse et al., 2018; Bergner et al., 2008; Bhat & Byatt, 2016; Bicking Kinsey et al., 2015; Cordle & Prettyman, 1994; deMontigny et al., 2017; Giannandrea et al., 2013; Hunter et al., 2017; Neugebauer et al., 1992; Nikcevic et al., 1998; Tavoli et al., 2018; Watson & Jewell, 2018). While some women draw on personal resiliency to recover quickly from these symptoms, others experience persistent and distressing levels of psychological symptoms following pregnancy loss that warrants additional attention from researchers (Janssen et al., 1996). Therefore, the purpose of this review of the literature is to highlight our current understanding of physiological, psychological, and social adjustment following pregnancy loss, and the gaps in the extant literature that remain. Specifically, more work is needed to better understand the importance of gestational age (GA) at the time of loss, specific psychological outcomes following loss, and the moderating role of various levels and types of support to inform psychosocial intervention. The present review of the literature provides definitions of different forms of pregnancy loss and their symptoms, cause and risk factors, prevalence rates, and psychological and social outcomes across different types of pregnancy loss to support the novelty and practical significance of the current project. To conduct the literature review, a number of databases were searched including Google Scholar, and the EBSCOhost platform through Idaho State University, which offers access to databases from a variety of disciplines (e.g., APA PsychInfo). Published dissertations

were not examined as a part of the literature review, and most sources were articles published in peer reviewed journals, books, and reputable online sites (e.g., U.S. Centers for Disease Control and Prevention). The literature review was conducted between Spring 2018 and October 2019.

## **Definitions, Rates, and Risk Factors for Miscarriage**

### ***Defining Miscarriage***

A miscarriage is defined as the loss of a pregnancy prior to 20 weeks gestation (Centers for Disease Control and Prevention, 2017; Mayo, 2016), and an early miscarriage is a loss prior to 13 weeks gestation (American College of Obstetricians and Gynecologists, 2018). In the United States (U.S.), a fetus weighing under 350 grams may also be classified as a miscarriage (Tavares Da Silva et al., 2016). However, Tavares Da Silva et al. (2016) and van den Akker (2011) highlight the many ways in which miscarriage is defined across countries, ranging from 10 to 28 weeks gestation or earlier, and fetal weight ranging from less than or equal to 350 to 1000 grams. In Idaho, stillbirth is defined as pregnancy loss at or following 20 weeks gestation, or a fetal weight of 350 grams or more (Centers for Disease Control and Prevention, 1997).

### ***Rates of Miscarriage***

According to The American College of Obstetricians and Gynecologists (ACOG; 2018a), approximately 10% of pregnancies result in miscarriage and 80% occur within the first trimester. The Mayo Clinic (2019) cites miscarriage rates between 10% and 20% and note that this statistic is likely underestimated, as many women may experience pregnancy loss without realizing that they were pregnant. Additionally, perinatal researchers cite miscarriage prevalence rates between 12 to 25% (Dennis et al., 2015; Lang & Nuevo-Chiquero, 2012; Lok et al., 2004; Scotchie, & Fritz, 2006; van den Akker, 2011). In a summary of the literature surrounding risk factors and psychological intervention for miscarriage, Athey and Spielvogel (2000) note that in the U.S.,

half a million women suffer from miscarriages each year, 48 to 51% experience psychiatric difficulties following the loss, and 22 to 44% exhibit clinically significant levels of anxiety and depression. Unfortunately, Idaho does not report rates of pregnancy loss prior to 20 weeks gestation, therefore local miscarriage statistics could not be referenced (Idaho Department of Health and Welfare, 2017a). The frequency of pregnancy loss increases with age, such that women between the ages of 20 to 30 experience lifetime miscarriage rates between 9 and 17%, while 80% of women over the age of 45 report a prior pregnancy loss in their lifetime (ACOG, 2018a).

### ***Types and Symptoms of Miscarriage***

Extant literature describes several types of miscarriage. Missed or silent miscarriage is described as when a fetus is not expelled from the woman's body and the loss of pregnancy may go unnoticed for several weeks due to a possible lack of pregnancy symptoms. Alternatively, an incomplete miscarriage includes partial or incomplete expulsion of the fetus or pregnancy tissue (e.g., amniotic sac or placenta), and symptoms such as cramping, bleeding, and opening of the cervix (van den Akker, 2011). Both missed and incomplete miscarriages require medical intervention (e.g., dilation and curettage) if the fetus and surrounding tissue is not completely and naturally expelled. In the case of complete miscarriage, the fetus and all pregnancy tissue is completely expelled from the woman's body and the cervix remains closed (van den Akker, 2011). Women may also experience threatened miscarriage characterized by signs that the woman might miscarry (e.g., vaginal bleeding or lower abdominal pain), which may result in pregnancy loss or successful completion (New South Wales Health Department, 2009). In an inevitable miscarriage, which may follow a threatened miscarriage, symptoms of miscarriage (e.g., vaginal bleeding, cramping, cervical dilation) are present but pregnancy tissue are still



intact in the uterus (New South Wales Health Department, 2009). Following a miscarriage, women may experience a number of physical changes including abdominal and back pain, weight loss, rhythmic contractions, decreasing signs of pregnancy and complications such as infection, vaginal discharge, chills, fever, abdominal tenderness, tissue clots or bleeding (Mayo Clinic, 2019; van den Akker, 2011). However, consistent with the fact that many miscarriages go undetected, women may not experience any noteworthy physical symptoms following miscarriage (Mayo Clinic, 2019). Symptoms of early pregnancy loss may include vaginal bleeding, uterine cramping, and an empty or small gestational sac (ACOG, 2018a). Unlike with stillbirth, women are typically not provided with a birth or death certificate in the case of miscarriage, however, some states, such as Nebraska and Tennessee, have recently passed bills to offer families commemorative birth certificates for miscarriages prior to 20 weeks gestation (van den Akker, 2011; WBIR-Staff, 2019). Last revised in 1997, the Centers for Disease Control and Prevention (CDC) reports U.S. state definitions for pregnancy loss and legal requirements for documenting and reporting on a state-by-state basis (CDC, 1997). In Idaho, legal reporting is required if the pregnancy loss meets the previously defined parameters (i.e., 20 weeks or more or 350 grams or more) and induced terminations of pregnancy (i.e., abortion) also require legal documentation (CDC, 1997).

### ***Causes and Risk Factors for Miscarriage***

Approximately 50% of miscarriages are due to a biological complication with the developing fetus (i.e., chromosomal abnormality) and may result in blighted ovum (i.e., lack of embryo formation), intrauterine fetal demise (i.e., embryo stops developing prior to symptoms of pregnancy loss), or molar (i.e., both sets of chromosomes are paternal resulting in abnormal placental growth and lack of fetal development), and partial molar pregnancy (i.e., maternal

chromosomes remain but two sets of paternal chromosomes are also present resulting in fetal and placental abnormalities; Mayo Clinic, 2019). Women may also experience pregnancy loss as a result of ectopic pregnancy (i.e., embryo implants in fallopian tube or elsewhere outside of the uterus) and subsequently experience symptoms such as severe lower abdomen pain, vaginal bleeding, feeling faint, vomiting, and shoulder pain (New South Wales Health Department, 2009). In addition, miscarriage may be caused by maternal health conditions (i.e., infection, thyroid disease, uncontrolled diabetes, hormonal issues, or problems with reproductive tissues or organs; ACOG, 2018a; Mayo Clinic, 2019). Women may also experience recurrent miscarriages as a possible result of chromosomal abnormalities, autoimmune issues, anatomical abnormalities, infections, thrombophilia, and endocrine and immune dysfunction (van den Akker, 2011).

Common risk factors for pregnancy loss include advanced maternal and/or paternal age, history of miscarriages or pregnancy terminations, infertility, assisted conception, stress, changes in romantic relationships, alcohol and substance use, low or high maternal weight, and in some cases, invasive prenatal exams (Mayo, 2016; van den Akker, 2011). Additionally, maternal blunt trauma, including motor vehicle accidents, domestic violence, and falls, result in fetal death in 3.4 to 38% of pregnancies (Grossman, 2004). This range may be due to the variety of physical traumas women may experience ranging from mild (e.g., bumping a desk) to major (e.g., car accident), and the different contexts in which trauma is measured (e.g., accidents or domestic violence versus maternal shock or death; Grossman, 2004; Krywko et al., 2021). It is important to better understand risk and resiliency factors regarding pregnancy loss given the long-term effects on women's psychosocial outcomes.

## **Definitions, Rates, and Risk Factors for Stillbirth**

### ***Defining Stillbirths***

According to Wingate et al. (2017), defining cutoffs between miscarriage and stillbirth is inconsistent across countries and research studies. The researchers note that in the U.S., stillbirth is defined as pregnancy loss at or after 20 weeks gestation. Similarly, the CDC defines stillbirth as a loss of pregnancy after 20 weeks gestation (2017). Idaho also uses a cut-off of at least 20 weeks gestation to define stillbirth (Idaho Department of Health and Welfare, 2017b). The CDC (2017) and the World Health Organization (WHO; 2015) acknowledges nuances within stillbirths based even more specific GA groupings such that early stillbirth occurs between 20 to 27 weeks, late stillbirth between 28 and 36 weeks, and term stillbirth at 37 weeks and later. At times, determining whether the label of stillbirth is appropriate for a pregnancy loss is complex. For example, Tavares Da Silva et al. (2016) note complicating factors such as the presence of a live birth and dead sibling in cases of twin pregnancy, as well as difficulty in determining whether the fetus lived for any point of time following birth in home deliveries.

### ***Rates of Stillbirth***

In 2015, the WHO reported 2.6 million stillbirths globally, with 75% occurring in south Asia and sub-Saharan Africa. According to the CDC (2017), stillbirth occurs in approximately 1% of U.S. pregnancies annually, while Patel et al. (2014) note that the overall rate of stillbirths decreased between 2008 to 2010 at 4.08 stillbirths per 1000 live births. Nicholson et al. (2016) report that the rate of term stillbirth in the U.S. increased between 2007 to 2013 from 1.102 to 1.177 per 1000 births, with a relative risk of 1.067. In a review of the literature by Tavares Da Silva et al. (2016), rates of stillbirths were found to range between 3.1 to 6.2 per 1000 live births or 1 in 160 deliveries. Unlike miscarriages, states are required to report fetal deaths. In a 2014

report of 37 U.S. participating states, including Idaho, an annual number of 15,840 fetal deaths, or stillbirths, was found (CDC, 2016c). Idaho's Department of Health and Welfare reported fluctuations in stillbirth rates, rising from 123 stillbirths in 2010 to 137 in 2011, 109 in 2013, 114 in 2016, and fluctuations in stillbirth ratios since 2002 (i.e., 4.9 to 6.1 to 5.1 per 1,000 live births; 2017a, 2017b). Nicholson et al. (2016) found an increase in rates of term stillbirths between 2007 and 2013, with a relative risk of 1.27. In an analysis of birth data between 2007 and 2015 from the National Center for Health Statistics of the U.S. CDC, Ananth et al. (2018) found a statistically significant decline in stillbirths from 5.7 to 5.6 per 1000 births.

### ***Types and Symptoms of Stillbirth***

As with miscarriage, there are numerous types of stillbirth, some of which are based on GA as mentioned above. Antepartum stillbirth refers to fetal death during pregnancy while intrapartum stillbirth occurs after the onset of labor and prior to delivery of the fetus (Tavares Da Silva et al., 2016). In the antepartum period, stillbirth may be indicated by the mother not feeling fetal activity, a maintenance or decrease in maternal weight or fundal height, absence of fetal heart-beat, vaginal dark blood loss, secretion of colostrum through the breasts, and fetal physical characteristics as determined by radiology (e.g., collapsed skull, cranial, facial, or spinal abnormalities) or ultrasound (e.g., absence of heart beat, movement, accumulation of fluid in subcutaneous tissue, pleural and peritoneal effusion, loss of fetal physically defined structures). However, none of these characteristics can be perfectly measured or used to conclusively determine stillbirth (Tavares Da Silva et al., 2016). Following a stillbirth, the ACOG recommends several possible medical interventions based on GA, prior uterine scarring, and the woman's preference (Barclay & Murata, 2009). For example, following fetal death, dilation and evacuation may be offered to the woman in the second trimester, while inducing labor may be

appropriate later in gestation if dilation and evacuation is not recommended, preferred, or available during the second trimester (Barclay & Murata, 2009). Prior to 28 weeks gestation, the ACOG recommends misoprostol or oxytocin to induce labor, while following 28 weeks gestation, cesarean delivery is related to increased potential for maternal mortality (Barclay & Murata, 2009). The ACOG also recommends a full autopsy if possible, following evacuation/extraction of the fetus, including visual examination, measurements (e.g., weight, head circumference, length, placenta weight), photographs, radiographs, ultrasound, magnetic resonance imaging, testing skin and blood, amniocentesis, and collection of a segment of the umbilical cord and fetal tissue (Barclay & Murata, 2009).

Although additional research is needed to establish safety and effectiveness across populations (e.g., different sociodemographic groups), extant research suggests that operative delivery (e.g., caesarean section), induction of labor rather than expectant management in post-term pregnancy and term breech presentations, magnesium sulfate for pre-eclampsia and eclampsia, transcervical amnioinfusion for meconium staining, and hyperoxygenation may be helpful in preventing stillbirth (Darmstadt et al., 2009). In determining the cause of stillbirth, examination of the fetus for congenital malformations, autopsy, karyotype, cord and placenta examination/pathology, and examination of antepartum maternal factors, fetal factors, external environmental factors, and peripartum events are utilized (Tavares Da Silva et al., 2016). Medical providers also attempt to estimate and document GA via the last menstrual period, fundal height and other biometric parameters (e.g., crown-to-heel length or foot length or fetal maturation; Tavares Da Silva et al., 2016).

The World Health Organization (2016) notes that U.S. states require fetal death reporting and federal law supports the collection of this data via the National Vital Statistics System.

Following a stillbirth, some hospitals proceed with established protocols for allowing parents to grieve their loss (e.g., holding and touching the child, taking mementos such as photos, hair, foot/hand prints, providing memorial/funeral services, investigation into the cause of death, birth and/or death certificate, support groups, psychoeducation about grief; Cleveland Clinic, 2018; Stanford Children's Health, n.d.; University of Utah Health, n.d.).

### ***Causes and Risk Factors for Stillbirth***

Unfortunately, the CDC (2017) notes that the cause for most stillbirths is frequently unknown, which may result in women's feelings of self-blame. Tavares Da Silva et al. (2016) report a rate of 25 to 50% of stillbirths due to unknown causes. However, more likely causes of stillbirth include birth defects or genetic issues, problems with the placenta or umbilical cord, or certain maternal conditions such as gestational diabetes, high blood pressure, or obesity (CDC, 2017). Additional maternal risk factors for stillbirth include African American race, adolescence, less than age 25, or over the age of 35, being unmarried, obese, smoking cigarettes, using alcohol, or tobacco use during pregnancy, medical conditions (e.g., diabetes, infection, lupus, cholestasis of the pregnancy, sickle-cell disease, anemia, nutritional deficiencies, high hemoglobin during early pregnancy, high blood pressure, cardiac, rheumatologic, and renal disorders, thrombophilia, and body mass index at or over 30), multiple pregnancies, and previous pregnancy loss (CDC, 2017; Tavares Da Silva et al., 2016; Wingate et al., 2017). Prior pregnancy loss increases risk of subsequent stillbirth 5 to 10 times (Tavares Da Silva et al., 2016). In the fetus, poor growth or intrauterine fetal growth restriction, congenital anomalies, genetic problems (e.g., karyotype abnormalities), fetal infection, post maturity, and being male may result in stillbirth (Tavares Da Silva et al., 2016). Placental causes include placental abruption, vasa previa, chorioamnionitis, premature rupture of membranes, vascular

malformations, and accidents in the umbilical cord, while external causes include obstetric trauma or accidents during labor/delivery (e.g., asphyxia). Contrary to other findings, Wingate et al. (2017), who studied ethnic characteristics and rates of stillbirth between 2009 and 2013, found lower rates of stillbirths among non-Hispanic black women and Hispanic women compared to non-Hispanic white women. Additionally, the researchers found greater risk at 32 to 33 weeks gestation among non-Hispanic black women with increasing risk with increasing GA. Finally, Hispanic and American Indian/Alaska Native women demonstrated lower risk of fetal mortality compared to non-Hispanic white women up until 38 to 39 weeks gestation. Tavares Da Silva et al. (2016) report that most stillbirths (approximately 98%) occur in low to middle-income countries and the overall rate of stillbirth has declined overtime in developed countries. Importantly, approximately 67% of stillbirths occur among rural families where skilled services are lower than in urban areas (Tavares Da Silva et al., 2016). However, research suggests that women suffering pregnancy loss, early or late term, are at risk for significant psychological and social outcomes. The literature review that follows attempts to identify whether researchers examined miscarriage or stillbirth as per the cutoffs defined above; however, some studies or reviews are not clear in differentiating between the two forms of pregnancy loss.

### **Psychosocial Outcomes Following Pregnancy Loss**

After examining extant literature on emotional outcomes following pregnancy loss, symptoms of depression, anxiety, trauma, and grief appeared most frequently and saliently across research studies. Although some prevalence rates are reported, clear and agreed upon rates are not consistent across the literature. The current study seeks to explore relations between the following psychological constructs, GA of pregnancy loss, and the moderating role of healthcare and social support in order to further understand processes underlying women's experiences that

may inform prevention.

### ***Depression***

Compared to the general population, depressive symptoms are higher among women who experience pregnancy loss, with some risk factors including receiving infertility treatment, recurrent loss of pregnancy, history of depression or Posttraumatic Stress Disorder (PTSD), intimate partner violence, and high levels of distress following the miscarriage (Bhat & Byatt, 2016; Mann et al., 2008; Neugebauer et al., 1992; Stirtzinger et al., 1999; Tavoli et al., 2018). Elevated depressive symptoms in women experiencing early-term miscarriages occur at rates 3.4 and 4.3 times greater than among pregnant and community cohorts, respectively (Neugebauer et al., 1992), and 10 to 50% of women experience Major Depressive Disorder following pregnancy loss, with symptoms lasting approximately 6 months to 1 year (Campbell-Jackson & Horsch, 2014; Lok & Neugebauer, 2007). Among urban, minority women with low socioeconomic status (SES) who suffered any form of pregnancy loss, including abortion, prevalence rates of depressive disorders were as high as 56% and 29% for comorbid major depression and anxiety disorder, respectively (Giannandrea et al., 2013). The researchers found that no specific type of loss was related to higher rates of symptoms, and with each additional pregnancy loss, the risk for comorbid depression-anxiety doubled (Giannandrea et al., 2013).

Symptoms may include suicidal ideation, decreased self-esteem, guilt, self-blame, stress, and psychomotor retardation (Athey & Spielvogel, 2000; Stirtzinger et al., 1999). Research demonstrates that depressive symptoms persist even when controlling for somatic complaints that may have been related either to depression or miscarriage/pregnancy (Neugebauer et al., 1992). Already having a child at the time of pregnancy loss has been demonstrated to be protective against depression and anxiety symptoms (Neugebauer et al., 1992; Stirtzinger et al.,



1999; Tavoli et al., 2018). Researchers hypothesize that for women who suffer pregnancy loss, having other children may provide a form of indirect social support (e.g., the presence of prior successful pregnancies provide a sense of confidence in the woman's reproductive ability), buffering multiparous women from depressive symptoms (Neugebauer et al., 1992). Some research suggests a possible relationship between perinatal loss and increased depression for women during subsequent pregnancies (Bhatt & Byatt, 2016; Hunter et al., 2017). Hunter et al., (2017) found that both type of perinatal loss (i.e., stillbirth;  $d=0.81$ ) and trimester of assessment (i.e., second trimester;  $d=0.32$ ) are significantly related to depression. deMontigny et al. (2017) reported on women's depressive and grief symptoms following miscarriage (i.e., within 27 weeks gestation) up to 6 years following the loss and found that depressive symptoms were highest for women who had experienced a miscarriage more recently. Among women who suffered pregnancy loss prior to 5-months gestation, at 3 months and 1 year following miscarriage, women endorsed elevated levels of depression symptoms either close to or at clinical threshold, with decreasing depressive symptoms over time (Stirtzinger et al., 1999). Women who were younger and experienced multiple pregnancy losses also demonstrated higher levels of depression during the first time point of assessment than older women who miscarried, while women over the age of 30 and with no living children experienced the highest level of depressive symptoms at 1 year follow-up. However, other literature suggests an inverse relationship between younger age at the time of pregnancy loss and depressive symptoms (Mann, et al., 2008). With regard to higher levels of depressive symptoms among women suffering miscarriage at a later GA rather than earlier, researchers cite prior theory that suggests that with increasing GA, the mother's attachment to the fetus increases, thereby increasing their sense of

loss (Neugebauer et al., 1992). This theme of attachment directly translates to theory surrounding symptoms of grief following pregnancy loss.

### ***Grief***

Athey and Spielvogel (2000) note that grief is the most common symptom following miscarriage with up to 40% of women suffering miscarriage experiencing bereavement, sadness, and a desire to communicate with others and understand the meaning of the loss. Other reviews of the literature report unclear incidence rates of grief among women following pregnancy loss (Bangal et al., 2013). Brier (2008) notes that characterizations of grief following pregnancy loss are few but variable, calling for additional research with the use of psychometrically sound and valid measures of perinatal grief. Prior research suggests a theoretical difference between depression and grief following perinatal loss (Ritsher & Neugebauer, 2002). In conceptualizing grief, Ritsher and Neugebauer (2002) and Brier (2008) highlight the importance of a loss of an attachment (i.e., with the fetus) that distinguishes grief, or traumatic bereavement, from depression. Symptoms may include “numbness, disbelief, guilt, self-blame, anger, social isolation, and yearning and searching for the deceased” (Brier, 2008; Ritsher & Neugebauer, 2002, p. 31), as well as doubts about their femininity, feelings of emptiness, sadness, crying, jealousy, and lower self-esteem (Bangal et al., 2013). Women may feel a sense of failure, question their identity, and grieve the loss of a prospective family, which may be exacerbated if women made significant life changes to start their families (Athey & Spielvogel, 2000).

According to literature reviews, these symptoms of grief may last between 4 months to 3 years following the loss (Brier, 2008; Athey & Spielvogel, 2000). Additionally, prior reviews of the literature suggest that while controlling for depression, traumatic grief increases risk for suicidality and heart disease (Ritsher & Neugebauer, 2002), while others have found perinatal

grief predicted posttraumatic stress symptoms (Krosch & Shakespeare-Finch, 2017). Several predictors of post-pregnancy loss complicated grief have been identified including lack of social support, depression or other psychiatric illness prior to the loss, ambivalence regarding the pregnancy, termination of the pregnancy due to fetal abnormality (Bhat & Byatt, 2016; Cassaday, 2018), younger age at the time of loss (Cassaday, 2018; Mann, et al., 2008), recurrent pregnancy loss, history of trauma, lack of other living children present, greater GA at the time of loss, a history of infertility, lack of ritual for the deceased, and general relationship difficulties/dissatisfaction (Bangal et al., 2013; Cassaday, 2018). Specifically, complicated grief may be defined as grief that is a result of poor adjustment to a loss and “more disruptive or longer lasting than typical grief,” perhaps longer than 2 years following the pregnancy loss (Cassaday, 2018, p. 527; Kersting & Wagner, 2012). Swanson et al. (2007) examined women who suffered miscarriage (at 20 weeks gestation or less) at 1, 6, 16, and 52 weeks following pregnancy loss and found that as general feelings of healing increased over time following the loss, active grieving and feeling overwhelmed decreased over the course of the year.

### ***Anxiety***

Research surrounding the persistence of anxiety symptoms appears inconclusive. Some findings suggest that anxiety becomes comparable to the general population by 1 to 6 months following the pregnancy loss (Bhat & Byatt, 2016; Farren et al., 2016); while others indicate fluctuations in the rates of anxiety over time following loss (Athey & Spielvogel, 2000; Tsartsara & Johnson, 2006) that may persist even after depression symptoms remit (Cordle & Prettyman, 1994). Research indicates mixed findings as to whether the presence of other children in the home is protective of anxiety symptoms in women following pregnancy loss (Bhat & Byatt, 2016; Tavoli et al., 2018). Additionally, with regard to subsequent pregnancies, a new pregnancy

may not be protective against poor psychiatric symptoms resulting from the prior pregnancy loss (Bhat & Byatt, 2016). While depression predominates the miscarriage literature, increasing evidence implicates symptoms of anxiety follow pregnancy loss as well (Lee & Slade, 1996), and may be more prevalent than depressive symptoms immediately following miscarriage (Geller, 2004). Specifically, anxiety symptoms following miscarriage receive less attention although 21 to 44% of women report symptoms immediately following pregnancy loss (Athey & Spielvogel, 2000; Cambell-Jackson & Horsch, 2014; Giannandrea et al., 2013). Women may question the loss, blame themselves, and worry about subsequent pregnancies; however, women provided with a medical explanation experience fewer symptoms of anxiety (Bhat & Byatt, 2016). Additional research suggests that women who suffer a miscarriage experience increased rates of suicide as compared to women who have live births and community samples (Bhat & Byatt, 2016).

A meta-analysis conducted by Hunter et al. (2017) examined the rates of stress, anxiety, and depression among women with a pregnancy loss and their partners during subsequent pregnancies. Although the overall effect of perinatal loss on anxiety appears non-significant, the trimester in which women were assessed suggest that women with pregnancy loss in the first trimester experience the most robust relationship with anxiety ( $d=0.61$ ). The effect of loss on pregnancy-specific anxiety was statistically significant and large, while the effect on trait anxiety was statistically significant and medium in size (Hunter et al., 2017). Conversely, Tsartsara and Johnson (2006) found that during the first trimester of a new pregnancy, women who have had a prior miscarriage (gestational age of loss unspecified, but could not include stillbirth or neonatal loss) reported higher rates of pregnancy-related anxiety than women with no miscarriage history did. At the third trimester, women with a miscarriage history demonstrated scores that had

decreased to nearly the same as those without such a history. Bergner et al. (2008) similarly found that women who had experienced a miscarriage had more pregnancy-specific anxiety and general anxiety during a subsequent pregnancy than those without a history of miscarriage, and women with recurrent miscarriages were worse off than those with only one pregnancy loss. Interestingly, women who passed the GA at which they had experienced their prior miscarriage demonstrated less anxiety than those who had not yet passed that point in their pregnancy, highlighting the importance of investigating psychological symptoms up to at least the anniversary of pregnancy loss (Bergner et al, 2008).

### ***Trauma***

Research has demonstrated that all types of perinatal loss are associated with increased PTSD symptoms, and risk factors include lower educational attainment, younger age, prior trauma experiences, older GA at the time of loss, and premorbid psychiatric concerns (Bhat & Byatt, 2016, Giannandrea et al., 2013). Although consistent prevalence rates could not be extracted, a more nuanced investigation of PTSD and general posttraumatic stress (PTS) found that across all types of reproductive loss, the prevalence of PTS is greater than PTSD, highlighting the importance of examining even subclinical levels of symptoms (Daugirdaitė et al., 2015). A longitudinal study of over 1300 women found trauma symptom prevalence rates of 25% 1 month following pregnancy loss and 7% at 4 months, with comparable severity to other samples of individuals experiencing different forms of trauma (e.g., nonsexual assault, sexual assault, accidents; Engelhard et al., 2001). Thirty four percent of women also reported depression comorbid with trauma symptoms, and while trauma symptoms decreased over time, depression symptoms appeared to be more persistent at the 4- month follow-up (Engelhard et al., 2001).

Among a diverse sample of urban women, Giannandrea et al. (2013) found rates of 9% for PTSD following any form of pregnancy loss.

Additional review of the literature suggests that trauma symptoms following miscarriage and planned abortion have been examined to a greater extent than stillbirth has (Daugirdaitė et al., 2015). Furthermore, increased GA at the time of loss is associated with an increase in severity of PTSD symptoms (Bhat & Byatt, 2016). Farren et al. (2016) examined women who experienced miscarriage and found that women reported elevated symptom levels of PTSD, anxiety, and depression compared to the control group. Interestingly, fewer women reported symptoms of depression as compared to PTSD and anxiety. Contrary to Engelhard et al. (2001), Farren et al. (2016) found that while symptoms of anxiety and depression decreased between 1 and 3 months post-loss, trauma symptoms persisted. Physical procedures (e.g., dilation and curettage) or state (e.g., pain and blood loss) as well as the loss itself have been shown to result in symptoms characteristic of a trauma response, including intrusive thoughts, anger and jealousy, avoidance of reminders of the loss, suppressed emotions, and guilt for these emotional reactions (Athey & Spielvogel, 2000). These findings suggest that while symptoms of trauma are likely present for many women following pregnancy loss, clear prevalence rates and persistence of symptoms remains less understood.

### ***General Psychological Adjustment***

According to Bhat and Byatt (2016), who examined perinatal loss regardless of GA and accompanying grief, women may experience guilt, self-blame, or feel that their bodies have failed them. Mixed findings have been reported regarding whether advanced maternal age, having viewed an ultrasound, experiencing fetal movement, naming or purchasing items for the baby, and the length of gestation prior to loss predict poorer psychological adjustment (Bhat &

Byatt, 2016). Those losing their pregnancy at 20 weeks gestation or later are at the highest risk for psychological difficulties and Adjustment Disorder is the most common diagnosis among these women. In some cases, women may struggle with psychological adjustment even into and following subsequent pregnancies. Robertson Blackmore et al. (2011) collected data from over 13,000 mothers from England to assess for the persistence of depression and anxiety following prior miscarriage or stillbirth. They found that a greater number of prior pregnancy losses predicted more anxiety and depression, which persisted even after the birth of a subsequent child. These results held while controlling for important confounds including maternal age, living with partner, parity, education, ethnicity, alcohol and tobacco use, history of depression, birth weight, and socioeconomic status. Such results suggest that many women suffering from depression or anxiety as a result of pregnancy loss struggle to adjust even after a successful pregnancy, and while psychological adjustment may be impacted by numerous contextual factors, the presence of the loss itself significantly contributes to mental health outcomes.

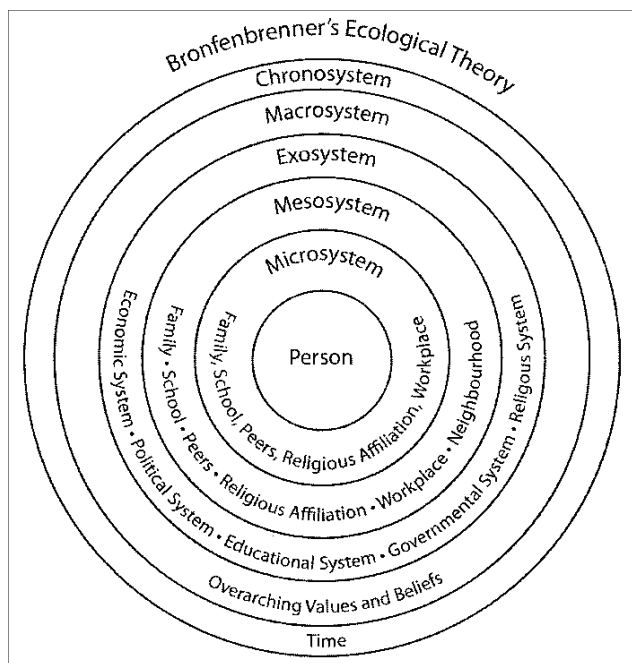
Among women who experience early miscarriages (i.e., prior to 16 weeks gestation), 72% reported thinking about their miscarriage occasionally or very often, 68% reported being moderately to very/extremely upset when thinking about the pregnancy loss, 12% reported thinking about their miscarriage very often and being very/extremely upset when doing so, 64% reported that their pregnancy loss had impacted their decision to become pregnant again, and 18% decided to never become pregnant again (Cordle & Prettyman, 1994). These women also reported experiencing feelings of loss, guilt, and difficulty comprehending the loss, anxiety about future pregnancies, uselessness or incompleteness, as well as less distress if they knew the sex of the fetus (Cordle & Prettyman, 1994).

Taken together, studies demonstrate the importance of raising awareness of the presence of mental health symptoms following miscarriage, and the need for assessment and follow-up treatment in primary care and general mental health settings (Hunter et al., 2017). Specifically, recent meta-analyses call for the development of psychosocial interventions for those who experience pregnancy loss and targeted treatment for issues with anxiety and depression (Hunter et al., 2017). Finally, studies support the long-term (i.e., negative emotional experiences even in subsequent pregnancies) impacts of pregnancy loss on attachment to new babies, family relationships, and emotional and physical well-being, thus highlighting the importance of research in this area (Hunter et al., 2017). The present project seeks to address several gaps in the literature noted in the above review such as the effect of GA of loss and psychological adjustment. GA at the time of pregnancy loss was chosen as the primary predictor variable in the current study because it appears to be one of the most commonly investigated predictors of psychosocial outcomes following pregnancy loss in the literature reviewed herein. Swanson et al. (2007) highlight the mixed literature on GA of loss and association with psychosocial distress. The role of GA at the time of loss is still unclear, such that some research has found no differences between various GAs and psychological outcomes. However, additional research is warranted in order to inform timely intervention. The project also seeks to examine the chronicity of depression, anxiety, grief, and trauma symptoms following loss; the investigation of the full spectrum of symptoms including subclinical levels of psychological constructs; and moderators (e.g., support) of the relations between pregnancy loss and poor psychological outcomes.



## **Pregnancy Loss and Support**

According to Bronfenbrenner's Ecological Systems Theory, people develop within the context of interpersonal and environmental interactions (1994). Several levels of environmental systems are proposed including micro-, meso-, exo-, macro- and chronosystems that affect development in complex and dynamic ways. In thinking about the ways in which pregnant women and their families may be impacted by their social environments, Bronfenbrenner's systems offer suggestions for several levels of social analysis. As demonstrated by the following review of social support literature during pregnancy loss, women are influenced by their microsystems comprised of their social roles, interpersonal relationships, and activities (e.g., family, friends, partners, group memberships, etc.). Additionally, mesosystems, or relations between multiple microsystems the woman participates in, also influence their psychological development (e.g., family and healthcare institution interactions). The culture and structure of a society is captured within the macrosystem and may encompass social attitudes and stigmatization that can influence women's psychosocial outcomes. Longitudinal analysis of these various system interactions on women's outcomes are classified under their chronosystems, such that social perception, policy, and general context change over time.

**Figure 1***Bronfenbrenner's Ecological Systems Theory Model*

*Note.* Adapted from Stranger (2011).

***Impact of Support***

Research has examined the role of social support and healthcare services in relation to adverse psychological outcomes following pregnancy loss. Women's grief may go unrecognized by society, subsequently resulting in a lack of support, particularly in medical settings by healthcare providers and/or by loved ones (Watson & Jewell, 2018). Miscarriage is often considered an "ambiguous death" resulting in limited recognition and acknowledgement as compared to other forms of pregnancy loss (e.g., stillbirth), and limited social support (Brier, 2008; Geller, 2004, p. 194; van den Akker, 2011; Watson & Jewell, 2018). Specifically, research suggests that due to the secrecy of early pregnancy loss and the lack of physical evidence of the loss, individuals may minimize women's experiences surrounding various psychological experiences (e.g., grief; Brier, 2008). However, even in cases of miscarriage, it may be important

for mothers to have family members and professionals recognize that life existed and was lost (Harden, 2018). Research indicates a “near universal pronatal” attitude that does not recognize parent’s sense of loss and mourning (van den Akker, 2011, p. 298). According to Swanson et al. (2007), many healthcare providers assume that women suffering from loss later in gestation experience greater psychological morbidity, which subsequently impacts the quality of care and attention women suffering from an earlier loss receive. Unfortunately, although miscarriage occurs with great frequency and results in significant psychological impacts, most support services are directed at pregnancy loss later in gestation (Séjourné et al., 2010). A lack of recognition of a woman’s grief surrounding pregnancy loss can increase negative emotional consequences, while social and healthcare support likely helps with psychological adjustment (Lee & Slade, 1996), including the couple’s ability to effectively cope with the loss (Abboud & Liamputtong, 2005). Importantly, even if both the physician and patient do not see the pregnancy loss as a significant source of distress, the loss could add to the women’s cumulative traumatic burden and increase her vulnerability for mental health issues during subsequent pregnancies (Giannadrea et al., 2013).

### ***Healthcare Support***

Several research studies have examined the role of the quality of the healthcare support and psychological outcomes following pregnancy loss. Research has found that especially women who feel inadequately supported by their partners and social networks could greatly benefit from support provided by healthcare professionals (van den Akker, 2011). Prior research suggests that healthcare providers often do not acknowledge the family’s loss, though the loss can lead to symptoms of traumatic stress (van den Akker, 2011). Additionally, follow-up for psychological consequences of pregnancy loss is not universally available even though literature

suggests that men and women can experience clinically elevated symptoms of depression, anxiety, trauma, and Obsessive-Compulsive Disorders following such loss (van den Akker, 2011). While there appears to be inconsistency in the use of diagnostic criteria to assess for psychological dysfunction, van den Akker (2011) notes the importance of screening and treating subclinical levels of distress as well, such as grief. Research indicates that the behaviors and actions or inactions of healthcare providers have a meaningful impact on parent's experiences, however, in a systematic review of the relevant literature surrounding healthcare following stillbirth, 100% of the sampled providers reported emotional, informational/knowledge, and system-based barriers to providing patients with effective care (Ellis et al., 2016)

**Cross-Cultural Findings.** Extant literature demonstrates similarities and differences in healthcare following pregnancy loss between U.S. and other countries (e.g., Hunter et al., 2017). Although healthcare systems typically vary quite dramatically across nations, the present literature review suggests gaps in care across developed countries (e.g., varying degrees of health support provided regarding emotional or informational support and sometimes limited follow-up). Additionally, the healthcare setting may also affect the quality of support received. For example, Abboud and Liamputtong (2005) found that women reported better experiences in private healthcare settings, while other women reported receiving conflicting advice and information, and repeated errors in their care from various providers, primarily in public institutions. While some couples were provided with minimal information in the form of a brochure, most were not provided with any follow-up. Many male partners reported that they would have liked to receive information about how to best support their partners following pregnancy loss.

In France, researchers found that among possible intervention options, women reported a preference for contact with medical providers and medical information (Séjourné et al., 2010). However, 48% of the sample believed that appointments with a psychologist or psychiatrist would be helpful, 45% of all participants believed a referral to these professionals would be helpful, and only 28% believed that psychological counseling would be beneficial. Additionally, women who had experienced more than one miscarriage considered psychological referral information more helpful compared to women experiencing a single miscarriage. Women were largely unsatisfied with the sufficiency of the information provided to them surrounding miscarriage by healthcare professionals. The most common concerns endorsed by women following miscarriage included fear about subsequent pregnancies (82%) and psychological experience surrounding the loss (66%). Interestingly, 86% and 81% of women reported coping with their miscarriage by drawing on social support from significant others and online forums, respectively. Furthermore, 70% drew on support from their friends and 64% connected with other women who had suffered pregnancy loss. Only 15% contacted mental health professionals and 1% contacted support associations, while as many as 75% attempted to distract themselves to cope with the loss (Séjourné et al., 2010). This finding runs counter to participants' endorsed rates of psychological distress, which would logically indicate a desire for increased mental health support. Alternatively, women from this French sample may have faced other barriers (e.g., stigma, or availability and/or affordability of care) to seeking support from mental health professionals regardless of their psychological distress or desire for treatment. Researchers call for additional attention provided to women who do not necessitate medical follow-up, as they may feel isolated in their challenges following pregnancy loss (Séjourné et al., 2010).

British women in the Nikcevic et al. (1998) study were assessed for chromosomal abnormalities at 10 to 14 weeks gestation and then underwent medical evacuation of their pregnancy. The median time for completing the questionnaires was 187 days (6.23 months) following the pregnancy loss. Importantly, 92% of the women reported having desired follow-up (i.e., psychosocial and emotional check-in) but only 30% were offered follow-up by their healthcare provider. Forty-five percent of the participants reported clinically elevated anxiety and 15% reported depression with no significant relationship between time since the pregnancy loss and anxiety, depression, or grief. Women who reported not having an opportunity to discuss their feelings at a follow-up visit following pregnancy loss reported higher levels of anxiety and depression. Most women (72%) believed that physicians should conduct follow-ups, 87% reported a strong desire to have more information about why their miscarriage happened, and 79% reported that their pregnancy loss experience was very stressful. Interestingly, even though women were provided with a pamphlet with contact information for additional support following their miscarriage, only 9% utilized this resource, potentially highlighting the importance of healthcare providers initiating contact for follow-up. Thirty six percent of women reported that they believed that emotional counseling would have been helpful and overall, women desired more information about the reason for their pregnancy loss and its implications, sensitivity and sympathy from healthcare professionals, and the acknowledgement that miscarriage qualifies as a trauma that medical providers frequently dismiss. Interestingly, no differences in levels of anxiety and depression were found between women who were provided with a follow-up and women who were not given the opportunity (Nikcevic et al., 1998). A possible explanation may be that women were not given adequate time or space to express their emotions. The authors note that this is inconsistent with some literature that suggests that follow-up is helpful for alleviating

psychological symptoms following miscarriage, perhaps indicating that the quality of follow-up requires further assessment. Additionally, French women who do not have other children and/or had poor experiences with healthcare services have also reported persistent depressive and grief symptoms well after miscarrying (deMontigny et al., 2017).

Additional qualitative research examined the experiences of 14 Irish parents (mothers and fathers) who experienced second-trimester miscarriage (e.g., usually between 12 to 20 weeks gestation; Cullen et al., 2017). Prior literature summarized by the authors has demonstrated the importance of individualized and sensitive care with health professionals following pregnancy loss. Interviews with women occurred between 7 and 23 months following their pregnancy loss. Parents overall reported empathetic and sensitive experiences with hospital staff, although some participants reported opposite experiences that resulted in added distress.

Rowlands and Lee (2010) studied Australian mothers who reported negative experiences with hospital staff following their miscarriages (gestational age unspecified) including receiving limited information and a lack of empathetic support. Interestingly, while none of the women in the sample had received treatment or felt they needed treatment for mental health problems, at least one of the nine participants would have liked to be offered counseling services. Several others reported wishing to have more emotional support following their miscarriage.

In an early influential study, Cordle and Prettyman (1994) examined psychological outcomes and perceptions of support among women in the United Kingdom who experienced early miscarriages (i.e., prior to 16 weeks gestation). The study examined experiences 12 weeks following the miscarriage and at a 2-year follow-up. Fourteen percent of the women in the sample reached out to their general practitioners for support after the miscarriage and only one subject reached out to a psychiatrist. Twenty eight percent of women reported being unsatisfied

with the psychological care that they received. Women who experienced anxiety were less likely to feel support from their partner, more likely to be upset by thoughts of the miscarriage, and more likely to have consulted with their physician regarding emotional problems. Twenty three percent of women reported a lack of psychological support at the time of the miscarriage and approximately 5% reported a lack of factual information and preparation for the pregnancy loss. The study highlights the lack of psychological support that women perceive, the need for more health professionals to provide clinical follow-up and support, and increased awareness in women's social support networks. The researchers suggest that psychological follow-up should be available to all women who experience a miscarriage.

**U.S. Findings and Literature Reviews.** Women in the U.S. as well as those captured by broader, cross-cultural literature reviews report similar experiences to cross-cultural samples. Baird et al., (2018) qualitatively studied 10 women 1 to 3 weeks following their miscarriage, finding mixed experiences from emergency room visits, including an overall lack of informational and emotional support, poor communication with hospital staff, and outpatient follow-up. In the case of a stillbirth where delivery is necessary, parents desire support in preparing for vaginal delivery, options and time when considering procedures/interventions, a balance of privacy and support from healthcare professionals, and tailored follow-up and post-delivery information (Ellis et al., 2016). Both parents and staff reported that they would prefer additional training, putting in place support systems/protocols, and continuity of care (Ellis et al., 2016). Prior research suggests that women may have poor experiences with healthcare professionals, such as feeling dismissed, not being provided with adequate information, and a general lack of emotional support (Lee & Slade, 1996). Giannandrea et al. (2013) highlight the importance of healthcare providers assessing reproductive and mental health histories to inform



treatment for women who have suffered pregnancy loss. Furthermore, they indicate that women should be monitored closely and have scheduled follow-up visits during their subsequent pregnancies, especially during times of potentially high vulnerability (i.e., GA of prior loss).

In a review of the literature surrounding any form of pregnancy loss, Harden (2018) notes that helping professionals need to recognize adverse outcomes beyond concrete diagnosable conditions such as anxiety and depression (i.e., shame, blame, failure, grief). Furthermore, rural communities may not have access to healthcare resources that could support them (i.e., grieving services specific to pregnancy loss), which may limit the opportunity for social connection and support (Harden, 2018). Development of mental health symptoms, access to care, and level of education all impact the grieving process (i.e., women with higher education experienced more depression). The authors also provide an argument for services being available to women regardless of the time that has passed since their pregnancy loss (Harden, 2018). They describe an expectation and pressure that mothers may experience to bounce back following their loss, as well as a pressure for shorter hospital stays, and while hospice care is typically available to women who experience a stillbirth or infant death, it is rarely offered to women with early miscarriages (Harden, 2018). Neugebauer et al. (1992) highlight the importance of follow-up by healthcare professionals even in cases of early term miscarriages and the loss of unwanted pregnancies, while Bicking Kinsey et al. (2015) note the importance of providers being aware of women's prior pregnancy losses and being open to discussing their experiences, as well as the potential role for mental health specialists, bereavement support groups, and increased awareness in public health and medical settings.

Athey and Spielvogel (2000) reviewed literature surrounding interventions following miscarriage. While most women report that having explanations for their miscarriage is

extremely important, one study found that only 36% of women felt that their follow-up with providers was adequate to provide them with desired information. In another study, 35% of women reported dissatisfaction with information provided and felt that their healthcare providers did not take their experiences seriously. Most women studied have reported a desire for follow-up around 2 to 3 weeks following miscarriage and those provided with follow-up care have endorsed the care as helpful. In one study summarized by Athey and Spielvogel (2000), women reported a desire for medical information about their miscarriage in order to increase the effectiveness of the intervention. Importantly, researchers have also indicated that screening for higher risk of psychological symptoms might help with targeted and intensive treatment for the most distressed subset of women. van den Akker (2011) notes that psychologists specializing in women's healthcare and couple's counseling following loss may be beneficial for men and women's psychological well-being and adjustment.

As previously mentioned, it is important to note that many women who experience pregnancy loss prior to 20 weeks gestation may not require medical visits (e.g., to evacuate their pregnancy) and therefore may not have contact with their healthcare provider or may not mention the pregnancy loss to their provider. Therefore, women likely rely on some combination of healthcare and/or social support following their pregnancy losses though more research is needed in this area.

### ***Social and Partner Support***

Alongside support provided by healthcare professionals, researchers have also explored the role of social support in negative maternal psychosocial outcomes. Cacciatore et al. (2009) found that while perceived family and healthcare support following stillbirth was important to psychological adjustment (e.g., anxiety and depression), these sources of support alone did not

significantly reduce symptoms, highlighting the importance of focusing on the full family system (e.g., partner and surviving children) when attempting to improve maternal psychological outcomes. Stirtzinger et al. (1999) found that low levels of social support, and greater partner and family conflict positively correlated with depression. Research conducted by Bicking Kinsey et al. (2015) examined the impact of maternal stress and social support (i.e., emotional/informational, tangible, and affectionate support and positive social interactions from any source) on the relationship between miscarriage and depression. The authors note that even though social support and stress did not change the relationship between miscarriage and depression, these variables were not measured specific to the miscarriage experience. Women may also believe that the social convention of not revealing pregnancy to friends and family prior to the end of the first trimester masks the prevalence of miscarriage among women thereby limiting access to support networks (Bellhouse et al., 2018). Women also report that they believe that decreasing broader social stigma and raising awareness of prevalence rates would ultimately result in less discomfort for family and friends and increase the availability of community support (Bellhouse et al., 2018). However, it appears that women believe that others cannot provide adequate support unless they too had experienced a pregnancy loss (Bellhouse et al., 2018). In the study by Bellhouse et al. (2018), social support providers seemed to struggle with providing empathetic support and demonstrated discomfort in discussing the subject with participants.

Some research supports the important role of partner support on maternal psychological adjustment. Francois (2018) found that among African American women who suffered stillbirth, those who experienced good relationships with their partners reported lower symptoms of depression. Among Swedish women, Surkan et al. (2009) found a significant increase in

maternal depressive symptoms following stillbirth if male partners were unwilling to discuss the event. Bellhouse et al. (2018) examined Australian women between the ages of 18 and 50 who had experienced at least one miscarriage (prior to 20 weeks gestation) between the last 3 months and 10 years prior. Women in this qualitative study reported their partners as their greatest sources of support and some positive emotional and physical support from friends and family. Campillo et al. (2017) attempted a systematic review of the literature regarding non-medical interventions provided to women who had suffered a prior miscarriage (within 24 weeks gestation) and were subsequently pregnant. Unfortunately, among the over 4,000 articles screened, no randomized control trials met the review's inclusion criteria, demonstrating a paucity of research on psychosocial interventions for this population.

### **Present Study Objectives**

The aims of the present study are multifaceted. While prior literature supports the relationship between pregnancy loss and psychological and social outcomes, few recent studies have explored the complex and multivariate relationships between social and institutional support on numerous, broad psychosocial outcomes. Additionally, the current project seeks to clarify the prevalence rates and persistence of psychological outcomes among women suffering from early and late-term pregnancy loss (Athey & Spielvogel, 2000; Bhat & Byatt, 2016). The present study seeks to also clarify the relationship between GA at time of loss, the provision of supports, and the presence of various psychological outcomes, as research to date has resulted in mixed findings with regard to time of loss and psychosocial outcomes (Swanson et al, 2007). A better understanding of this relationship would result in clarification of which types of support and other psychosocial interventions would be most beneficial based on women's psychological experiences corresponding to time of loss. This would assist clinicians, physicians, family, and

friends in better understanding the unique needs of these women. In addition, there is a paucity of research examining the relationship among these variables via quantitative, psychometrically sound measurements that have been validated with or used with this population previously (see Campbell-Jackson & Horsch, 2014). The present project also seeks to include measures that are accessible to researchers and clinicians with regard to both cost and time to administer. A goal is that the measures used in this study may be feasibly administered in clinical settings in which there is a desire to assess for perceived support and psychological outcomes among individuals having suffered pregnancy loss.

In addition, the project seeks to more clearly elucidate the relationship between gestation at the time of pregnancy loss, and the most beneficial types of support for the most commonly experienced psychological outcomes in this population. The present study seeks to investigate these relationships among a broad U.S. sample to reflect population diversity, a factor that has been lacking in a large amount of pregnancy loss literature (see Campbell-Jackson & Horsch, 2014).

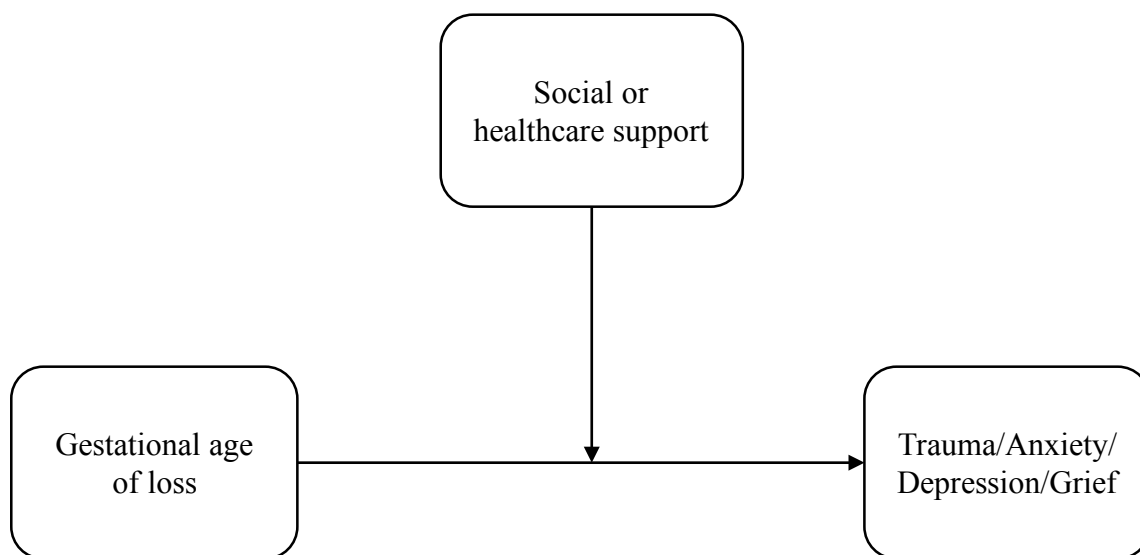
### **Proposed Statistical Analyses and Hypotheses**

In order to examine the proposed moderation relationships, statistical analyses will be completed in the Statistical Package for Social Sciences (SPSS), version 26 (International Business Machines (IBM Corps, 2020). All regression assumptions (i.e., casewise diagnostics to eliminate outliers ( $\pm 3$  standard deviations), examination of scatterplots to assess linearity and restriction of range, assessment of frequency histograms for normality of distribution, investigation of multicollinearity via intercorrelations and variance inflation factors, and examination of residuals for homoscedasticity and normality of residuals) will be analyzed prior to conducting primary statistical analyses. The frequencies of sociodemographic variables and

means and standard deviations for primary predictor and outcome variables will be computed to describe the current sample. Moderation models will be tested using hierarchical multiple regression. The first step will include any covariate(s) that need to be added to the model, the second step will include the two main effects, and the third step will include the interaction term. Each variable will be centered, and an interaction term will be computed by multiplication. The regression equations include: Step 1 anxiety (or) depression (or) trauma (or) grief (y) = covariate(s) ( $x_1$ ) assuming 1 covariate, though up to three will be added); Step 2 anxiety (or) depression (or) trauma (or) grief (y) = GA at time of loss ( $x_2$ ) + social (or) healthcare support ( $x_3$ ); and Step 3 anxiety (or) depression (or) trauma (or) grief (y) = GA at time of loss x social (or) healthcare support ( $x_4$ ). For parsimony, each variation of the equation is noted by (or) notation. The statistical significance of  $R^2_{\text{Change}}$  from Step 1 to 2 and the interaction term will be examined.

**Figure 2**

*Moderation Model*



*Note.* This theoretical model represents the hypothesized relationship among proposed variables in Hypotheses 1 and 2.

### ***Hypotheses 1a-d***

Increased GA at the time of loss will be related to greater psychological symptoms up to 2 years following the loss. Additionally, there will be a significant interaction between GA and perceived social support such that women with greater GA and less social support will report more psychological symptoms (i.e., (a) depression, (b) grief, (c) trauma, and (d) anxiety) up to 2 years following pregnancy loss.

Analysis: We will conduct a moderation analysis in which perceived social support will moderate or explain the relationship between GA at time of pregnancy loss and psychological outcomes. GPower (version 3.1; Faul et al., 2007) was used to conduct an *a priori* power analysis for Hypotheses 1 and 2. Parameters for the power analysis included linear multiple regression with up to six predictors (independent variable, moderator, interaction term, and up to three possible covariates). This included a medium effect size ( $f^2=0.15$ ), a two-tailed  $p$ -value of .05, and power of .80. Effect size for the power analyses was determined by utilizing conventions in the field (e.g., Cohen, 2013) and extant literature on pregnancy and maternal outcomes (e.g., Tubay et al., 2019). Unfortunately, systemic reviews of pregnancy loss literature (e.g., Campbell-Jackson & Horesh, 2014) note the lack of power analysis reporting in the field. Results suggested that a sample of 98 participants was sufficient for the most complex analyses tested in Hypotheses 1 and 2.

### ***Hypotheses 2a-d***

Increased GA at the time of loss will be related to greater psychological symptoms up to 2 years following the loss. Additionally, there will be a significant interaction between GA and perceived healthcare support such that women with greater GA and less social support will report

more psychological symptoms (i.e., (a) depression, (b) grief, (c) trauma, and (d) anxiety) up to 2 years following pregnancy loss.

Analysis: We will conduct a moderation analysis in which perceived healthcare support will moderate or explain the relationship between GA at time of pregnancy loss and psychological symptoms.

### ***Hypothesis 3***

Women who experienced a miscarriage (prior to 20 weeks gestation) will report lower levels of healthcare and social support than women who experienced a stillbirth (20 weeks gestation or later).

Analysis: We will conduct Independent samples *t*-tests to examine the differences between the two loss groups (i.e., miscarriage and stillbirth). Another *a priori* power analysis in GPower (version 3.1; Faul et al., 2007) suggested that a total sample size of 128 is needed to conduct Independent Samples *t*-tests with a medium effect size ( $d=0.5$ ), two-tailed *p*-value of .05, and equal group sizes in order to achieve a power of .80. Based on these power analyses and those conducted for the moderation models described in Hypothesis 1 (see above), the present project seeks to collect data from approximately 130 MTurk participants, which will be used to test these respective hypotheses.

### ***Hypothesis 4***

Beyond group differences (i.e., miscarriage and stillbirth), we hypothesize that increased GA at the time of loss will be positively related to social and healthcare support.

Analysis: We will conduct Spearmans's rank order correlations for this analysis. An additional *a priori* power analysis in GPower (version 3.1; Faul et al., 2007) suggested that a



total sample size of 67 is needed to conduct this correlation analysis in order to achieve a power of .80, with a medium effect size of .3.

### ***Follow-up/Probing Analyses***

If the moderation models are statistically significant, follow-up analyses will be conducted to further examine the interaction effects. Specifically, we are interested in examining the relationship between GA at loss and psychological outcomes at 3 levels of social and/or healthcare support (16<sup>th</sup>, 50<sup>th</sup>, and 84<sup>th</sup> percentiles).

Analysis: Simple slopes analyses utilizing the pick-a-point technique will be used to probe statistically significant interactions (Hayes & Matthes, 2009; Preacher et al., 2006). In particular, the 50<sup>th</sup> percentile score of social and/or healthcare support score will serve as a “medium” level of support, 84<sup>th</sup> percentile will serve as a “high” level, and 16<sup>th</sup> percentile will serve as a “low” level.

## **Chapter II: Methodology**

### **Participants**

Women were eligible to participate in the study if they suffered a pregnancy loss at any point during a prior pregnancy within the last 2 years. Extant literature has noted great variability in the timeframe for which psychological outcomes are measured following pregnancy loss, with some studies beginning data collection as early as 1 week following the loss (Swanson et al., 2007) and others sampling participants who experienced pregnancy loss up to 10 years prior (Bellhouse et al., 2018). In general, it appears that most studies reviewed above noted timeframes between 1 and 2 years following pregnancy loss (e.g., Bhat & Byatt, 2016; Cullen et al., 2017; Lee & Slade, 1996; Stirtzing et al., 1999; Swanson et al., 2007), which captures one or more anniversaries of the loss. In addition, a timeframe of 2 years captured relatively similar healthcare experiences with regard to institutional structure and policy. In order to determine validity of responses, an open-ended screening question asked women how many days ago they experienced their most recent pregnancy loss. If women responded with any value greater than 730 days (2 years), their data was not utilized for the present project. An additional screening question at the beginning of the survey was used to balance enrollment. For example, once approximately 65 participants with pregnancy loss prior to 20 weeks gestation participated, the researcher was able to switch the survey programming to screen out participants who endorsed early pregnancy loss and allow those with late pregnancy loss (i.e., after 20 weeks gestation) to participate. Participants were also required to be able to read in English and have lived in and received healthcare surrounding their pregnancy loss in the United States. Finally, only female born women were permitted to participate in the study, therefore an additional screening question asked whether the participant was male or female, and those marking male were opted out from

further participation. The present study excluded women who lost a pregnancy by way of planned aborted pregnancy. Women who elected to abort their pregnancies may have experienced differences in healthcare, and social and institutional support/stigma, and therefore may have exhibited different psychological adjustment. In addition, most of the literature reviewed above differentiates between spontaneous pregnancy loss (i.e., miscarriage or stillbirth) and planned abortions as demonstrated by their own inclusion and exclusion criteria. If exclusion criteria were not met, participants were recruited through MTurk to complete a Qualtrics survey.

## **Measures**

Variables included sociodemographic descriptors, GA at the time of pregnancy loss, perceived healthcare support, social support, trauma, anxiety, depression, and grief. Potential covariates included presence of multiple pregnancy losses, and presence of other children in the home, age at time of loss, income, and insurance at the time of loss. All women were asked to think of their most recent (within the last 2 years) pregnancy loss when answering questions. If a woman had experienced more than one pregnancy loss within the last 2 years, she was asked to keep in mind the loss that she felt was most salient within that timeframe, which is consistent with the assessment of trauma across various measures of PTSD (e.g., PTSD Checklist for *DSM-5* with Criterion A; Weathers et al., 2013a).

### ***Sociodemographic Questionnaire***

The study's sociodemographics questionnaire assessed for a variety of participant information at the time of miscarriage (e.g., age, ethnicity, race, years of education, annual income, religious/spiritual identity, any type of insurance coverage, and state and zip code of residence, assessed via zip code, to determine rural or urban status; See Appendix A). Questions with regard to race and ethnicity were adapted from the prospective United States 2020 Census

questionnaire in order to collect data in a comprehensive and up-to-date manner (United States Census Bureau, 2020). The question regarding insurance coverage was adapted from the most recent Pregnancy Risk Assessment Monitoring System (PRAMS) questionnaire (CDC, 2016b, Phase 8, Standard Questions, p. 14).

### ***Gestational Age of Pregnancy Loss and Reproductive History***

Gestational age at the time of the pregnancy loss was determined by participants' retrospective reporting of when their pregnancy ended in terms of week of gestation. The reproductive history questions assessed the number of prior pregnancy losses (excluding elected abortions) the participant has suffered; parity (i.e., number of pregnancies carried to at least 20 weeks gestation regardless of number of fetuses or pregnancy outcomes); gravidity (i.e., number of times a woman has been pregnant regardless of pregnancy outcome); time since pregnancy loss (in days); number of live children living with woman at the time of the pregnancy loss; use of any reproductive assistance technology; whether the lost pregnancy was planned; premorbid mental health diagnoses; whether the woman was currently pregnant; whether the woman had given birth to a child since the most recent loss; type of healthcare organization used (e.g., community clinic, private medical office, major hospital, etc.); use of online support groups following loss; whether the woman knew what caused/contributed to her pregnancy loss; and whether the woman blamed herself for the loss (See Appendix B). The questions regarding the use of reproductive assistance, the type of facility used following pregnancy, and the number of children living in the home were adapted from the PRAMS most recent questionnaire from 2016 (Phase 8, Standard Questions, p. 1, 14, and 30). Definitions for parity and gravidity were retrieved from the ACOG webpage's link to reVITALize Obstetric Data Definitions (2014), endorsed by American Academy of Family Physicians, American College of Nurse-Midwives,

ACOG, Association of Women's Health, Obstetric and Neonatal Nurses, and Society for Maternal-Fetal Medicine. Additional questions regarding reproductive history were adapted from some of the literature reviewed above (e.g., Bellhouse et al., 2018; Giannandrea et al., 2013; Stirtzinger et al., 1999; Tsartsara & Johnson, 2006). While some of the questions from the Reproductive History Questionnaire were used in hypothesized analyses (see hypotheses above), many were only used to describe the samples to determine generalizability of findings and to determine how the present study sample compared and contrasted with samples used in prior literature.

### ***Grief***

The Perinatal Bereavement Grief Scale (PBGS; see Appendix C; Ritsher & Neugebauer, 2002) is a 15-item questionnaire assessing symptoms of yearning and grief related to pregnancy loss on a rating scale examining the past week (i.e., rarely or none of the time (less than 1 day), some of the time (1 to 2 days), a moderate amount of time (3 to 4 days), and most or all of the time (5 to 7 days)) and coded from 1 to 4 points, respectively (Ritsher & Neugebauer, 2002). Total scores range from 15 to 60 points, with higher scores indicating a greater degree of yearning and grief. Only item 8 is reverse coded. Internal consistency reliability was high when women were assessed 6 months following their loss ( $\alpha=.89$ ), and test-retest reliability was .69 between 2 and 6 weeks after the loss, .67 between 6 weeks and 6 months after the loss, and .48 between 2 weeks and 6 months (Ritsher & Neugebauer, 2002). Divergent validity was also strong with correlation coefficients between the CES-D and PBGS ranging from .32 and .51, and exploratory factor analysis, using oblique rotation and specifying two factors, determined two distinct factors with all 20 CESD items on one factor and all 15 PBGS on another factor (Ritsher

& Neugebauer, 2002). In the present sample of 149 participants, the PBGS demonstrated good reliability (Cronbach's  $\alpha=.88$ ).

### ***Depression***

To assess for depressive symptoms, participants were administered the Center for Epidemiological Studies Depression Scale-Revised (CESD-R; Eaton et al., 2004), a 20-item questionnaire with a Likert scale (i.e., rarely or none of the time (less than 1 day), some or a little of the time (1 to 2 days), occasionally or a moderate amount of time (3 to 4 days), most or all of the time (5 to 7 days)), or nearly every day for 2 weeks to assess for a variety of symptoms related to core depressive symptomology (see Appendix D). For example, the questionnaire assesses constructs of sadness/dysphoria, anhedonia, appetite, sleep, thinking/concentration, guilt/worthlessness, tired/fatigue, movement/agitation, and suicidal ideation (The Center for Innovation Public Health Research, n.d.). Prior research on the CESD (Radloff, 1997) suggests an administration time between 5 and 10 minutes (Sharp & Lipsky, 2002), and although duration for administration has not been specified for the CESD-R, it is likely similar to the CESD as both measures contain 20 items.

The measure is scored by summing the total points across the 20 items such that rarely or none of the time (less than 1 day) is weighted as 0 points, some or a little of the time (1 to 2 days) is weighted as 1 point, occasionally or a moderate amount of time (3 to 4 days) is weighted as 2 points, and most or all of the time (5 to 7 days) is weighted as 3 points for a possible score ranging from 0 to 60 points (The Center for Innovation Public Health Research, n.d.). The revised version, also includes the option of nearly every day for two weeks and is scored as 3 points to remain consistent with the scoring of the first version of the measure. There are no reverse scored items

on the CESD-R (Eaton et al., 2004). For the present study's primary analyses, the total score was used as a continuous variable.

The CESD-R (Eaton et al., 2004) was revised from the original version to match the updated *Diagnostic and Statistical Manual, 4<sup>th</sup> edition (DSM-IV*; APA 1994). Although the field currently uses the *DSM-5* (APA, 2013), core criteria for a Major Depressive Disorder (e.g., core criteria) did not change between the two editions. In addition, the CESD (Radloff, 1977) was used to distinguish between depression and grief following pregnancy loss and was therefore selected to be administered alongside the Perinatal Grief Bereavement Scale (PGBS; Ritsher & Neugebauer, 2002). In a pilot test on household residents and inpatients, the 20-item CESD-R demonstrated strong reliability ( $\alpha=.96$ ; Eaton et al., 2004, Chapter 11, p. 367). In an additional large community sample, the CESD-R also demonstrated strong reliability ( $\alpha=.923$ ; van Dam & Earleywine, 2011). Additional research suggests internal consistency alpha estimates between .85 to .90, split-half alphas between .77 to .92, and test-retest between .51 to .67 (Bloom et al., 2013). Overall, the multiple validation studies suggest strong reliability and validity of the CESD-R (Eaton, et al., Chapter 11, p. 367). Although the CESD-R has not been validated among obstetric samples, the CESD has been widely used in research of women throughout the perinatal period (e.g., Sharp & Lipsky, 2002; Zuckerman et al., 1989). Among perinatal samples, pooled sensitivity and specificity estimates for a diagnosis of Major Depressive Disorder with the CESD and CESD-R indicated ranges between 84 to 90% and 78 to 80%, respectively (Owora et al., 2016). In the present sample of 149 participants, the CESD-R demonstrated excellent reliability (Cronbach's  $\alpha=.94$ ).

## *Anxiety*

The Perinatal Anxiety Screening Scale (PASS) is a 31-item self-report questionnaire used to screen for a broad range of anxiety symptoms in perinatal women and takes approximately 6 minutes to complete. (See Appendix E; Somerville et al., 2014). The PASS has been validated for use in a variety of settings (e.g., antenatal clinics, inpatient and outpatient hospitals, and mental health treatment settings) among perinatal populations. The PASS includes four factors: Factor 1 (Acute Anxiety and Adjustment), Factor 2 (General Worry and Specific Fears), Factor 3 (Perfectionism, Control and Trauma), and Factor 4 (Social Anxiety). The four scales and total score have high internal consistency (Cronbach's  $\alpha$  = .86 to .96), and the measure has demonstrated adequate test-retest reliability among antenatal and postnatal women (Pearson's product moment correlation  $r$  = .74; Somerville et al., 2014). In a study examining the impact of a mindful self-compassion intervention on over 100 pregnant Australian women's depression, anxiety, and stress, the authors found the PASS to be highly reliable measure of anxiety in their sample (Cronbach's  $\alpha$  = .95; Townshend et al., 2018). As scales are moderately correlated (Pearson's product moment correlation  $r$  = .40 to .51), they capture unique information regarding perinatal anxiety (Somerville et al., 2014). The PASS total score is significantly correlated with other common measures of anxiety (e.g., the Depression Anxiety Stress Scale (DASS) Anxiety and Stress scales (Pearson's product moment correlation  $r$  = .78 and .81, respectively), anxiety scale of the Edinburgh Postnatal Depression Scale (EPDS; Pearson's product moment correlation  $r$  = .74) and the State-Trait Anxiety Inventory (STAI) State (Pearson's product moment correlation  $r$  = .75) and Trait (Pearson's product moment correlation  $r$  = .83), which support convergent validity (Somerville et al., 2014). The PASS's sensitivity for the detection of anxiety



disorder diagnoses (68%) was greater than that of the STAI-S (64%) and EPDS-A (36%; Somerville et al., 2014).

While the PASS has not been widely used, or validated among pregnancy loss samples, it is one of the most psychometrically sound measures of perinatal anxiety that is free for use and appropriate in clinical settings (i.e., DASS, EPDS, and STAI are expensive and are intended for research purposes). As items 1 (Worry about the baby/pregnancy) and 2 (Fear that harm will come to the baby) include language that appears to assume successful live birth of the baby, minor modification was made to ensure the appropriateness of the full measure for pregnancy loss samples. Specifically, item 2 was modified to read “fear of harm to fertility/ability to have a baby” to generalize the symptom of fear to the woman’s ability to conceive and maintain a successful pregnancy, and remove the specifier to an infant. Item 2 loads onto the Excessive Worry and Specific Fear subscale, therefore, in order to maintain the reliability of the overall measure, the modification to the question includes a specific rather than a general fear. As women may have continued to worry about their baby or pregnancy, the language of item 1 was be maintained. The current study used the total global anxiety score as a continuous measure of post-pregnancy loss anxiety. In the present sample of 149 participants, the PASS demonstrated excellent reliability (Cronbach’s  $\alpha=.96$ ).

### ***Trauma***

To assess for symptoms of trauma, the PTSD Checklist for *DSM-5* Standard Form (PCL-5; Weathers, et al., 2013b) was administered (see Appendix F). The questionnaire is a 20-item self-report checklist that corresponds to symptoms of PTSD from the *DSM-5* and takes between 5 and 10 minutes to complete. Items are rated on a scale of 0 to 4 for each symptom, with 0 indicating “not at all” experiencing the symptom, 1 indicating “a little bit,” 2 indicating

“moderately,” 3 indicating “quite a bit,” and 4 indicating “extremely.” The present project utilized the form without Criterion A items or the extended Life Events Checklist, as inclusion criteria required the presence of a traumatic event (e.g., loss of pregnancy as an example of exposure to death; APA, 2013). While a cutoff score of 33 (total score ranges from 0 to 80) is suggested to determine the possible presence of PTSD, the present study used the PCL-5 as a continuous rather than categorical measure of trauma symptoms (U.S. Department of Veterans Affairs; 2016). Among two samples of trauma exposed college students, the PCL-5 demonstrated excellent internal consistency (alphas between .94 and .95), test-retest reliability within 1 week ( $r=.82$ ), and convergent (zero-order correlation  $r$  values between .84 and .85 on PCL, Posttraumatic Distress Scale, and Detailed Assessment of Posttraumatic Symptoms–Posttraumatic Stress Scale) and divergent validity (zero-order correlation  $r$  values between .31 and .60 for depression, mania, and antisocial features as measured by the Personality Assessment Inventory; Blevins et al., 2015). Additionally, Blevins et al. (2015) found diagnostic Cronbach’s alphas for sensitivity ranging between .66 and .78 and between .95 and .97 for specificity. A meta-analysis of postpartum trauma symptoms by Cook et al. (2018) suggests that previous versions of the PCL-5 (e.g., PCL-C and PCL) have been widely used with perinatal populations. Among Spanish speaking women, the PCL-C demonstrated adequate to excellent internal consistency (Cronbach’s  $\alpha=.90$ ), sensitivity (Cronbach’s  $\alpha=.86$ ), and specificity (Cronbach’s  $\alpha=.63$ ), and suggested a cutoff score of 26 (Gelaye et al., 2017). In a sample of Israeli women who suffered from pregnancy loss, the PCL-5 demonstrated strong internal consistency reliability (Cronbach’s  $\alpha=.94$ ; Horesh et al., 2018), while other studies have utilized the PCL-5 among perinatal samples but not reported psychometric performance in their samples (Baas et

al., 2017; Byrne et al., 2017). In the present sample of 149 participants, the PCL-5 demonstrated excellent reliability (Cronbach's  $\alpha=.96$ ).

### ***Perceived Healthcare Support***

The Short-Form Patient Satisfaction Questionnaire (PSQ-18) is an 18-item self-report measure that broadly assesses satisfaction with healthcare services (see Appendix G; Marshall & Hays, 1994). Items are rated on a five-point scale (1=strongly agree, 2=agree, 3=uncertain, 4=disagree, 5=strongly disagree). Total administration time is approximately 3 to 4 minutes (Marshall & Hays, 1994). The questionnaire includes seven subscales: General Satisfaction (Items 3 and 17); Technical Quality (Items 2, 4, 6, and 14); Interpersonal Manner (Items 10 and 11); Communication (Items 1 and 13); Financial Aspects (Items 5 and 7); Time Spent with Doctor (Items 12 and 15); Accessibility and Convenience (Items 8, 9, 16, and 18). Questions 1, 2, 3, 5, 6, 8, 11, 15, 18 are reversed scored and items in each subscale are averaged together to yield seven subscale scores. Unfortunately, no total score can be calculated across all domains.

The literature reviewed for the present study reveal several themes regarding women's satisfaction with healthcare services following pregnancy loss, highlighting particular areas for assessment (e.g., cost, location/access, and timing of services, referral for psychological/emotional support, informational support, timely follow-up, provider sensitivity/sympathy/empathy, communication with healthcare staff, feeling acknowledged/heard, continuity of care, and clear protocols; Athey & Spielvogel, 2000; Baird, et al., 2018; Bicking Kinsey et al., 2015; Cordle & Prettyman, 1994; Ellis et al., 2016; Giannadrea et al., 2013; Harden, 2018; Lee & Slade, 1996; Neugebauer et al., 1992; Nikcevic et al., 1998; Phillippi, 2009; Rowlands & Lee, 2010; Séjourné et al., 2010). While no single subscale of the PSQ-18 captures all of these areas, the Technical Quality scale appeared to touch on more of

these themes than the other scales (e.g., continuity of care, provider knowledge, thoroughness, and general provider ability to provide care). For the present study, the entire PSQ-18 questionnaire was administered to participants. However, only the Technical Quality subscale was used for primary analysis. Descriptive statistics of the sample included mean scores and standard deviations on the remainder of the PSQ-18 subscales in order to provide more detailed information about the sample.

In a large sample ( $n=2,197$ ; 60% women), internal consistency estimates for the PSQ-18 were adequate (alphas between .64 and .77; Marshall & Hays, 1994). The subscales show fairly high correlations ( $r=.23$  to  $.74$ ), indicating high overlap among the seven subscales. In a systematic review of the literature surrounding women's satisfaction with healthcare services during pregnancy and childbirth, one study was found to use a 16-item version of the PSQ-18 with a Cronbach's alpha of .95 (Macpherson et al., 2016). In a study of vulnerable women with newborns, a 10-item version (excluding the Technical Quality and Financial Aspects subscales) of the PSQ-18 was administered yielding an overall Cronbach's alpha of .84 (Armstrong et al., 1999). Additional studies have also utilized the PSQ-18 but did not report psychometric performance of the questionnaire in their perinatal samples (e.g., Rahman et al., 2016; Tubay et al., 2019). Marshall and Hays (1994) original sample included those suffering from hypertension, diabetes, heart disease, and depressive symptoms, demonstrating valid use across a variety of samples in general healthcare. High correlations between the original PSQ-III subscales and those of the PSQ-18 (Pearson's product moment correlation  $r=.83$  to  $1.00$ ) provide support for validity to the original, larger measure (Marshall & Hays, 1994). In the present sample of 149 participants, the PSQ-18 General Satisfaction, Technical Quality, Interpersonal Manner, Communication, Financial Aspects, Time Spent with Doctor, and Accessibility and Convenience

demonstrated adequate to very good reliability, respectively (Cronbach's  $\alpha$  = .60, .83, .74, .56, .72, .78, and .77).

### ***Perceived Social Support***

The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item questionnaire that assesses perceptions of social support from friends, family, and significant others (see Appendix H; Zimet et al., 1988). The Shirley Ryan Ability Lab estimates a questionnaire completion time of 5 to 10 minutes (2015). Items are rated on a seven-point scale (1=very strongly disagree, 2=strongly disagree, 3=mildly disagree, 4=neutral, 5=mildly agree, 6=strongly agree, and 7=very strongly agree). Mean scores may be calculated for each source of support (i.e., family, friends, or significant other) or an average total scale score may be used for analyses. The present study used the total scale score to capture broad perceived social support. As suggested by prior research (Zimet et al., 1990), items related to support from significant others were reworded to state "I have a significant other" instead of "special person" for clarity. In the initial validation study, 136 female and 139 male undergraduates were examined to determine reliability and validity.

Factor analysis supported the three distinct factors, and the MSPSS demonstrated strong internal consistency (Cronbach's alphas of .91, .87, and .85, for Significant Other, Family, and Friends subscales, respectively and .88 for total score) and strong test-retest reliability 2 to 3 months after the initial screening ( $r$  of .72, .85, and .75 for Significant Other, Family, and Friends subscales, respectively and .85 for total score; Zimet et al., 1988). A follow-up study of 265 pregnant women receiving prenatal care confirmed the original factor structure of the measure and demonstrated excellent internal consistency (Cronbach's alphas of .90, .94, .90, and .92 for Family, Friends, Significant Other, and Total subscales, respectively; Zimet et al., 1990).

While James and Kristiansen (1995) administered the MSPSS to women who experienced miscarriage, they did not report the psychometric performance of the measure within their sample. Validity for the measure's Family and Significant Other subscales were demonstrated in the original study by Zimet et al. (1988). Among the pediatric resident sample, multivariate analysis of variance (MANOVA) demonstrated that married residents reported statistically significantly greater support from a significant other as compared to single residents ( $F(1,46)=16.50, p<.001$ ). In addition, among the adolescent sample, MANOVA analysis revealed a positive linear trend between youths' level of sharing with their mothers and perceived family support ( $F(1,68)=34.47, p<.001$ ; Zimet et al., 1988). In both analyses of subscale validity, only the subscale in question was statistically significantly related to the comparison (i.e., marital status and sharing with mothers, respectively). In the present sample of 149 participants, the MSPSS total score demonstrated excellent reliability (Cronbach's  $\alpha=.91$ ).

### ***Covariates***

Covariates were included in the moderation models if they were statistically significantly correlated with both the primary predictor and the outcome variable for each respective model. Theoretically, this criteria for covariate inclusion was made based on the use of moderation models for primary analyses. Specifically, as the proposed relation between the predictor and outcome variables depended on the level of the moderator, we sought to control for variables that could confound the relation between predictor and outcomes. Thus, it was suspected that covariates would be related to both the main independent and the dependent variables. Some extant literature that has investigated pregnancy loss have used similar inclusion criteria (e.g., Bicking Kinsey et al., 2015; Robertson Blackmore et al., 2011). An additional possible covariate considered was rural versus urban geographic location. These variables may have been related to

the quantity and quality of healthcare women receive, as well as their willingness and ability to report on early-term pregnancy losses. However, these possible covariates were only be included if sample sizes for comparisons were reasonably large. As indicated by the *a priori* power analyses for an Independent samples *t*-test above, a total sample size of approximately 130 participants was required to run *t*-test analyses, with 65 participants in each group. Thus, geographic location was only to be included if we were able to achieve 65 participants from urban and 65 participants from rural settings. Given the large number of possible covariates, up to three could have been included in any single model. If more than three covariates were correlated with the predictor and outcome variables, the three most robustly related covariates were to be selected, based on the strength of the correlation.

**Premorbid Mental Health Diagnoses.** At least one prior study (Athey & Spielvogel, 2000) reviewed above examined the role of emotional functioning/presence of mental health diagnoses prior to pregnancy loss, as research demonstrates that a history of mental health problems serve as a risk factor for later emotional dysfunction. Therefore, the present study included premorbid mental health diagnoses as a possible covariate. This variable was measured by question 8 of the Reproductive History Questionnaire (see Appendix B).

**Time Since Pregnancy Loss.** As the literature reviewed above notes, research has captured variability in the time since pregnancy loss that symptoms are measured (e.g., deMontigny et al., 2017). Retrospective reporting may vary based on how long ago women experienced their most salient loss in the last 2 years, therefore, the time since the pregnancy loss was included as a possible covariate and measured by question 3 on the Reproductive History Questionnaire (see Appendix B).

**Presence of Multiple Losses.** Prior literature suggests that the presence of multiple pregnancy losses may significantly influence women's psychological adjustment to additional pregnancy loss (Bergner et al., 2008; Bhat & Byatt, 2016; Giannandrea et al., 2013; Robertson Blackmore et al., 2011; Stirtzinger et al., 1999; Tavoli et al., 2018). Therefore, the present study examined the total number of multiple pregnancy losses (excluding planned abortion) as a possible covariate. This was measured by question 2 of the Reproductive History Questionnaire (see Appendix B).

**Presence of Other Children in the Home at Time of Loss.** Although some variability exists, several of the studies reviewed above note the possible confounding factor of the presence of other children in the home at the time of pregnancy loss, such that women may experience buffering against worse psychological adjustment or no effect at all (Athey & Spielvogel, 2000; Bhat & Byatt, 2016; Neugebauer et al., 1992; Stirtzinger et al., 1999; Tavoli et al., 2018). Therefore, the number of other children in the home at the time of pregnancy loss was considered as a possible covariate and was measured by question 6 of the Reproductive History Questionnaire (see Appendix B).

**Age at Time of Loss.** Prior literature also suggests that the age of the woman at the time of her pregnancy loss may impact psychological adjustment, with considerable variability across research findings (Athey & Spielvogel, 2000; Bhat & Byatt, 2016; Neugebauer et al., 1992; Robertson Blackmore et al., 2011; Stirtzinger et al., 1999). These studies reported age ranges of about 23 to 35 years, 23 to 26, or categories of younger than 30 or older than 30 years of age. The present study examined maternal age as a continuous variable, consistent with extant literature. Therefore, age of the participant was be considered as a possible covariate and was measured by question 1 of the Sociodemographic Questionnaire (see Appendix A).



**Income.** Giannandrea et al. (2013), Robertson Blackmore et al. (2011), and Séjourné et al. (2010) suggest that income or affordability of care may be related to women's access to healthcare resources. Therefore, approximate annual household income as measured by question 3 of the Sociodemographic Questionnaire (see Appendix A) was considered as a possible covariate in the primary analyses.

**Insurance Coverage.** As mentioned above, some researchers suggest that affordability of care may serve as a barrier to services, which may affect women's perceptions of healthcare support (Giannandrea et al., 2013; Robertson Blackmore et al., 2011; & Séjourné et al., 2010). Therefore, along with income, insurance coverage at the time of pregnancy loss was considered as a possible covariate. This variable was measured by question 4 of the Sociodemographic Questionnaire (see Appendix A).

## **Procedures**

### ***Privacy and Confidentiality***

In order to protect participant confidentiality and privacy, the online surveys were not linked to identifying information. MTurk allows for anonymous participation. To inform participants of rights, they were asked to read a consent form prior to beginning the survey that required a forced response in order to proceed (see Appendix J).

### ***Recruitment***

The present project recruited participants from Amazon's Mechanical Turk (MTurk). The study's purpose, informed consent, benefits of participation (e.g., incentives, self-awareness), foreseeable risks (e.g., discomfort, reporting mandates on imminent harm), and freedom to skip questions or withdraw without penalty was included at the beginning of the surveys. The survey required a forced response to agree to the consent form prior to proceeding with the study. For

the collection of miscarriage data, the title of the study was presented as Women's Physical and Emotional Health. However, in order to increase specificity and target women who suffered a stillbirth, the title of the study was changed to Late Term Pregnancy Loss and Emotional Outcomes during stillbirth data collection (see Appendix K).

### ***MTurk Participation***

MTurk is an internet platform that allows for broad data collection from voluntary participants reaching across the globe. Research suggests that MTurk participants offer sociodemographic diversity to researchers who may not be available to them via convenience sampling, allow for lower compensation costs as MTurk participants are typically paid less than those from other recruitment methods, and due to the availability of 24/7 data-collection, often allows for more efficient data collection (Buhrmester et al., 2017). Additionally, although MTurk workers are paid less for their participation, research suggests that paying participants significantly more may influence intrinsic motivation to participate in research projects and does not necessarily result in higher quality work/results (Buhrmester et al., 2017; Mason & Suri, 2012). Researchers are able to create surveys through online platforms such as Qualtrics (Buhrmester, Kwang, & Gosling, 2011) and ultimately link this survey to the MTurk website for online participation. To pilot the survey on MTurk and to avoid increased costs of the recruitment of large sample sizes, batches of 10 surveys at a time were posted to MTurk.

To help verify that participants were women who have experienced pregnancy loss, participants chose the appropriate sex in order to begin the survey and must have answered coherently to the open-ended questions provided throughout the survey, with special attention to the reproductive history questionnaire. Participants whose answers are nonsensical (e.g., reported 0 pregnancy losses, reporting greater than 40 weeks when asked about age of loss, responding 0

to how long ago the pregnancy loss occurred, etc.), were excluded from data analyses and did not receive compensation.

To address attention issues, participants were required to have at least a 95% approval rating on MTurk and have completed at least 100 prior surveys. In order to facilitate data collection, the number of completed surveys was dropped to 50 for the stillbirth group. In addition, the survey included 14 open-ended questions that required participants to attend and actively respond while taking the survey (Buhrmester et al., 2017; see questions highlighted in yellow in the Appendices). In addition to the consent form, potential participants were asked to answer six Qualification Questions in order to determine eligibility (see Appendix I). If participants passed all the Qualification Questions, they read a short set of instructions regarding participation and answered four questions pertaining to these directions. In order to continue, participants must have achieved a minimum score of 3 out of 4 to ensure understanding and attention (see Appendix L). Additionally, data from participants who completed the survey in less than 10 minutes (i.e., those who spend approximately 3 seconds per question, (as per Bardos et al., 2015) was excluded, as their data likely reflected random responding. Respondents were permitted to complete the survey only once, and if a participant's MTurk identification number appeared more than once in the final dataset, their second set of data was excluded from analyses (Bardos et al., 2015). Qualtrics also allowed for filtering out participants that attempt to complete the survey more than once from the same internet protocol (IP) address (i.e., prevention of ballot box stuffing). Participant's data that reflected universally neutral responding (e.g., variance and standard deviation of data equals 0) was excluded from compensation and the final dataset. Finally, 10 attention checks were distributed across the survey in order to ensure that participants carefully read items (see items highlighted in pink throughout Appendices; items are not

numbered so as to maintain the true item numbers of each questionnaire). Participants were required to pass at least 80% of the attention checks in order to receive compensation and in order to have their data included in the final dataset. Prior literature has demonstrated the use of MTurk to investigate miscarriage and myths/misperceptions among the general population (Bardos et al., 2015; Sohr-Preston et al., 2018), suggesting MTurk participants may have been familiar with the present research topic and willing to participate. A Google email address was created for the study so that participants could have contacted the researcher if necessary.

### ***MTurk Timeline***

The present project sought to collect 130 participants, 65 with early and 65 with late pregnancy loss. The same survey was offered to both groups. Based on this sample size, it was estimated that MTurk data collection would take at least 1 week to complete. Bardos et al (2015) collected data from 1147 participants within the span of 3 days. However, these researchers included fewer constraints on their eligibility criteria (e.g., sampled men and women over the age of 18 with MTurk approval ratings above 85%). However, MTurk Data Consultants (n.d.), a company that helps various organizations and universities with MTurk data collection (e.g., Dartmouth, University of Cambridge, etc.) suggest that most data collection can be completed within 24 hours when sampling for less than 500 participants and when specific qualifiers are limited. Given the additional inclusion and exclusion criteria for the present project, it was estimated that it would take at least 1 week to collect participant data.

### ***MTurk Compensation***

Based on estimations for times of completion for each questionnaire included in the survey, it was thought that it would take a maximum of approximately 60 minutes to complete the entire survey of 151 questions. Additionally, undergraduate research assistants and a

dissertation committee member piloted the survey before it was linked to MTurk for data collection, which helped clarify the length required for participation, as well as technical performance of the survey and appropriateness of the language used. Based on this calculation, the time allotted to complete the survey was 120 minutes, doubling the maximum time projected to participate. Based on a sample of approximately 40 MTurk studies, a range of \$1 to \$60 for 60 minutes of work was calculated. Due to the limited financial resources of a dissertation project, women participating through MTurk were offered \$1 upon completion of the survey. Participants were compensated within 3 days of participation or automatically received the \$1 payment if their data was not reviewed with the 3-day time frame, regardless of the quality of the data. In order to facilitate data collection for the stillbirth group, compensation was raised to \$2. If participant data was determined to be unusable for analyses due to a failure to meet attention check or participation requirements, or the participant provided nonsensical responses, the participant was explicitly notified with the reason they were not being compensated for their work.

### ***Debriefing***

Due to the nature of this project and questions asked, a debriefing form was included at the end of each survey to provide participants with a brief explanation of the study's aims and resources for those that may have wanted additional psychosocial support (see Appendix M).

### ***Data Disposal***

All quantitative and qualitative data was submitted for archiving. In accordance with the American Psychological Association (APA) Record Keeping Guidelines, data will be stored for a minimum of 7 years after the date of research participation, consistent with the American Psychological Association Guidelines (APA, 2007). The study investigators are working on an

Institution Authorization Agreement between ISU and Tulsa University so that the data can be securely stored.

### **Expected Outcomes and Implications**

Expected outcomes for the present project included support for the presently hypothesized relationships. Specifically, that perceived social support and healthcare support would moderate the relationship between GA at loss and all psychological outcomes. Should the analyses have confirmed these hypothesized relations, this project will have demonstrated several important practical implications for research and clinical work. Statistically significant moderation models would suggest that women, regardless of the timing of their pregnancy loss, would benefit from greater healthcare support across a variety of domains (e.g., provision of information, emotional support, etc.) and social support from multiple sources (e.g., partner, family, friends). Our findings would also help highlight which types of support are most robustly related to specific psychological outcomes, which would inform the most appropriate sources of intervention for particular adjustment concerns. The possible inclusion of multiple covariates may have elucidated additional variables that affected these hypothesized relations and may have been additional targets for intervention (e.g., the need for more affordable healthcare services for women following pregnancy loss). The present project also added to the field's existing understanding of the prevalence and persistence of common psychological outcomes following pregnancy loss, which may also assist in delineating appropriate interventions on multiple levels (e.g., family, community, healthcare policy, etc.). Finally, the present project hoped to add to the literature by assessing constructs through quantitative, psychometrically sound measures, as much of the literature surrounding support following pregnancy loss appears to be qualitative.

Additionally, we hoped confirm the reliable use of accessible and feasible outcome measures that may be used in research and clinical settings.

## Chapter III: Results

### Descriptive Statistics

#### *Sample Sociodemographics*

Data collection began on April 10, 2020 and ended on May 15, 2020. Data were collected from 76 women who experienced a miscarriage and 73 women who reported experiencing a stillbirth, resulting in a total sample of 149 participants. All participants successfully passed initial requirements for data inclusion as outlined in the Qualification Questions and Instruction Questions, and provided consent to participate. Participants' average age was 31 years old ( $SD=7$  years). Participants were represented from 36 unique U.S. states. Twenty nine percent of women reported living in a zip code located in a rural region while 56% of women lived in an area that qualified as a Health Professional Shortage Area (HPSA), including shortages in medical and/or mental health access. On average, women reported a total annual household income of \$61,461 ( $SD=\$47,964$ ) at the time of their pregnancy loss. The majority of participants identified as White (87%), having a partial college education (42%), and Christian (56%; see Appendix N, Table N1).

#### *Reproductive History and Characteristics*

Women reported an average of 1.57 ( $SD=1.35$ ) pregnancy losses in their lifetime. Regarding gravidity and parity respectively, women most commonly reported one time that they had become pregnant regardless of the pregnancy outcome (67%) and one pregnancy carried to at least 20 weeks gestation regardless of the number of fetuses carried or pregnancy outcomes (39%; see Appendix N, Table N1). One participant declined to answer the question regarding parity. As parity was only reported descriptively and was not used in any statistical analyses, missing data procedures were not implemented. With regard to GA at the time of their most



recent pregnancy loss, one woman chose not to respond and the average GA was 17.86 weeks ( $SD=8.72$  weeks). Average time since loss was 405.52 days ( $SD=201.19$  days). The majority of women reported living with at least one child at the time of their loss (57%; see Appendix N, Table N1). Four percent of participants endorsed the use of reproductive assistant technology to conceive their most recent pregnancy loss. Specifically, women reported using IVF ( $n=1$ ), intrauterine insemination (IUI;  $n=1$ ), and hormone therapy ( $n=2$ ). Approximately 46% of women noted that their most recent lost pregnancy was planned. Few women reported having given birth since their most recent pregnancy loss (11%) and only 1% of women reported being pregnant at the time of participation.

### ***Mental Health History***

Regarding mental health history, 42% of women reported between one to five prior and/or current psychiatric diagnoses (see Appendix N, Table N1). Diagnoses endorsed by participants included anxiety disorders (e.g., Generalized Anxiety Disorder, Panic Disorder, Social Anxiety Disorder), mood disorders (e.g., Bipolar Disorder, Major Depressive Disorder), Posttraumatic Stress Disorder, Obsessive-Compulsive Disorder, Attention-Deficit/Hyperactivity Disorder, Schizoaffective Disorder, eating disorders (e.g., Bulimia Nervosa, Anorexia Nervosa), and personality disorders (e.g., Borderline Personality Disorder).

### ***Healthcare Provider***

With regard to primary type of organization providing healthcare following the loss, almost an equal number of women reported receiving services from a private medical office or a public hospital (39% and 38%, respectively; see Appendix N, Table N1). Women were also asked to select which type of healthcare provider primarily provided their care following their

pregnancy loss. The majority of women reported primarily utilizing the services of a medical physician (66%; see Appendix N, Table N1).

Support groups were reportedly utilized by 25% of participants and 50% of women felt they were to blame for the pregnancy loss. Specifically, women reported blunt force trauma (e.g., slipping down the stairs, car accident), maternal physical conditions (e.g., polycystic ovary syndrome, uterine prolapse, fatigue, weight loss, autoimmune disorder, high blood pressure, age, diabetes, becoming pregnant again too soon), maternal psychological conditions (e.g., stress), pregnancy-related complications (e.g., ectopic pregnancy, infection, umbilical cord dissection, nuchal cord, carrying low and premature labor), fetal complications (e.g., chromosomal abnormality, fetal hypoxia), and use or misuse of medication (e.g., missing methadone doses, use of contraindicated medication, faulty birth control) as possible contributing factors. Only 2% of women felt they knew exactly what caused their pregnancy loss.

### ***MTurk Data Collection***

The average completion time for the survey was 17.80 minutes ( $SD=8.33$  minutes). A flow chart of participants included and excluded from the study can be found in Appendix R. Only one participant was contacted by the primary investigator in an attempt to follow up regarding missing GA of their loss. Unfortunately, this participant did not respond and she was subsequently removed from analyses in which GA of pregnancy loss was utilized. A total of \$403.95 was spent on setting up CloudResearch and MTurk, in addition to participant compensation.

### **Frequencies and Regression Assumptions**

Frequencies for primary predictor and outcome variables are depicted in Table S5 (see Appendix S). All data used in the primary study analyses were checked for regression

assumptions prior to proceeding. Skew and kurtosis values were compared to the  $z$  statistic range of  $\pm 1.96$  (Howell, 2013), and values can be found in Table T6 (see Appendix T). One outlier ( $\pm 3 SD$ ) was found when examining MSPSS (Zimet et al., 1988) scores, however, following reflection and square root transformation due to negative skew, no outliers were found. The CESD-R (Eaton et al., 2004) was negatively skewed and transformed using reflection and the square root function. Although the PCL-5 (Weathers, et al., 2013b) was not skewed, the total score demonstrated a mildly platykurtic distribution, determined through visual inspection and the kurtosis statistic (kurtosis=-2.08). As such, a negative log transformation was attempted, however, this made the data skewed and the kurtosis worse as well (Whittaker, Whitehead, & Somers, 2005). Therefore, due to the mild kurtosis, the variable was left untransformed for analyses.

Several potential covariates also required transformation in order to normalize their distributions. Income demonstrated a positive skew and three outliers ( $\pm 3 SD$ ) were identified. After removing these outliers, income was transformed using the square root function. As income was ultimately not related to both predictor and outcome variables, it was not included as a covariate and the outliers were maintained in the sample for the purpose of descriptive statistics. Although it was originally proposed to split maternal age into two groups (younger than 35 years old and older than 35 years old), grouping revealed a large difference in group size ( $n=103$  younger than 35,  $n=46$  older than 35). As such, maternal age was examined as a continuous variable and was transformed using the square root function due to positive skew. Some transformation attempts were unsuccessful, and instead, these variables were dichotomized and examined via chi-square tests. Specifically, based on the distribution of data for each variable, number of prior pregnancy losses was grouped as one loss or more than one loss,

number of children in the home as no children or any children, premorbid mental health as no diagnoses or any number of diagnoses, and time since pregnancy loss as loss within the last 12 months or 13-24 months.

In examining scatterplots to assess linearity and restriction of range, findings appeared inconclusive, therefore, additional tests of linearity (i.e., linearity statistic from SPSS) were performed and the linearity statistics were examined in order to identify possible deviations. No violations of linearity were found, such that deviation from linearity values were not statistically significant ( $p < .05$ ). Grand mean centering was used to assist in reducing the probability of multicollinearity among the interaction and main effects. Additionally, correlations among primary outcome variables were examined using Pearson's product moment correlations (see Appendix O, Table O2). Due to the categorical nature of the predictor variable, the assumption of homoscedasticity was examined using Levene's test for homogeneity of variance. No violations were detected, such that all  $p$  values in these analyses were greater than .05. Additionally, visual examination of residual plots suggested homoscedasticity.

### **Correlations With Covariates**

To examine whether possible covariates should be entered into current study analyses, premorbid maternal mental health, time since pregnancy loss, number of prior pregnancy losses, number of children present in the home at the time of loss, maternal age at the time of pregnancy loss, insurance coverage, annual household income at the time of pregnancy loss, and rurality were examined in relation to predictor (dichotomous GA at the time of loss, i.e., miscarriage or stillbirth) and outcome (scores on measures of grief, depression, trauma, and anxiety) variables via Pearson's product moment correlations, point-biserial correlations, Independent samples  $t$ -tests, and chi-square tests, depending on the nature of the variables in each relation (see

Appendix P, Table P3). Only maternal age at the time of pregnancy loss was significantly related to both predictor and outcome variables and was therefore utilized in all regression analyses. With regard to rurality, homogeneity of variance was violated when examining rurality group differences in anxiety scores on the PASS (Somerville et al., 2014). As such, when examining the relation between rurality and the PASS, an Independent samples *t*-test, in which equal variances were not assumed, was used, revealing no relation between the variables. Additionally, Chi-Square Tests of Association and point-biserial correlations revealed no relation between rurality and primary predictor and outcome variables (see Appendix P, Table P3). Although not a potential covariate in the present study, HPSA was examined in relation to primary predictor (GA) and outcome variables, which yielded no statistically significant findings (see Appendix P, Table P3).

### **Differences in Recruitment**

Due to differences in recruitment (e.g., change in compensation amount and study title on MTurk), group differences on primary predictor, moderator, and outcome variables and covariates were examined between miscarriage and stillbirth groups. It is important to note that the recruitment change occurred at the start of the stillbirth data collection. Therefore, all data for miscarriage was collected using the first recruitment method, and all data for stillbirth was collected using the second. Independent sample *t*-tests revealed differences in maternal age, grief, anxiety, trauma, and depression (see Appendix Q, Table Q4). Effect sizes for these group differences are noted via Cohen's *d* values. Specifically, in examining the statistically significant group differences for grief, trauma, anxiety, depression, and maternal age, all were closest to a medium effect size, as compared to standard conventions (i.e., .2=small, .5=medium, .8=large; Cohen, 1992), and maternal age yielded the greatest effect ( $d=.54$ ).

## Primary Analyses

Primary analyses were conducted using Hayes' PROCESS macro version 3.4 (Hayes, 2017) in SPSS version 26 (IBM, 2020). Due to a number of transformations utilized to meet regression assumptions for primary moderation analyses, only statistical significance of effect was determined using transformed data, while size and direction of effects was calculated using raw data (see Follow-Up Analyses, below).

### *Hypothesis 1a*

Increased GA at the time of loss would be related to more depression symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived social support such that women with greater GA and less social support would report more depression symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived social support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in depressive symptoms ( $F(4,144)=8.79$ ,  $R^2=.20$ ,  $p<.01$ ).

While considering the main effect of perceived social support and interaction with GA, as well as controlling for maternal age, there was a statistically significant relationship between GA and depression symptoms ( $b=-.50$ ,  $t(144)=-2.02$ ,  $SE=.24$ ,  $p<.05$ ). Additionally, there was a statistically significant relationship between perceived social support and depression symptoms in the model ( $b=-2.00$ ,  $t(144)=-4.66$ ,  $SE=.43$ ,  $p<.01$ ). Furthermore, there was a statistically significant relation between the interaction term (GA x perceived social support) and depression symptoms in the regression ( $b=1.84$ ,  $t(144)=2.98$ ,  $SE=.62$ ,  $p<.01$ ). Finally, maternal age was significantly related to depression symptoms while considering all other variables ( $b=.46$ ,  $t(144)=2.41$ ,  $SE=.19$ ,  $p<.05$ ).

### ***Hypothesis 1b***

Increased GA at the time of loss would be related to more grief symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived social support such that women with greater GA and less social support would report more grief symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived social support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in grief symptoms ( $F(4,144)=7.27$ ,  $R^2=.17$ ,  $p<.01$ ).

While considering the main effect of perceived social support and interaction with GA, as well as controlling for maternal age, there was a statistically significant relationship between GA and grief symptoms ( $b=3.67$ ,  $t(144)=2.54$ ,  $SE=1.45$ ,  $p<.05$ ). Additionally, there was a statistically significant relationship between perceived social support and grief in the model ( $b=10.33$ ,  $t(144)=3.93$ ,  $SE=2.63$ ,  $p<.05$ ). Furthermore, there was a statistically significant relation between the interaction term (GA x perceived social support) and grief symptoms in the regression ( $b=-13.17$ ,  $t(144)=-3.48$ ,  $SE=3.79$ ,  $p<.01$ ). Finally, maternal age was not a significant covariate in the regression analysis while considering all other variables ( $b=-1.93$ ,  $t(144)=-1.67$ ,  $SE=1.16$ ,  $p=.10$ ).

### ***Hypothesis 1c***

Increased GA at the time of loss would be related to more trauma symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived social support such that women with greater GA and less social support would report more trauma symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived social support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in trauma symptoms ( $F(4,144)=9.54$ ,  $R^2=.21$ ,  $p<.01$ ).

While considering the main effect of perceived social support and interaction with GA, as well as controlling for maternal age, there was a statistically significant relationship between GA and trauma symptoms ( $b=6.80$ ,  $t(144)=2.27$ ,  $SE=2.99$ ,  $p<.05$ ). Additionally, there was a statistically significant relationship between perceived social support and trauma in the model ( $b=21.76$ ,  $t(144)=4.00$ ,  $SE=5.45$ ,  $p<.01$ ). Furthermore, there was a statistically significant relation between the interaction term (GA x perceived social support) and trauma symptoms in the regression ( $b=-20.26$ ,  $t(144)=-2.58$ ,  $SE=7.84$ ,  $p<.01$ ). Finally, maternal age was a significant covariate in the regression analysis ( $b=-8.12$ ,  $t(144)=-3.39$ ,  $SE=2.40$ ,  $p<.01$ ), and negatively related to trauma symptoms while considering all other variables in the model.

### ***Hypothesis 1d***

Increased GA at the time of loss would be related to more anxiety symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived social support such that women with greater GA and less social support would report more anxiety symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived social support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in anxiety symptoms ( $F(4,144)=9.63$ ,  $R^2=.21$ ,  $p<.01$ ).

While considering the main effect of perceived social support and interaction with GA, as well as controlling for maternal age, there was not a statistically significant relationship between GA and anxiety symptoms ( $b=5.09$ ,  $t(144)=1.55$ ,  $SE=3.27$ ,  $p=.12$ ). However, there was a



statistically significant relationship between perceived social support and anxiety in the model ( $b=24.41$ ,  $t(144)=4.10$ ,  $SE=5.95$ ,  $p<.01$ ). Furthermore, there was a statistically significant relation between the interaction term (GA x perceived social support) and anxiety symptoms in the regression ( $b=-17.96$ ,  $t(144)=-2.09$ ,  $SE=8.57$ ,  $p<.05$ ). Finally, maternal age was a significant covariate in the regression analysis ( $b=-9.85$ ,  $t(144)=-3.76$ ,  $SE=2.62$ ,  $p<.01$ ), with a negative direction of effect while considering all other variables.

### ***Hypothesis 2a***

Increased GA at the time of loss would be related to more depression symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived healthcare support such that women with greater GA and less social support would report more depression symptoms up to 2 years following pregnancy loss.

In the interpretation of these results, it is important to keep in mind that the CESD-R was reflected during transformation (Eaton et al., 2004). In this regression analysis, the main effects of GA and perceived healthcare support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in depressive symptoms ( $F(4,144)=5.57$ ,  $R^2=.13$ ,  $p<.01$ ).

While considering the main effect of perceived healthcare support and interaction with GA, as well as controlling for maternal age, there was not a statistically significant relationship between GA and depression symptoms ( $b=-.40$ ,  $t(144)=-1.62$ ,  $SE=.25$ ,  $p=.12$ ). However, there was a statistically significant relationship between perceived healthcare support and depression in the model ( $b=.46$ ,  $t(144)=2.44$ ,  $SE=.19$ ,  $p<0.05$ ). Furthermore, there was not a statistically significant relation between the interaction term (GA x perceived healthcare support) and depression symptoms in the regression ( $b=-.12$ ,  $t(144)=-.42$ ,  $SE=.26$ ,  $p=.68$ ). Finally, maternal

age was a significant covariate in the regression analysis ( $b=.40$ ,  $t(144)=1.02$ ,  $SE=.20$ ,  $p<.05$ ), while considering all other variables.

### ***Hypothesis 2b***

Increased GA at the time of loss would be related to more grief symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived healthcare support such that women with greater GA and less social support would report more grief symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived healthcare support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in grief symptoms ( $F(4,144)=3.64$ ,  $R^2=.092$ ,  $p<.01$ ).

While considering the main effect of perceived healthcare support and interaction with GA, as well as controlling for maternal age, there was a statistically significant relationship between GA and grief symptoms ( $b=3.36$ ,  $t(144)=2.21$ ,  $SE=1.52$ ,  $p=.03$ ). However, there was not a statistically significant relationship between perceived healthcare support and grief in the model ( $b=-1.33$ ,  $t(144)=-1.14$ ,  $SE=1.17$ ,  $p=0.26$ ). Furthermore, there was not a statistically significant relation between the interaction term (GA x perceived healthcare support) and grief symptoms in the regression ( $b=-.13$ ,  $t(144)=-.08$ ,  $SE=1.60$ ,  $p=.94$ ). Finally, maternal age was not a significant covariate in the regression analysis while considering all other variables ( $b=-1.85$ ,  $t(144)=-1.53$ ,  $SE=1.21$ ,  $p=.13$ ).

### ***Hypothesis 2c***

Increased GA at the time of loss would be related to more trauma symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and

perceived social support such that women with greater GA and less healthcare support would report more trauma symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived healthcare support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in trauma symptoms ( $F(4,144)=6.44$ ,  $R^2=.15$ ,  $p<.01$ ).

While considering the main effect of perceived healthcare support and interaction with GA, as well as controlling for maternal age, there was not a statistically significant relationship between GA and trauma symptoms ( $b=6.06$ ,  $t(144)=1.94$ ,  $SE=3.12$ ,  $p=.0538$ ). Additionally, there was not a statistically significant relationship between perceived healthcare support and trauma in the model ( $b=-3.26$ ,  $t(144)=-1.35$ ,  $SE=2.41$ ,  $p=0.18$ ). Furthermore, there was not a statistically significant relation between the interaction term (GA x perceived healthcare support) and trauma symptoms in the regression ( $b=-.82$ ,  $t(144)=-.25$ ,  $SE=3.28$ ,  $p=.80$ ). Finally, maternal age was a significant covariate in the regression analysis ( $b=-7.64$ ,  $t(144)=-3.07$ ,  $SE=2.49$ ,  $p<.01$ ), while considering all other variables.

### ***Hypothesis 2d***

Increased GA at the time of loss would be related to more anxiety symptoms up to 2 years following the loss. Additionally, there would be a significant interaction between GA and perceived healthcare support such that women with greater GA and less social support would report more anxiety symptoms up to 2 years following pregnancy loss.

In this regression analysis, the main effects of GA and perceived healthcare support, the interaction between these variables, and the covariate of maternal age explained a statistically significant amount of the variance in anxiety symptoms ( $F(4,144)=7.71$ ,  $R^2=.18$ ,  $p<.01$ ).

While considering the main effect of perceived healthcare support and interaction with GA, as well as controlling for maternal age, there was not a statistically significant relationship between GA and anxiety symptoms ( $b=4.01$ ,  $t(144)=1.19$ ,  $SE=3.36$ ,  $p=.23$ ). Additionally, there was not a statistically significant relationship between perceived healthcare support and anxiety in the model ( $b=-3.82$ ,  $t(144)=-1.47$ ,  $SE=2.60$ ,  $p=0.14$ ). Furthermore, there was not a statistically significant relation between the interaction term (GA x perceived healthcare support) and anxiety symptoms in the regression ( $b=-3.40$ ,  $t(144)=-.96$ ,  $SE=3.54$ ,  $p=.34$ ). Finally, maternal age was a significant covariate in the regression analysis ( $b=-9.03$ ,  $t(144)=-3.36$ ,  $SE=2.69$ ,  $p<.01$ ), while considering all other variables.

### ***Hypothesis 3***

Women who experienced a miscarriage (prior to 20 weeks gestation) would report lower levels of healthcare and social support than women who experienced a stillbirth (20 weeks gestation or later).

The Independent samples *t*-test comparing perceived healthcare support between groups was not statistically significant ( $t(147)=1.55$ ,  $p=.12$ ). In addition, mean differences between perceived social support between groups was not statistically significant ( $t(147)=.04$ ,  $p=.97$ ).

### ***Hypothesis 4***

Beyond group differences (i.e., miscarriage and stillbirth), we hypothesized that increased GA at the time of loss would be positively related to social and healthcare support. Although our planned statistical methods originally included a Pearson's product-moment correlation, the data for GA was extremely skewed and demonstrated severe kurtosis. As participants provided their GA of loss in terms of weeks, an ordinal variable, it was determined that the nonparametric Spearman's rank-order correlation was instead appropriate.

The Spearman's rank-order correlation between GA and perceived social support was not statistically significant ( $\rho = -.02, p = .85$ ). The correlation between GA and perceived healthcare support was also not statistically significant ( $\rho = -.08, p = .32$ ).

### **Moderation Follow-Up Analyses**

Follow-up analyses were run in the newest version of SPSS (IBM, 2020), version 27. Additionally, an updated version of the PROCESS macro, version 3.5, was utilized that included the pick-a-point technique as a part of the moderation modeling options. All variables that define products were grand mean centered prior to analyses. Although follow-up analyses were originally planned to include the pick-a-point technique using the mean and  $\pm 1 SD$ , data ultimately required numerous different data transformations, making pick-a-point analyses difficult to interpret. As such, we decided to examine relations between perceived social support and psychological outcomes by group (i.e., early and late term pregnancy loss), yielding results that are conceptually and statistically easier to interpret as compared to the originally proposed approach. Additionally, per Hayes (2017), simple slopes were examined at the 16<sup>th</sup>, 50<sup>th</sup>, and 84<sup>th</sup> percentiles, rather than mean and  $\pm 1 SD$ , due to skewness in the data (i.e., measure of social support). Specifically, Hayes (2017) notes that when data is highly skewed, the value at one  $SD$  below or above the mean could easily fall outside of the range of observed data and/or beyond the scale of measurement. If such were the case, probing the interaction using values of the variable outside these bounds would not offer meaningful information. In using the 16<sup>th</sup> and 84<sup>th</sup> percentiles, Hayes (2017) reports that the distribution of the variable will fall within the range of observed data, regardless of distribution, and the 50<sup>th</sup> percentile of the variable serves as the center of the distribution. Given that interactions were significant using transformed data, follow-up analyses were completed using transformed data to determine the significance of the effects.

However, given the complexity of multiple transformations used to test each of the hypotheses yielding a significant interaction term, follow-up analyses with raw data were used in order to determine the size and direction of effects as well as plots of the interaction terms in original scale units. All but Hypothesis 1b's follow-up analyses included the covariate of maternal age given its pattern of statistically significant relations with outcome variables in the regression analyses.

### ***Findings From Transformed Data Analyses***

In Hypothesis 1a, for participants having experienced miscarriage, the slope of the relation between perceived social support and depressive symptoms significantly differed from 0 (slope=-2.00 ( $SE=.43$ ),  $t=-4.66$ ,  $p<.01$ ). This relation was not statistically significant for those who experienced a stillbirth (slope=-.16 ( $SE=.44$ ),  $t=-.36$ ,  $p=.72$ ).

In Hypothesis 1b, for participants having experienced miscarriage, the slope of the relation between perceived social support and grief symptoms significantly differed from 0 (slope=10.36 ( $SE=2.65$ ),  $t=3.92$ ,  $p<.01$ ). This relation was not statistically significant for those who experienced a stillbirth (slope=-3.14 ( $SE=2.73$ ),  $t=-1.15$ ,  $p=.25$ ).

In Hypothesis 1c, for participants having experienced miscarriage, the slope of the relation between perceived social support and trauma symptoms significantly differed from 0 (slope=21.76 ( $SE=5.45$ ),  $t=4.00$ ,  $p<.01$ ). This relation was not statistically significant for those who experienced a stillbirth (slope=1.50 ( $SE=5.64$ ),  $t=.26$ ,  $p=.79$ ).

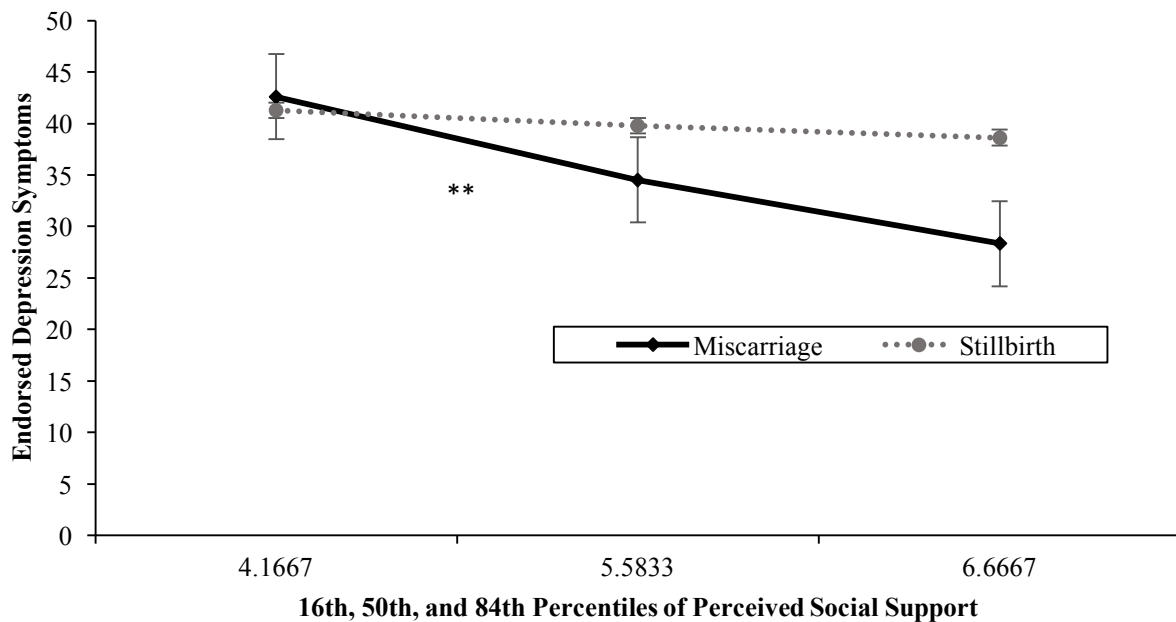
In Hypothesis 1d, for participants having experienced miscarriage, the slope of the relation between perceived social support and anxiety symptoms significantly differed from 0 (slope=24.41 ( $SE=5.95$ ),  $t=4.10$ ,  $p<.01$ ). This relation was not statistically significant for those who experienced a stillbirth (slope=6.45 ( $SE=6.17$ ),  $t=1.05$ ,  $p=.30$ ).

### *Findings From Raw Data Analyses*

The simple slopes approach was used to interpret the size and direction of statistically significant interactions. In Hypothesis 1a, for participants having experienced miscarriage, the negative slope of the relation between perceived social support and depressive symptoms significantly differed from 0 ( $b=-5.71$ ,  $t=-4.54$ ,  $SE=1.26$ ,  $p<.0001$ ). This negative direction of effect is consistent with the hypothesized relation. This relation was not statistically significant for those who experienced a stillbirth ( $b=-1.06$ ,  $t=-.79$ ,  $SE=1.33$ ,  $p=.43$ ). Specifically, when pregnancy loss is coded as miscarriage, there is a significant negative relationship between perceived social support and depression.

**Figure 3**

*Relation between Depression and Social Support Among Miscarriage and Stillbirth*



*Note.* This figure demonstrates the relation between endorsed depression symptoms and perceived social support among women who experienced a miscarriage versus those who

experienced a stillbirth. Specifically, for those with miscarriage, as perceived social support increases, endorsed depression symptoms decrease. This relationship is not statistically significant among those who experienced stillbirth. Maternal age is included as a covariate in these analyses. Error bars depict standard error, and are notably smaller in stillbirth.

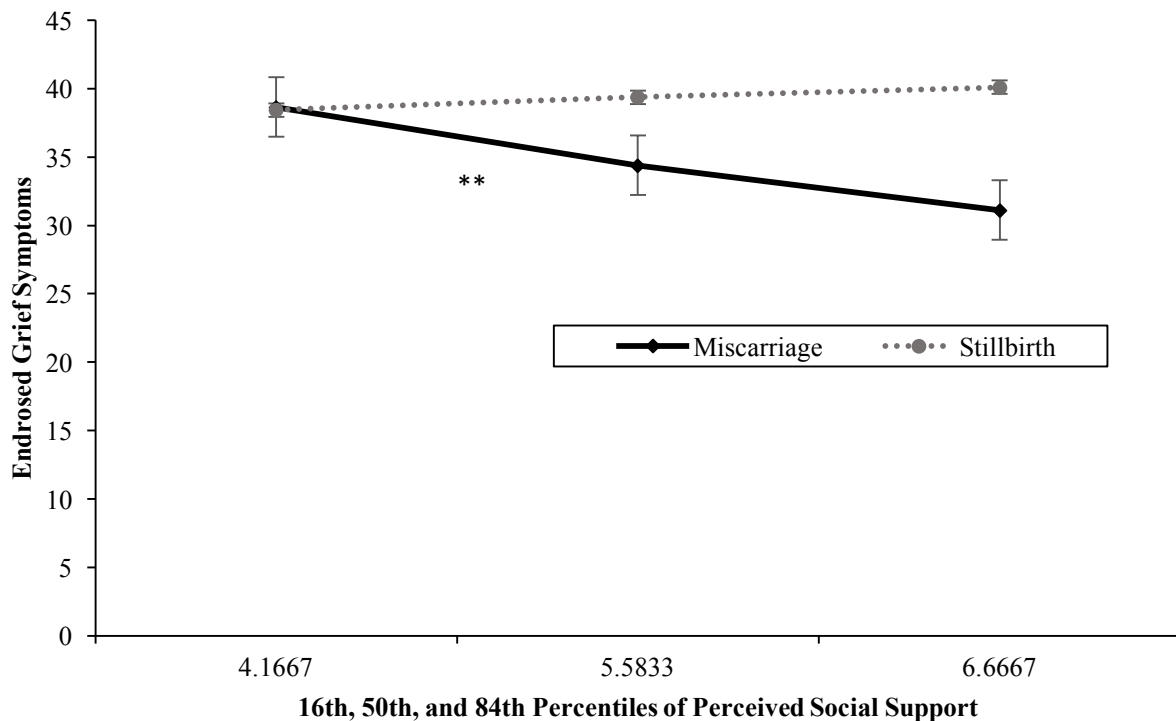
**\*\* $p < .01$**

In Hypothesis 1b, for participants having experienced miscarriage, the negative slope of the relation between perceived social support and grief symptoms significantly differed from 0 ( $b = -3.01$ ,  $t = -3.74$ ,  $SE = .81$ ,  $p = .003$ ). This negative direction of effect is consistent with the hypothesized relation. This relation was not statistically significant for those who experienced a stillbirth ( $b = .67$ ,  $t = .78$ ,  $SE = .85$ ,  $p = .43$ ). Specifically, when pregnancy loss is coded as miscarriage, there is a significant negative relationship between perceived social support and grief.



**Figure 4**

*Relation between Grief and Social Support Among Miscarriage and Stillbirth*



*Note.* This figure demonstrates the relation between endorsed grief symptoms and perceived social support among women who experienced a miscarriage versus those who experienced a stillbirth. Specifically, for those with miscarriage, as perceived social support increases, endorsed grief symptoms decrease. This relationship is not statistically significant among those who experienced stillbirth. Error bars depict standard error, and are notably smaller in stillbirth.

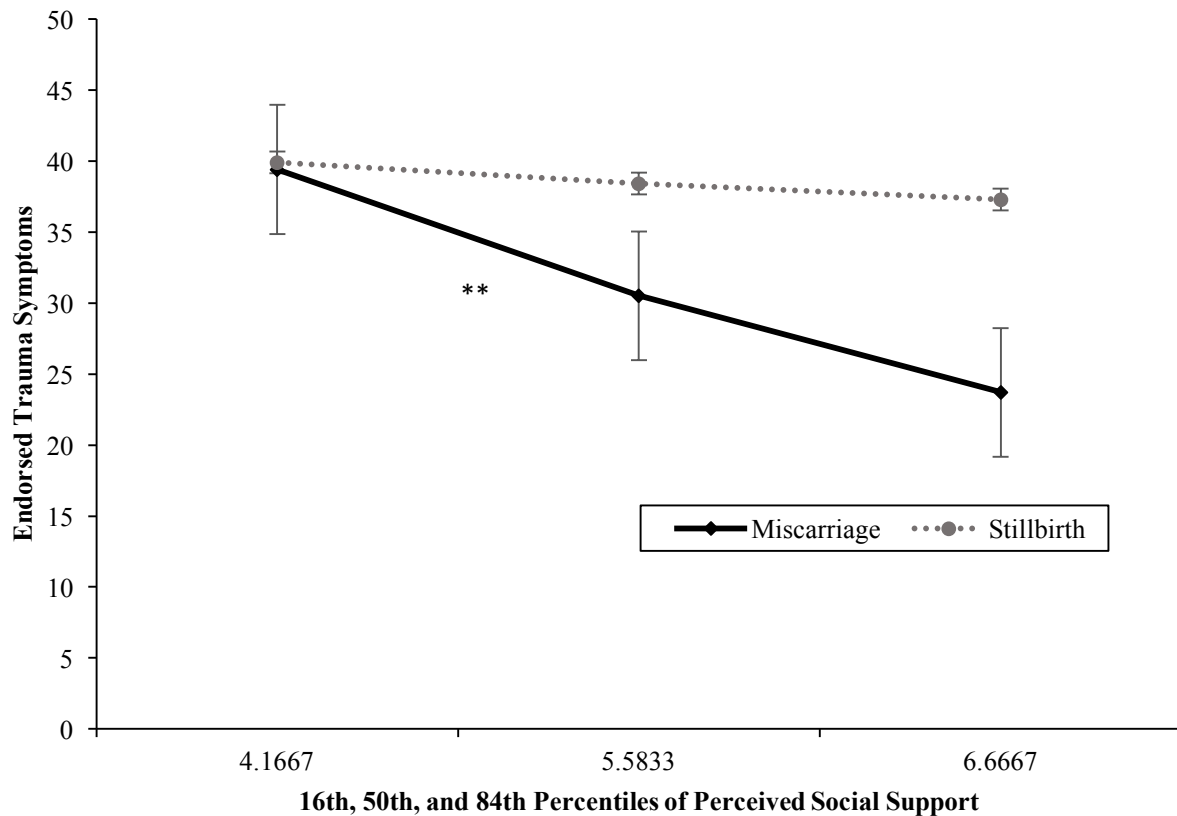
**\*\* $p < .01$**

In Hypothesis 1c, for participants having experienced miscarriage, the negative slope of the relation between perceived social support and trauma symptoms significantly differed from 0 ( $b = -6.28$ ,  $t = -3.79$ ,  $SE = 1.66$ ,  $p = .0002$ ). This negative direction of effect is consistent with the hypothesized relation. This relation was not statistically significant for those who experienced a

stillbirth ( $b=-1.05$ ,  $t=-.60$ ,  $SE=1.75$ ,  $p=.55$ ). Specifically, when pregnancy loss is coded as miscarriage, there is a significant negative relationship between perceived social support and trauma.

**Figure 5**

*Relation between Trauma and Social Support Among Miscarriage and Stillbirth*



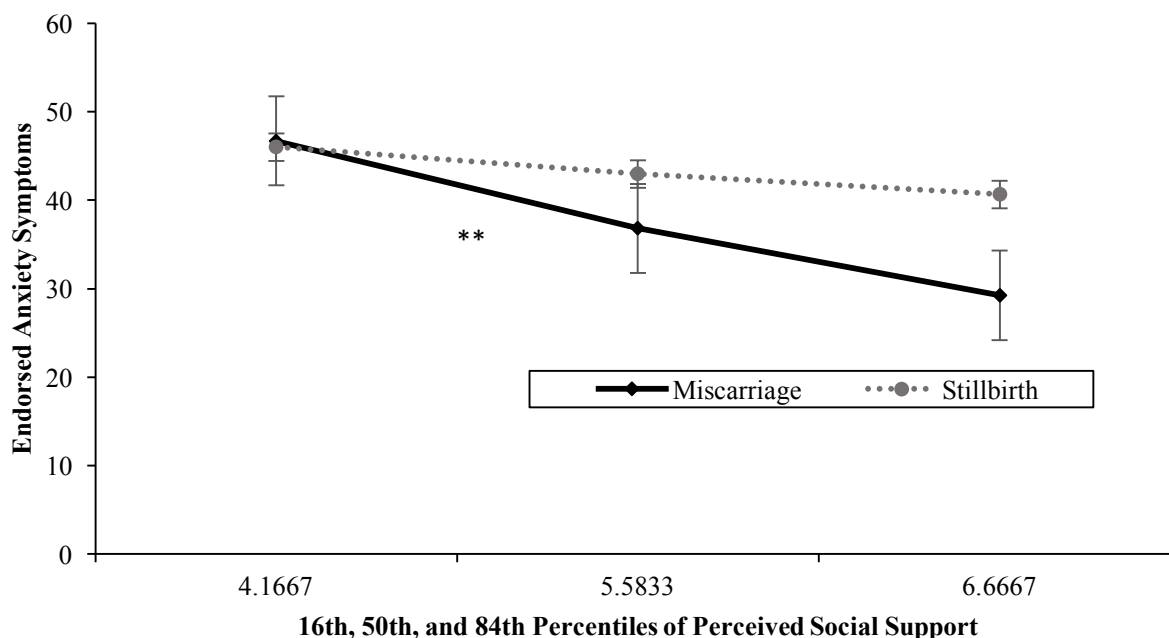
*Note.* This figure demonstrates the relation between endorsed trauma symptoms and perceived social support among women who experienced a miscarriage versus those who experienced a stillbirth. Specifically, for those with miscarriage, as perceived social support increases, endorsed trauma symptoms decrease. This relationship is not statistically significant among those who experienced stillbirth. Maternal age is included as a covariate in these analyses. Error bars depict standard error, and are notably smaller in stillbirth.

**\*\* $p < .01$**

In Hypothesis 1d, raw data analyses did not reveal a significant interaction between perceived social support and GA at time of loss. However, because of the significant interaction among these variables when utilizing transformed data, the interaction was depicted via the graphed data. Follow-up analyses were conducted using raw data. For participants having experienced miscarriage, the negative slope of the relation between perceived social support and anxiety symptoms significantly differed from 0 ( $b = -6.99$ ,  $t = -3.86$ ,  $SE = 1.81$ ,  $p < .0002$ ). This negative direction of effect is consistent with the hypothesized relation. This relation was not statistically significant for those who experienced stillbirth ( $b = -2.13$ ,  $t = -.67$ ,  $SE = 3.20$ ,  $p = .51$ ). Specifically, when pregnancy loss is coded as miscarriage, there is a significant negative relationship between perceived social support and anxiety.

**Figure 6**

*Relation between Anxiety and Social Support Among Miscarriage and Stillbirth*



*Note.* This figure demonstrates the relation between endorsed anxiety symptoms and perceived social support among women who experienced a miscarriage versus those who experienced a stillbirth. Specifically, for those with miscarriage, as perceived social support increases, endorsed anxiety symptoms decrease. This relationship is not statistically significant among those who experienced stillbirth. Maternal age is included as a covariate in these analyses. Error bars depict standard error, and are notably smaller in stillbirth.

**\*\*** $p < .01$

Overall, these follow-up analyses using raw data indicate that, following early-term pregnancy loss (i.e., miscarriage), greater perceived social support is related to less psychological maladjustment, including fewer depression, grief, anxiety, and trauma symptoms. Examination of the graphical depictions of data from women experiencing late-term pregnancy losses (i.e.,

stillbirths) suggest negative trends in relationships between social support and symptoms of depression, anxiety, and trauma, but not grief. However, these trends in stillbirth were not statistically significant.

In broadly considering these results, predicted models proposed in Hypotheses 1a-d were all statistically significant, and follow-up analyses confirmed the direction of hypothesized effects, such that negative relations were found between social support and depression, grief, trauma, and anxiety. None of the predicted interactions in the moderation models for Hypotheses 2a-d were statically significant, therefore the null hypotheses were accepted and no additional follow-up analyses to probe direction and size of effect were completed. In Hypothesis 3, the null hypothesis was also accepted, as the *a priori* prediction that women who experienced early-term loss would report lower levels of healthcare and social support than those who experienced late-term pregnancy loss, was not supported. Finally, Hypothesis 4 proposed that increased GA at the time of pregnancy loss would be positively related to social and healthcare support. Again, a statistically significant relation was not found and the null hypothesis was accepted.

## **Chapter IV: Discussion**

The following includes a discussion of the pattern of study findings and potential practical implications, with reference to study strengths and limitations in order to inform future directions in pregnancy loss research. Possible explanations are considered within the context of the extant literature, and conclusions highlight the importance of ongoing study of women who have experienced pregnancy loss.

### **Study Findings**

#### ***Sociodemographics***

The 149 women making up the study sample were characterized as mostly White (87%), Christian (56%), partially college educated (42%), living in a suburban/urban area (71%), and an average of 31 years old. These demographic characteristics are comparable to the average MTurk worker (Moss & Litman, 2020). For example, the largest group of MTurk workers (37%) are in their 30s, and nearly 80% identify as White, which closely reflects U.S. Census data (77%; Moss & Litman, 2020). Furthermore, the income distribution among MTurk workers reflects that of the general U.S. population (Moss & Litman, 2020). Specifically, in the present sample, annual household income ranged from \$13,497 to \$109,425, which is consistent with the finding that MTurk workers are less likely to make over \$150,000 annually (Moss & Litman, 2020). Eighty nine percent of MTurk workers' annual household income fall within the same range as this study's sample (Moss & Litman, 2020). It is also important to compare the present sample with the demographic characteristics of the broader U.S. population of women who have experienced pregnancy loss. Data from the Early Childhood Longitudinal Study, Birth Cohort (ECLS-B) suggests that women who identify as Black, non-Hispanic, with partial college education or less, and income below the poverty line experience a significantly elevated risk of pregnancy loss, as

compared to other demographic groups (Price, 2006). As such, the present sample appears to underrepresent the racial and economic groups at the highest risk for pregnancy loss, which may impact generalizability of findings. Interestingly, rurality did not appear related to pregnancy loss in the sample examined by Price (2006), as was the case in the current study's sample.

To further characterize the present sample, HPSA was examined with regard to shortages in medical and/or mental healthcare access. Notably, 56% of the sample reported living in zip codes that qualified as a HPSA. However, HPSA was also unrelated to GA, suggesting access to healthcare status based on geographic area was not related to GA at loss or measures of psychological adjustment in the present sample (see Appendix P, Table P3). Unfortunately, review of current research yielded no studies that have examined HPSA status among the pregnancy loss population, though recently enacted legislation underscores the importance of understanding HPSA status in relation to maternity care, so as to better place providers in shortage areas (Improving Access to Maternity Care Act, 2018). Future studies should seek to examine the relation between HPSA and pregnancy loss experiences to evaluate obstetric and maternal healthcare needs in underserved communities, so as to improve access to and quality of care.

As in the present study, Price (2006) controlled for maternal age at the time of pregnancy loss in statistical analyses. Generally, relatively older or younger maternal age is associated with a higher likelihood of having experienced a history of pregnancy loss, such that 80% of women over the age of 45 have experienced at least one loss (ACOG, 2018) and women under the age of 25 and over the age of 35 are at increased risk of stillbirth (CDC, 2017). Overall, researchers examining data from diverse samples note complex relations between maternal age and psychological adjustment (Athey & Spielvogel, 2000; Bhat & Byatt, 2016; Neugebauer et al.,

1992; Robertson Blackmore et al., 2011; Stirtzinger et al., 1999). The variability in maternal age in the present study's sample ( $M=31$  years old,  $SD=7$  years) reflects the range of maternal ages highlighted in extant research, therefore, the relations between maternal age and psychological adjustment are likely generalizable to this study's findings as well.

### ***Reproductive History and Characteristics***

In comparing this sample's reproductive characteristics with other, comparable samples (e.g., in maternal age), the rate of early-term pregnancy loss following ART was 15-20% (Mansour & Buckett, 2008; Tummers et al., 2003; Winter et al., 2002). Regarding stillbirth, ACOG (2020) reports a two- to three-fold increased risk of stillbirth following IVF when controlling for age, parity, and multifetal gestation. These findings suggest the rate of 4% use of ART in this study's sample is perhaps lower than average. As such, the present study's findings may not generalize to women who underwent ART and subsequently experienced pregnancy loss (e.g., experiences of support and psychological adjustment). ART is often expensive and as of 2016, only 15 U.S. states have enacted legislation that requires private insurers to cover some or all of the costs, and only 8 states mandate reimbursement (CDC, 2016a). Therefore, ART may have been less prevalent in the present sample, as 60% of participants made less than the sample's average income (\$61,461). As an example of the cost of ART, Crawford et al. (2016) examined CDC's National ART Surveillance System data and estimated costs ranging from approximately \$3,000 to almost \$500,000, depending on the type and number of treatments received. For the over 60% of women in the present study sample who make less than the U.S. annual median income (between \$64,324 and \$68,703 from 2018-2019), these procedures are likely very expensive, if not unaffordable (Semega et al., 2020).



Women in the present sample most commonly (67%) reported a history of one prior pregnancy and 39% reportedly carried one prior pregnancy to at least 20 weeks gestation, regardless of pregnancy outcome. A study of over 53,000 Israeli women suggests first trimester miscarriage occurs in 43% of parous women (Cohain et al., 2017), which is relatively comparable to the present sample, though does not include rates among women who experienced stillbirth. Unfortunately, the present study did not differentiate between gravidity/parity and historical number of successful live births. Although the study did ask participants about the number of children living in their home at the time of their reported pregnancy loss, the nature of the relationship to the children was not specified (e.g., biological). Future studies should further clarify the rate of gravidity, parity, and successful live births among women who experience pregnancy loss to better understand potential risk and resilience factors. Prior literature suggests the presence of one or more child in the home following pregnancy loss may buffer against psychological maladjustment, though other findings are mixed (e.g., Tavoli et al., 2018), and the present sample found that approximately 57% of participants were living with at least one other child at the time of their loss. Prior literature suggests approximately 41-71% of women who experience pregnancy loss live with at least one other child, demonstrating significant variability (Neugebauer et al., 1992; Stirtzinger et al., 1999). Tavoli et al. (2018) found that nearly 53% of their sample lived with at least one child they had given birth to previously at the time of their reported pregnancy loss, which is relatively comparable to the present study's finding. However, as mentioned previously, the nature of the relationship to the child in the home was not specified in the current project, therefore generalizability of these findings may be limited.

According to Bhattacharya and Bhattacharya (2009), only 1% of women experience recurrent miscarriages, defined as two or more consecutive pregnancy losses (American Society

for Reproductive Medicine, 2017). In the present study, 11% of women reported giving birth since their reported pregnancy loss. However, in the present project, it was not specified as to whether participants experienced a live birth or gave birth to a stillborn child. Future studies should seek to further specify the nature of subsequent births so as to better characterize study samples and to better understand women's birthing experiences following previous pregnancy loss. Additionally, the present study is limited by the fact that data was collected, at most, only 2 years retrospectively, therefore impacting the timeframe in which women could have attempted conception. Nonetheless, only 1% were reportedly pregnant at the time of study participation. Furthermore, the present study did not assess women's desire for subsequent pregnancy, though 46% of lost pregnancies were planned. As such, it is unknown how many women in the present sample actually desired subsequent pregnancy following their reported loss. These current study limitations highlight areas in which to improve the specificity of questions on reproductive history questionnaires in future projects. Researchers interested in examining recurrent pregnancy loss and/or viable, planned, and desired pregnancies following loss may also consider a longitudinal model or extending beyond only the last 2 years of reproductive experiences.

Flink-Bochacki et al. (2017) found that approximately 45% of unintended pregnancies in a large U.S. sample ( $n=1351$  pregnancies) end in spontaneous abortion. This rate is comparable to the 45% of unintended pregnancies in the present study sample. Women reporting unintended pregnancy in Flink-Bochacki et al.'s (2017) sample were more likely to be unmarried, multiparous, and reported an inter-pregnancy interval of less than 1 year (Flink-Bochacki et al., 2017). These researchers did not find race/ethnicity or SES to be independently associated with unintended pregnancy ending in pregnancy loss (Flink-Bochacki et al., 2017). In comparison to present study characteristics, the majority of women were multiparous (about 81%) as well.

Unfortunately, the present study did not inquire about marital status or inter-pregnancy intervals. Of the 45% of women reporting unintended pregnancy, 15% reported the pregnancy as unwanted (Flink-Bochacki et al., 2017). Importantly, although less than half the present study's sample reported planned pregnancies, desire for the lost pregnancy was not assessed. Future studies would benefit from further understanding the relation between intention and desire for pregnancy, associated risk factors (e.g., SES, race/ethnicity), and psychological adjustment following pregnancy loss.

### ***Mental Health History***

With regard to premorbid mental health, Athey and Speilvogel (2000) report that 50% of women who experience miscarriage have experienced prior symptoms of depression. This is fairly comparable to the 42% of women in the present sample who reported premorbid mental health symptoms, though the present sample captures greater variability in symptomology (e.g., anxiety, depression, trauma, personality disorders, etc.). Current understanding of premorbid mental health conditions suggests possibly higher rates of symptomology following pregnancy loss among those with premorbid mental health concerns (Athey & Spielvogel, 2000; Bhat & Byatt, 2016, Giannandrea et al., 2013). Furthermore, Gold et al. (2007) found that premorbid mental illness (OR=1.8), especially affective disorders (OR=1.6) or substance use disorders (OR=1.4), served as an independent risk factor for pregnancy loss. As such, future studies should continue to examine the implications of pre-existing mental health symptoms on reproductive outcomes in order to inform possible points of intervention. Specifically, women who screen positive for mental health conditions at prenatal visits may benefit from preventative intervention to minimize the impact of pre-existing psychological challenges on the perinatal period, including possible pregnancy loss.

Extant literature suggests women, and their families, may benefit from online support following pregnancy loss, however, absence of facilitators or group moderators, as well as cyberbullying, present as possible challenges (Carlson et al., 2012). Twenty five percent of the study's sample utilized online support groups following their loss. Given this sample's access to the internet, required for study completion, it is surprising that more women did not utilize online support groups. This is especially salient since Gold et al. (2012) found that over half of their sample of women who used online message boards for support had lost their pregnancy within the last 2 years. However, it is also notable that no clear prevalence statistics are available with regard to the specific use of online support groups among women, following pregnancy loss. It is possible that women in the present sample utilized online resources for support that they did not perceive as a "support group" (e.g., blogs, social media posts). As such, the present study may not have captured the variability of internet use for support in the present sample. Future research should consider further assessing women's use of broad online resources following pregnancy loss.

Half of the present project's sample endorsed self-blame with regarding to their pregnancy loss, consistent with frequent documentation of self-blame in the extant literature (Bhat & Byatt, 2016). Robinson et al. (1994) found in their sample that about 41% of women endorsed self-blame for their pregnancy loss and nearly 23% reported feeling that others blamed them for the loss. Notably, existing literature on self-blame in pregnancy loss appears to be largely qualitative, therefore, future researchers should consider examining women's perceptions of pregnancy loss in a quantifiable manner. This may inform possible statistical relations to psychological adjustment and utilization of support following pregnancy loss. In the case of pregnancy loss, possible causes can at times be identified (e.g., biological, blunt trauma).

However, in the present sample, only 2% of women reported knowing the cause of their pregnancy loss. It is possible that women did not seek this information or were not provided this information following their loss. However, as extant literature suggests, understanding the cause of pregnancy loss can be helpful for psychological adjustment and coping (e.g., Ellis et al., 2016; Lee & Slade, 1996; Neugebauer et al., 1992), which may explain the relatively high rate of mental health symptoms in the sample. In the present sample, 99% of women reported symptoms of depression or anxiety, and 100% of women reported symptoms of grief or trauma. Utilizing recommended cutoff scores from the developers of the measures, 88% of the sample met the cutoff score for at least subclinical symptoms of depression; 75% met the threshold for anxiety symptoms; and 57% of participants met the threshold for trauma symptoms. Unfortunately, there is no recommended cutoff score for the grief scale. Neugebauer et al., (1997) found between 30-50% of women develop some depressive symptoms within 6 months following miscarriage. In a review of the literature, Farren et al., (2018) found that anywhere from 2-41% women experience mild-severe symptoms of anxiety following miscarriage. These samples reviewed spanned from less than 1 month to 1 or more years following miscarriage. Farren et al. (2018) also found that 6-39% of women who experienced early term pregnancy loss met criteria for PTSD. However, it is important to note that the present sample examined experiences, including miscarriage and stillbirth, up to 2 years following pregnancy loss, which may account for the higher observed prevalence in the present sample. Giannandrea et al. (2013) found 65% of women who had previously experienced either a miscarriage or stillbirth met criteria for major or minor depression at the time of interview, and 49% met criteria for any anxiety disorder. Regarding trauma, Horesh et al. (2018) found a PTSD rate of about 33% in their sample of Israeli women. Though the rates noted in Giannandrea et al. (2013) and Horesh et al. (2018) are closer to those

observed in the present sample, and capture the spectrum of pregnancy loss, they are still quite low compared to this project's sample. It is important to note that the present study was interested in the prevalence of any symptoms of depression, grief, anxiety, and trauma following pregnancy loss, rather than exclusively clinical rates of these experiences. Cut-off scores on the screeners used in the present project are indicative of the presence of psychological symptoms that warrant additional follow-up, but do not necessarily meet the threshold for clinical diagnosis. As such, the higher rates of symptoms observed in the present sample could be due to the variability of experiences captured. Future studies should consider examining differences in GA and role of healthcare and social support among women with subclinical versus diagnostically significant psychological symptoms to inform possible stepped-care approaches to intervention following pregnancy loss. Alternatively, differences in prevalence rates may also be due to the longer period of retrospective reporting captured by the present study (e.g., up to two years post-loss), while extant literature appears to focus on more acute and short-term experiences (e.g., weeks and months following loss).

### ***Healthcare Provider***

Regarding characteristics of healthcare utilization, approximately 54% of current study participants reported receiving services from a private medical facility (e.g., private medical office or private hospital) and 44% a public facility (e.g., community clinic or public hospital) following their pregnancy loss. Few women reported receiving prenatal care from home, other, or no institution (about 3%). Women also endorsed using a variety of healthcare providers, with 66% of participants visiting a medical physician for post-pregnancy loss care.

The rate of utilization of various healthcare facilities and practitioners following pregnancy loss is not well documented. This is perhaps related to the inconsistent need for

medical intervention following pregnancy loss (e.g., complete miscarriage). It is possible that women may continue to seek medical care from providers that supported them in the prenatal timeframe, therefore, current rates were compared to prenatal provider and institution utilization. Unfortunately, research on most commonly utilized healthcare facilities for prenatal care in the U.S. has not been updated for many years. The Institute of Medicine (IOM;1989) reported that most women received care in private physicians' offices. This is somewhat comparable to the present study sample, in that the majority of participants endorsed receiving care from a private medical facility. IOM (1989) also reported that 20% of women endorsed care from a public establishment (e.g., outpatient public hospital, community health center, health department). If compared to the present study sample's 44% use of public institutions, this rate appears to have increased since 1989. This may be due in part to changes in insurance coverage and availability of obstetric care in the public sector. Although rates of utilization of specific healthcare practitioners for prenatal care appears to be poorly documented in the U.S., data from the CDC suggests that 14% of routine prenatal care visits between 2009-2010 were completed by non-obstetric and gynecological providers (Uddin et al., 2014). IOM (1989) reported that most women at that time received prenatal care from either OB/GYNs or family/general practitioners.

### ***Study Context and COVID-19***

With regard to the context in which data collection occurred in spring 2020, it is important to take into consideration the global pandemic of the COVID-19 virus and its potential impact on participation and study findings. By April 2020, unemployment in the U.S. reached 15%, which is the highest documented rate since 1948 when data collection began (Falk et al., 2021). During this health crisis, it is likely that many Americans found themselves spending more time at home in quarantine, potentially unemployed. As such, it is possible that more

individuals searched online for opportunities for substitute or adjunctive income. According to data published on MTurk participation during the pandemic, the demographic characteristics of participants has remained stable, and CloudResearch observed a 7% increase in completed MTurk studies, though a similar pattern of study completion on a monthly basis, as compared to 2019 (Moss, n.d.). Arechar and Rand (2021) report that the number of new MTurk accounts increased by 17% since the start of quarantine in March 2020, though this rate does not specify completion of research studies. Additionally, when examining participation in social science studies specifically, participants since the pandemic appear to be slightly more demographically diverse, as well as less reflective and attentive when completing studies (Arechar & Rand, 2021). These possible increases in MTurk accounts may be due to steady increases in MTurk participation that has been observed over the last few years (Moss, n.d.), financial motivation during the pandemic's economic downturn, or perhaps increased free time as a result of unemployment (Falk et al., 2021) and/or reduced social engagements.

Rigorous attention checks, such as those implemented in the present project, are recommended in MTurk research projects, especially if participants are indeed paying less attention to study questions. If current study participants were less reflective in their responding, as suggested by Arechar and Rand (2021), it is possible that the accuracy of retrospective reporting, especially of the potentially emotionally challenging subject of pregnancy loss, may have been adversely impacted. Future research projects may consider including a measure of reflectiveness (e.g., Cognitive Reflection Test; Fredrick, 2005) to assess this variable within the context of the study. It is also possible that women may have spent more time at home with their families during the pandemic, as many schools and jobs required at-home work. In considering the recency of pregnancy loss among women in the present study sample (last 2 years), it is



possible that increased exposure to other children in the home may have served as an unwelcome reminder or buffer to additional psychological stress related to their pregnancy loss (e.g., Bhat & Byatt, 2016; Tavoli et al., 2018). Future projects that collected data during the pandemic should consider the impact of the increase in access and exposure to immediate family members on study variables of interest.

Finally, retrospective consideration of social and healthcare support may also have been impacted by the extreme circumstances surrounding the pandemic, including social distancing/isolation and access to and/or trust in the healthcare system. It is possible that emotionally salient interactions, or lack thereof, with these sources of support during the COVID-19 pandemic may have influenced women's perceptions of support within the context of recollection of pregnancy loss experiences. Additionally, some women in the sample may have been actively processing and psychologically adjusting to more recent pregnancy losses without typical support systems. Therefore, future studies should consider assessing shifts in perceptions of support during the pandemic, as well as changes in utilization of online resources for social and healthcare support (e.g., telehealth services).

### ***Statistically Significant Relations Among Primary Variables and Covariates***

Based on review of the current literature, a number of possible covariates were considered in the present study analyses including premorbid maternal mental health, time since pregnancy loss, number of prior pregnancy losses, number of children present in the home at the time of loss, maternal age at the time of pregnancy loss, insurance coverage, annual household income at the time of pregnancy loss, and rurality. Interestingly, only maternal age at the time of pregnancy loss was found to be statistically significantly related to both primary predictor and outcome variables. Specifically, symptoms of depression, grief, trauma, and anxiety decreased

with increasing age. It is possible that relatively few covariates were added in models due to the nature of our analyses, such that possible covariates were required to be related to both the primary predictor (GA) and outcome variables (depression or grief or anxiety or trauma). For example, some potential covariates were related to only outcome variables, but not GA (e.g., premorbid mental health and income; see Appendix P, Table P3). Alternatively, the considerable variability in extant research as to whether and how these variables are related to pregnancy loss and psychosocial adjustment could account for null findings regarding relations between prospective covariates and predictor and outcome variables in the present study. Finally, as demonstrated by the present study's demographic characteristics, it is possible that homogeneity in factors such as race and economic status resulted in a lack of relations among variables that appear to be at least somewhat consistently related in more demographically diverse samples (e.g., time since pregnancy loss, number of pregnancy losses, presence of children in the home, insurance coverage, rurality; Giannandrea et al., 2013).

**Maternal Age.** Although extant literature suggests mixed findings with regard to associations among maternal age at the time of pregnancy loss and psychological outcomes, the current study supports a relation between older maternal age and fewer symptoms of psychological maladjustment (Bhat & Byatt, 2016). These mixed findings in the existing body of research may be due to variability in the maternal age cut-off (e.g., 30 versus 35; Stirtzinger et al., 1999) or age range examined (e.g., 23 to 35 years versus 23 to 26; e.g., Neugebauer et al., 1992). Additionally, women in the miscarriage group were also older in age, which is consistent with research demonstrating that higher rates of early pregnancy loss are associated with increasing maternal age (e.g., ACOG, 2018a).

**Premorbid Mental Health.** Premorbid mental health was significantly, negatively related to symptoms of trauma and anxiety following pregnancy loss. Interestingly, this is inconsistent with findings from the reviewed literature, which has suggested premorbid mental health diagnoses serve as a possible risk factor for emotional dysfunction following pregnancy loss (Athey & Spielvogel, 2000). One possible explanation may be that women experiencing premorbid mental health challenges were already seeking mental health services at the time of, or prior to, pregnancy loss and therefore did not struggle to cope with symptoms following the loss. Specifically, some women with premorbid psychological diagnoses who sought care previously may have developed coping mechanisms that buffered against poor psychological outcomes following pregnancy loss. Alternatively, question 8 on the Reproductive History Questionnaire (see Appendix B) did not assess timing of the psychological diagnoses, therefore it is possible that some women endorsed remote psychological symptoms that they no longer found impairing or were not exacerbated following pregnancy loss.

**Income.** Finally, annual income was significantly negatively related to depression, trauma, and anxiety symptoms following pregnancy loss. This finding is consistent with extant research that suggests income, and thus ability to pay for healthcare, could be related to access to healthcare resources during and following pregnancy loss (e.g., Giannandrea et al., 2013). It is possible that women with more financial resources feel they have access to higher quality healthcare, experience less financial stressors that may increase risk for mental health challenges, or may also have additional financial means to support future attempts at conceptions (e.g., ART), which may be associated with better psychological adjustment following a pregnancy loss. Future studies should attempt to further elucidate the possible relation between income and psychological adjustment following pregnancy loss by assessing other specific correlates of

income (e.g., resources, etc.) that may serve as protective factors for financially advantaged women, and inform the groups of women most vulnerable and in need of additional resources/intervention.

In considering possible covariates, the existing literature suggested some variability in relation to study variables and their possible confounding effects in the present hypothesized relations. Therefore, it is possible that some of these variables are ultimately not related to the predictor and outcome variables, though this may only be true for the present project and sample based on some of the unique aspects of the current study noted above (e.g., fewer risk factors and homogeneity of demographic characteristics).

### ***Differences in Recruitment***

Following slowed recruitment after all miscarriage data was collected on MTurk, the compensation for participation was increased to \$2 to further incentivize participation, and the study title was updated to specifically target women who had experienced stillbirth. Due to this change in recruitment, group differences between predictor, covariate, and outcome variables were examined. It is important to note that relations among covariate and outcome variables regarding GA were also examined simultaneously with other variables in each regression equation for moderation analyses. Thus, these group comparisons were included to highlight univariate comparisons between covariate and outcome variables, and otherwise unexamined associations between GA and social and healthcare support. A statistically significant, group difference in maternal age was revealed in these analyses, such that women in the miscarriage group were older. Regarding effect size, maternal age demonstrated the largest effect (Cohen's  $d=.54$ ) as compared to predictor and outcome variables (see Appendix Q, Table Q4). This finding is consistent with the field's current understanding of maternal age and pregnancy loss,

such that increasing maternal age is associated with increased risk/likelihood of pregnancy loss (e.g., ACOG, 2018a). These findings suggest that providers working with pregnant women who are of more advanced maternal age should keep in mind the higher likelihood of a history of pregnancy loss, collect a detailed reproductive history, and offer resources and referrals for support throughout the pregnancy, as indicated.

Additionally, statistically significant group differences were identified between GA and symptoms of anxiety, grief, and trauma, such that women in the stillbirth group reported higher mean scores of these symptoms, and women in the miscarriage group reported higher mean depression scores (see Appendix Q, Table Q4). Again, these significant findings are consistent with extant literature, such that late-term pregnancy loss is associated with increased difficulty with psychological adjustment (e.g., Hunter et al., 2017). This provides additional evidence in support of using MTurk as a platform for data collection for this specific population, as findings are present in both existing research and the current study's sample. These findings reinforce the need for follow-up and for providers to offer psychological support following stillbirth.

Additionally, public health initiatives should continue to focus on decreasing stigma surrounding late-term pregnancy loss and promote broad community and societal support of women and their families who suffer such a loss through psychoeducation (e.g., education about stillbirth and psychological adjustment, normalization of conversations about stillbirth, information about how to provide empathic support; Bellhouse et al., 2018).

### ***Hypotheses 1***

Primary study analyses included examining the relation between GA at the time of loss and symptoms of grief, depression, trauma, and anxiety as well as the interaction between GA and social support in relation to these outcomes.

**Main Effect of GA.** In all regression models except with anxiety as the outcome, there was a significant main effect of GA while considering the main effect of perceived social support and interaction with GA, as well as controlling for maternal age. Specifically, GA was statistically significantly related to symptoms of depression (e.g., Campbell-Jackson & Horsch, 2014; Lok & Neugebauer, 2007), grief (e.g., Athey & Spielvogel, 2000; Ritsher & Neugebauer, 2002) and trauma (e.g., Giannandrea et al., 2013, Daugirdaitė et al., 2015), which is consistent with findings in extant literature. However, it is important to note that these associations were present while considering other variables and relations in the moderation models, suggesting these main effects were present even while controlling for effects of perceived social support, its interaction with GA, and maternal age. Interestingly, although research to date suggests a relation between GA and anxiety (Athey & Spielvogel, 2000), the present study did not find a significant main effect between these variables. This suggests that other variables in the model may explain a larger proportion of the variance in anxiety symptoms. For example, in examining regression coefficients in the moderation model with anxiety as the outcome, perceived social support, its interaction with GA, and maternal age all appear to claim a larger portion of the variance than GA alone. It is possible that this null relationship is due to the measure of anxiety used in the present sample, such that a modified version of the PASS (Somerville et al., 2014) was utilized, which has not been done in existing literature. Nonetheless, the modified measure demonstrated excellent reliability in the present sample. Future studies should continue to examine the PASS (Somerville et al., 2014) as a measure of pregnancy-specific anxiety, and its reliability and validity in the pregnancy loss population.

**Interaction Between GA and Social Support.** The omnibus effects and interaction regression coefficients in Hypothesis 1 using the transformed data were all statistically

significant. Raw data analyses suggested that greater perceived social support may serve as a buffer to the development of poor psychological adjustment following pregnancy loss, including grief, depression, anxiety, and trauma, but only for those experiencing pregnancy loss at an earlier GA (i.e., miscarriage versus stillbirth). Although not statistically significant, graphical depiction of this relation among women who experienced stillbirth also suggest a downward trend, except in the case of grief symptoms.

One possible explanation for finding significant associations only in the miscarriage group is perhaps because psychological outcomes associated with earlier pregnancy loss are influenced by social support whereas those in later-term loss are not. There could be differences in how women choose to communicate with their social support network, such that pregnancy associated with a miscarriage (early-term loss) may not be announced to friends and family and therefore perception of support may be stable and unchanging within the context of loss. In the case of stillbirth, loss is often more physically visible and the pregnancy has been openly announced to family and friends, which may result in greater variability of experiences with the social network, including the possibility for unsupportive interpersonal interactions (e.g., Bellhouse et al., 2018). Although there is limited, if any, research examining the differences in experiences of stigma between women who suffer miscarriage versus stillbirth, at least one meta-analysis has found that women, especially in low and middle-income countries, who experience stillbirth report: beliefs from others that they were cursed or willed the pregnancy loss, being avoided by others, receiving no time from work following the stillbirth, or being divorced, physically abused, or forced out of their communities/villages, essentially characterizing pregnancy loss as taboo (Burden et al., 2016). However, the lack of association between social support and stillbirth appears inconsistent with the extant theory related to pregnancy loss and

empirical literature, such that the field's current understanding is that women with later-term pregnancy loss may experience greater social support, possibly as a result of the visibility of the pregnancy and subsequent loss (e.g., Brier, 2008; Harden, 2018). If a pregnancy is visible, it is possible that the loss is acknowledged by social networks and support is more readily available.

Conceptually, Bronfenbrenner's Ecological Systems Theory (1994) and the stress buffering model of social support suggested by Cohen and Wills (1985) consider a person's context (i.e., timing of pregnancy loss) when examining development, either broadly, as in Bronfenbrenner's model, or specific to stress, as in the model posited by Cohen and Wills (1985). For the present project, Bronfenbrenner's model is important to consider when conceptualizing the variety of levels of a woman's context during reproductive experiences, and served as the guiding theoretical model in designing this study. Specifically, the present project examined contextual influences at the microsystem level of analysis, characterized by women's experiences with family, friends, partners, and healthcare institutions following pregnancy loss. These social roles and perceptions of interpersonal and institutional relations were the primary subject of interest in the present study. Additional research is needed to better understand contextual factors from a mesosystem perspective (e.g., interactions between family and healthcare institutions), including how relations between women's microsystems impact psychological adjustment following pregnancy loss. For example, researchers may consider examining multivariate relations between women's self-reported adjustment and perceptions of support, as it interacts with her social roles (e.g., at school, among peers, religious affiliation, etc.). Furthermore, future projects should seek to better understand the macrosystem and exosystem influences on women's psychological adjustment, including potentially helpful (e.g., destigmatizing social policy, access to resources, public health policy geared toward education)



and harmful (e.g., stigma rooted in social values and beliefs and perpetuated by religious, educational, or political systems) aspects of society. Such a project may include review of values, resources, and policies across these systems and their ultimate impact on women's adjustment experiences within the context of pregnancy loss. Future studies should also replicate present study findings from a chronosystem perspective by examining women's social relations and psychological development longitudinally. Tracking women's pregnancy loss experiences over time would help address concerns with retrospective reporting.

Notably, recent literature also suggests use of Bronfenbrenner's model in case conceptualization of psychological treatment following pregnancy loss (Rogers et al., 2019). For example, Rogers et al. (2019) suggests consideration of "developmental, relational, cultural, political, and economic impacts of miscarriage" when case conceptualizing within the context of clinical work (p. 51). Using an ecological lens to case conceptualization likely helps clinicians place women's experiences into broader context and supports a more comprehensive approach to care. In working with clients, Rogers et al. (2019) suggests highlighting the multi-system complexities related to resilience and distress following pregnancy loss so as to "help lessen self-directed attribution leading to blame, shame, and guilt" (p. 55). Rogers et al.'s (2019) clinical applications of Bronfenbrenner's Ecological Systems Theory (1994) expands the relevance of this theory beyond research and highlights the clinical and practical implications of studying women's pregnancy loss experiences within an ecological context. As demonstrated in the present study, women experiencing early-term pregnancy loss appear to benefit from social support with regard to psychosocial adjustment. As such, these women may particularly benefit from the case conceptualization and treatment approach suggested by Rogers et al. (2019). Future studies should seek to examine Rogers et al. (2019) proposed treatment approach, with

special attention to social support across ecological systems among women experiencing early-term pregnancy loss.

Additionally, the stress buffering model of social support assists in understanding the specific, statistically significant findings of the present study, such as the potential buffering effect of social support on maternal psychological outcomes for those experiencing miscarriage. Specifically, this theory suggests that social support buffers the effect of stressful events on poor psychological and physical health outcomes (Cohen & Wills, 1985). Future projects should consider the stress buffering model of social support as a possible framework for studies that seek to further understand the complex relations between pregnancy loss and social support systems.

Another notable finding regarding the interaction effect in Hypothesis 1 is that although transformed data analyses suggested a statistically significant interaction between perceived social support and GA at the time of loss, with anxiety as the outcome variable, this was not replicated in raw data analyses. However, given the significant interaction using transformed data, follow-up analyses were conducted using raw data and these findings indicated a statistically significant relation between perceived social support and anxiety symptoms for women who experienced miscarriage. It is possible that the discrepancy in significance between raw and transformed data could be due to a violation of regression assumptions, which could have led to a greater probability of Type II error. Therefore, this follow-up analysis should be considered exploratory and should be replicated before making substantive conclusions about the significance of the finding.

**Main Effect of Social Support.** With regard to the main effect of social support, statistically significant relations with all psychological outcomes were found in moderation

models, including depression, grief, trauma, and anxiety. Again, these associations were present while considering other variables and relations in the regression analyses, therefore these main effects were present even while including effects of GA, its interaction with social support, and maternal age. Notably, some of these main effects are also supported by extant literature, such that depression (e.g., Francois, 2018; Stirtzinger et al., 1999) and grief (e.g., Bhat & Byatt, 2016; Cassaday, 2018). However, as noted in the present study's review of the literature, the relations between anxiety (e.g., Bhat & Byatt, 2016; Tavoli et al., 2018) and trauma, and social support is less investigated and understood. For example, Bhat & Byatt (2016) and Tavoli et al. (2018) note the mixed findings regarding the presence of other children in the home (which may function as a form of support) at the time of the loss, on symptoms of anxiety. It is possible that limited extant literature exists with regard to anxiety and trauma because depression and grief have received the majority of attention in the field of pregnancy loss outcomes (e.g., Lee & Slade, 1996). As such, these main effect findings both replicate relations found in current literature and add to the growing body of information on trauma and anxiety reactions following pregnancy loss.

**Maternal Age.** Maternal age at the time of loss accounted for a statistically significant portion of the variance in psychological adjustment outcomes, except when grief was the outcome variable. There are several possible explanations for this null finding in the present analyses. For example, perhaps older mothers were more likely to have had successful pregnancies and children in the home, which could have served as a buffer against symptoms of grief, specifically (e.g., Bhat & Byatt, 2016). As mentioned above, older women may have already developed better coping mechanisms for grief and loss despite experiencing psychological symptoms of depression, anxiety, and trauma. Grief is a common human

experience that may result in a variety of reactions, including resilience, characterized by positive coping and health adjustment such as fondly remembering the lost loved one and the ongoing ability to experience/express positive emotions (Arizmendi & O'Connor, 2015).

Bonanno et al. (2002) note that this resilient response following loss was the most prevalent reaction among the older adults in their study sample. Additionally, women of more advanced age may also have greater access to resources, including financial and social, than younger mothers. Access to greater financial resources specifically may also mean greater access to higher quality physical and mental healthcare (Giannandrea et al., 2013; Robertson Blackmore et al., 2011; & Séjourné et al., 2010).

Interestingly, prior literature suggests that younger age at the time of loss is related to presentations of complicated grief (Cassaday, 2018; Mann, et al., 2008). Notably, complicated grief is often defined as a prolonged grief reaction, perhaps beyond 1-2 years following a loss and experienced in about 7% of the population, and 24% of those experiencing child bereavement (Bonanno et al., 2002; Kersting & Wagner, 2012). Additionally, complicated grief is differentiated from normative grief by symptoms of “emotional numbness, anger, avoidance of reminders of the loss, a belief that life is meaningless, and even suicidal ideation” (Bonanno et al., 2002, p. 59). According to Bonanno et al. (2002), these symptoms of complicated grief are measured through the gold standard Inventory for Complicated Grief. The present study utilized the PBGS (Ritsher & Neugebauer, 2002), which assesses for the presence of general grief and bereavement following the specific experience of pregnancy loss. Future studies may consider examining whether the association between GA and grief differs when using the ICG versus the PBGS, which may subsequently inform our understanding of complex versus general grief and bereavement following pregnancy loss. Additionally, researchers may consider modifying the

ICG to specifically measure experiences related to pregnancy loss, as in the PBGS. It is possible that women at any age experience symptoms of grief following pregnancy loss and benefit from social support, while other psychological outcomes are impacted by maternal age at the time of loss.

### ***Hypothesis 2***

**Main Effect of GA.** In contrast to regression models examining the impact of social support, there was not a statistically significant main effect of GA while considering the main effect of perceived healthcare support and interaction with GA, as well as controlling for maternal age, in most models. Specifically, GA was not related to symptoms of depression, trauma, or anxiety, though these relations were observed in Hypothesis 1 models. However, there was a statistically significant relation between GA and grief symptoms, a finding that is supported by extant literature (e.g., Athey & Spielvogel, 2000) and consistent with Hypothesis 1b. As noted above, research findings have typically supported the relation between GA and symptoms of depression, trauma, and anxiety. This may perhaps suggest that other variables in these models explain a larger proportion of the variance (e.g., perceived healthcare support or maternal age), or perhaps that this relation was not observed in the present study sample. For example, in examining the moderation model for depression, both healthcare support and maternal age explained a significant portion of the variance in the regression. Furthermore, maternal age explained a significant portion of the variance in moderation models with trauma and anxiety as outcomes.

While models examining either perceived social or healthcare support demonstrated a significant relation between GA and grief, all other psychological outcomes revealed variable findings. Existing literature highlights that grief is likely the most common symptom following

pregnancy loss, (Athey & Spielvogel, 2000; Cacciatore et al.; 2009). It is possible that regardless of the type of support provided, many women experience some degree of grief, which may not be the case with the development of other psychological symptoms. Perhaps, as suggested by Cacciatore et al. (2009), among others, normative grief reactions serve as a precursor to other psychological maladjustment, and depending on the provision of social and/or healthcare support, additional symptoms of depression, anxiety, and/or trauma may develop. Future research should seek to further clarify our understanding of the prevalence and role of grief in adjustment following pregnancy loss.

**Interaction Between GA and Healthcare Support.** With regard to healthcare support as a possible buffering variable to the relation between GA at the time of pregnancy loss and psychological outcomes, none of the moderation analyses revealed a statistically significant interaction. It is possible that in using only the Technical Quality subscale of the PSQ-18 (Marshall & Hays, 1994) did not capture enough variability in women's perceptions of healthcare. Additionally, although neither the Communication or General Satisfaction scales of the PSQ-18 were used in study analyses, they both demonstrated poor reliability in the study sample. A large portion of the study's sample also included women in HPSAs, and as such, this sample may not demonstrate large enough variability in healthcare support experiences. For example, women in HPSAs may have limited options for healthcare support and relatedly, not know what to expect as far as quality of support during pregnancy and following loss. However, examination of the standard deviation of the Technical Quality subscale in the present sample suggests relatively greater variability (see Appendix S, Table S5).

Alternatively, a dosage effect, such that women likely have greater contact with social support networks (e.g., family, significant other, friends) than healthcare providers, may explain

the lack of a significant effect regarding healthcare support. In the present sample, 66% of women sought prenatal care prior to their loss. Women who suffered pregnancy loss, especially those with miscarriage, may also have planned to see a healthcare provider but had not seen one for pregnancy- or loss-related care. If so, participants may have endorsed more neutral, prospective perceptions of healthcare providers rather than perceptions based on actual interactions. If a relation does exist with healthcare support, it is possible that women did not report large enough variability of experiences in the present sample, accounting for the lack of significant findings.

It is also important to consider that perhaps there is no effect in the hypothesized relations including healthcare support. Some statistically significant relations were found in regression analyses with healthcare support. Depression symptoms were found to be significantly negatively related to perceived healthcare support. As this is a correlational finding, perhaps women who endorse symptoms of depression perceive healthcare support differently or avoid interacting with healthcare workers. Alternatively, it is possible that the quality of healthcare support is directly related to depression symptoms. In this moderation analysis, maternal age explained a significant negative portion of the variance in depression. Maternal age also explained a significant negative portion of the variance in analyses utilizing trauma and anxiety symptoms as the outcome variables. As mentioned above, existing literature and our theoretical understanding of maternal age within the context of pregnancy loss suggests maternal age is a complex, often inconsistently measured, variable. Of note, maternal age was related to these symptoms even while controlling for other variables in the regression equations. As such, maternal age may play a significant role in our understanding of psychological adjustment following pregnancy loss and should be considered in future research as a possible primary

variable in study analyses. It is possible that maternal age is the most robust predictor in the present study analyses. Alternatively, these findings may suggest that it is important to consider all the variables in the regression analyses comprehensively when studying psychological adjustment following pregnancy loss.

**Main Effect of Healthcare Support.** With regard to the main effect of healthcare support, a statistically significant relation with depression was found in the moderation model, a finding that is consistent with some extant literature (e.g., deMontigny et al., 2017). However, no significant relations were observed in models with grief, trauma, or anxiety as outcome variables. These association were examined while considering other variables and relations in the regression analyses, therefore the main effect of healthcare support and depression was present even while including effects of GA, its interaction with healthcare support, and maternal age. Although a significant main effect was also observed between perceived social support and depression, relations between social support and all other psychological outcomes were not replicated in these models with healthcare support. As highlighted in the reviewed literature for this project, research regarding the impact of healthcare support on psychological adjustment following pregnancy loss is somewhat mixed, such that some have found significant relations that suggest a lack of healthcare support is related to poorer adjustment (e.g., deMontigny et al., 2017), while others have not found differences in psychological outcomes among women who are provided with the opportunity to follow-up with providers (e.g., Nikcevic et al., 1998). The notable difference between deMontigny et al.'s (2017) and Nikcevi et al.'s (1998) findings are that participants in the former study were assessed on perceived satisfaction with healthcare, while those in the later were actually offered the opportunity to follow-up with providers. As such, it makes sense that the present study's findings align more closely with those of



deMontigny et al.'s (2017). These mixed findings suggest that future researchers should examine the nature (e.g., tangible, informational, etc.) and quality (e.g., availability, empathy, time spent) of support provided in healthcare settings as they relate to psychological outcomes. It is also possible that other variables examined in the regression models contribute to psychological adjustment other than perceived healthcare support, or, as discussed in the limitations section below, the present study's measure of healthcare support did not capture adequate variability in women's healthcare experiences.

**Maternal Age.** Maternal age at the time of loss accounted for a statistically significant portion of the variance in psychological adjustment outcomes, except when grief was the outcome variable, which replicates findings from regression models in Hypothesis 1. There are several possible explanations for this null finding presented above for Hypothesis 1. Similar explanations for this finding can be extended to these regression models. Notably, it appears that aside from grief reactions, maternal age serves as an important variable for consideration when examining psychological outcomes following pregnancy loss.

### ***Hypotheses 3 and 4***

Two additional relations were hypothesized, neither of which yielded statistically significant findings. In Hypothesis 3, it was predicted that women who experienced a miscarriage would report lower levels of perceived healthcare and social support than women who experienced stillbirth. Differences in reported levels of support were not found between these groups. Additionally, in Hypothesis 4, it was believed that increased GA at the time of pregnancy loss would be related to greater perceived social and healthcare support. Again, these relations were not statistically significant. As such, the null hypothesis was supported whether we conceptualized GA as a dichotomous or semi-continuous variable.

Similar explanations can be suggested with these null findings as those in some of the moderation analyses, including limited variability in perceived social and healthcare support, or perhaps an overall lack of relation between GA and support following pregnancy loss.

Specifically, it is possible that women may generally experience a lack of perceived support regardless of their pregnancy loss experience, and in that case, timing of the pregnancy loss may not make a difference (e.g., Corbet-Owen, 2003). Alternative variables may also influence perceptions of social and/or healthcare support aside from GA and should be considered in future research projects. For example, differences in women's perceived attachment to the lost child, coping styles following the loss, and whether social and healthcare systems' provision of support match women's coping needs, may also impact perceptions (e.g., Shreffler et al., 2011). Because there are many competing possibilities in the literature regarding variables that may influence perceptions of support following pregnancy loss, as well as varied effect sizes and directions of effect, a systematic review and/or meta-analysis is recommended on the subject to help researchers synthesize and understand this complex research area.

### **Practical Implications**

Methodology and findings from the present project offer several practical implications. Regarding feasibility, the project utilized psychometrically sound, accessible screeners that were administered in a brief period of time and relatively cost-effective manner via MTurk. As such, researchers examining screening should include these characteristics and investigate how screening may inform risk assessment or intervention in women who have experienced pregnancy loss (e.g. Lok et al., 2004). Based on the study's findings, patients and healthcare providers would benefit from screening of psychosocial outcomes and perceptions of support to

make recommendations about appropriate intervention, and it appears feasible to do so using the measures from this study (e.g., Lok et al., 2004).

In examining premorbid mental health diagnoses, present study findings suggest a statistically significant relation to trauma and anxiety symptoms following pregnancy loss. Therefore, healthcare providers should be aware of women's mental health histories, as it may relate to psychological adjustment in the case of pregnancy loss. However, as this finding is correlational, future research should seek to further clarify this possible relation in order to inform more specific clinical recommendations.

In the full regression models with social support, the combination of main and interactive effects as well as the age covariate explained 20% of variance in the anxiety score outcome, which was similar to trauma (20%) and depression (20%), but somewhat lower for grief (14%). As such, screening broadly for psychological maladjustment may be most appropriate. In considering the clinical implications for women in the miscarriage group, as perceived social support increases by 1 unit, maternal anxiety decreases by 6.99 points. Since the PASS (Somerville et al., 2014) categories shift in severity in 20-point increments, this change of nearly 7 points seems clinically important (e.g., an increase in 3 units on the MSPSS, would be associated with a shift from mild/moderate to minimal anxiety on the PASS), suggesting that monitoring anxiety following pregnancy loss appears especially relevant despite the dominance of depression in the miscarriage literature (e.g., Lee & Slade, 1996).

However, it is also important to note that as social support increases by 1 unit, maternal trauma decreases by 6.28 points, depression by 5.71 points, and grief by 3.02 points. Regarding trauma symptoms, the PCL-5 (Weathers, et al., 2013b) offers a cut-off score of 31-33, and authors note that a 5-point change reflects the minimum change score to determine whether an

individual has responded to treatment, and a 10-point change reflects the minimum threshold for clinically meaningful improvement in symptoms (Weathers et al., 2013). Based on these suggested change scores, a 6.28 decrease in points would suggest at least the minimum response to symptomatic change within the perceived presence of social support. In examining depression symptoms on the CESD-R (Eaton et al., 2004), the clinical cut-off between subthreshold depression symptoms and possible major depressive episode is 16 or more total points. Therefore, a change in 5.71 points appears to be at least somewhat clinically meaningful (e.g., an increase in 3 units on the MSPSS, would be associated with a shift from possible major depressive episode to a subthreshold screen on the CESD-R). Although the PBGS measuring grief symptoms (Ritsher & Neugebauer, 2002) does not offer a cut-off score or ranges of clinical significance, the 4-point Likert-type scale used is identical to the CESD-R. Thus, for example, an increase in 1 unit on the MSPSS would correspond to a minor reduction in the frequency of three symptoms (e.g., from experiencing symptoms 1-2 days/week to less than 1 day per week) or a major reduction in the frequency of one symptom (e.g., from experiencing the symptom 5-7 days/week to 1-2 days per week), which seems important within the context of assessing and treating grief.

The present project found that women endorsed symptoms of grief following loss regardless of maternal age. As such, clinicians should utilize measures of grief that offer cut-off scores to differentiate between normative grief reactions and clinical distress. Unfortunately, as the PBGS (Ritsher & Neugebauer, 2002) does not provide cut-off scores, measures such as the ICG (Bonanno et al., 2002) should be considered.

Additionally, as evidenced by the relatively large sample size of the present project, the use of an electronic format for data collection, and for possible future screening and intervention,

is perhaps feasible. With the use of electronic platforms, researchers and practitioners may be able to increase accessibility and tolerance of research participation and treatment. For example, in a randomized control trial, Kersting et al. (2013) demonstrated the feasibility, cost-effectiveness, and psychological impact of a brief, internet-based cognitive-behavioral intervention among women and men who experienced pregnancy loss. They found a reduction in symptoms of trauma and prolonged grief at 12-months follow-up, and noted a low attrition rate from the treatment study (14%; Kersting et al., 2013).

As projected, relations were significant among women who experienced miscarriage, and researchers should strive to investigate socially-based interventions with those experiencing early pregnancy loss (e.g., Brier, 2008). Returning to Bronfenbrenner's Ecological Systems Theory (1994), intervention should not only target the individual patient, but also her broader social context at levels of partners, families, and friends. Specifically, community-based interventions that provide information, address stigma, and offer suggestions for the provision of support for women who experience pregnancy loss is indicated. This may be especially relevant given 50% of the present sample reported self-blame related to their pregnancy loss. Future studies and practitioners should consider screening for self-blame, as well as the presence and impact of social stigma on psychological adjustment so as to inform intervention (Rogers et al., 2019). Additionally, researchers should take into consideration maternal age when examining the psychosocial impact of pregnancy loss. Negative relations between predictor and outcome variables and maternal age suggest increasing age is related to decreased psychological maladjustment (see Appendix P, Table P3). Therefore, it appears that younger mothers may psychologically struggle with pregnancy loss to a greater degree than older women, at least with regard to the current sample's age and other sociodemographic characteristics.

## Study Limitations

As previously noted, the study sample was fairly homogenous aside from geographic diversity. As such, the generalizability of the project findings may be limited to similar populations. The homogeneity within the present sample may be clarified in considering the population who has access to technology to complete online surveys, as well as who is typically aware of research. Historically, racially diverse populations have faced barriers in their access to research participation, in part due to assumptions and exclusions made by White researchers (George et al., 2014). It is therefore important to acknowledge the present study was designed, conducted, and analyzed by a White, cis-gender woman, which may have impacted the diversity of the sample. Future studies should seek to utilize diverse research teams so that a variety of perspectives are included throughout the research process, which may ultimately impact the sociodemographic composition of the sample. Although data collection for the present project was overall successful with regard to sample size, time needed for data collection, and quality of data, the progress of data collection slowed for the stillbirth group, resulting in an increase in compensation from \$1 to \$2 for participants who experienced stillbirth. Group comparisons suggest only a difference in perceived healthcare support scores, suggesting differences in compensation likely did not impact participant responding. Additionally, healthcare support was not a statistically significant moderator in any of the relations proposed in Hypothesis 2. This could be in part be due to differences in sample characteristics or study features as compared to the research that has found statistically significant relations. For example, Harden (2018)'s review of the literature notes diversity in other research samples, such as rurality, race, and socioeconomic status. It is also notable that a large portion of the healthcare support literature is conducted within the field of midwifery, social work, education, and others, and include what

appears to be a higher number of qualitative methods (e.g., Rowlands & Lee, 2010; Cullen et al., 2017). Therefore, future psychological studies may also consider the inclusion of both qualitative and quantitative reporting when examining women's experiences of healthcare support. This may be particularly relevant given the lack of a psychometrically sound measure of healthcare support that is specific to pregnancy loss experiences. The Communication and General Satisfaction scales of the PSQ-18 demonstrated poor reliability in the study sample, although neither scale was used for study analyses (Marshall & Hays, 1994). Therefore, future studies should examine the reliability of these scales prior to planned data analyses. Additionally, related to healthcare support, the present project did not define what a public versus private hospital was in question 12 of the Reproductive History Questionnaire (see Appendix B). As such, women may not have known which category was most representative of their healthcare institution, and future projects should consider defining these constructs further. For example, perhaps federal, state, and county hospitals may be best categorized as public, while for-profit hospitals are considered private institutions. An additional limitation to the present study was the use of self-report measures (Paulhus & Vazire, 2007) and retrospective reporting (Ellison et al., 2020) for a period of up to 2 years, which may indicate reporting biases and issues with recall of emotional states. As highlighted in the review of findings from the study's Reproductive History Questionnaire, certain questions (e.g., how many children living with at time of loss) were not specific enough to directly compare to reproductive findings from other projects (e.g., Tavoli et al., 2018). Suggestions for additional specification on these questions is highlighted above (e.g., include pregnancy intention, desire, and physiological outcomes), however, future researchers should seek to standardize measures assessing reproductive history in light of current study limitations and variability reproductive questionnaires across the literature. Finally, the study

was also cross-sectional in nature, therefore conclusions could not be drawn as to the duration of psychological symptoms and support (Spector, 2019).

### **Study Strengths**

The present study design included several notable strengths that may inform future research with women who have experienced pregnancy loss. The study was novel in its use of MTurk for data collection, and the success of this data collection, within a relatively short time (i.e., just over 1 month), suggests this online platform is likely appropriate for researching this population in the future. Data collection also occurred at the height of a global pandemic, a time in which in-person data collection was impacted by safety restrictions characterized by social distancing and quarantine. In these exigent circumstances, MTurk proved to be a powerful tool for data collection and appeared feasible for use among participants across the country.

The project also used psychometrically sound and quantitative questionnaires to measure primary study variables. All measures used performed well in the present study, aside from the General Satisfaction and Communication subscales on the PSQ-18 (Marshall & Hays, 1994), which were not used for study analyses. Notably, the measures chosen for the study are readily accessible and appropriate for both clinical and research use. As participants only took an average of approximately 18 minutes to complete the entire survey, it is likely that some or all of these questionnaires could be administered in a clinical setting in a timely manner as well. Although the sample was homogenous with respect to race, religion, education, and economic status, the majority of the sample lived in a HPSA and participants represented 36 unique U.S. states, demonstrating geographic diversity.

The present study also investigated an area of the literature that is relatively understudied, using robust statistical methodology to examine multivariate relations. Specifically, the project



examined nuances between miscarriage and stillbirth with regard to some of the most commonly reported psychological outcomes experienced by this population, and the role of both social and institutional support. As highlighted by existing research, women suffering pregnancy loss may suffer in silence, though a significant number report experiencing stigma and complex psychological symptoms with regard to adjustment (e.g., van den Akker, 2011). The prevalence of challenging psychological adjustment was also reflected in the present study sample. In considering women's contexts across numerous societal levels (Bronfenbrenner, 1994), family, friends, significant others, and healthcare institutions and providers can play an important role in these outcomes and should be studied further to inform assessment and treatment of the sequelae of pregnancy loss.

### **Additional Future Directions**

Suggestions for future directions have been noted throughout the Discussion section of this document, however, additional general recommendations are highlighted here. As noted above, data collection for the present project occurred during the COVID-19 pandemic, which resulted in important considerations for findings and interpretation. Remaining consistent with Bronfenbrenner's Ecological Systems Theory (1994), future researchers and clinicians (Rogers et al., 2019) should qualify their work that occurs within the context of the pandemic.

Future projects seeking to examine psychosocial outcomes related to pregnancy loss would benefit from longitudinal design to reduce the need for retrospective reporting, to better understand the duration of psychological symptoms, and inform timely support. For example, following women from the time of their loss to up to 2 years after pregnancy loss, and pooling data across a variety of women's healthcare settings, would help capture this information without the present study's limitations. Additionally, future projects may examine women's own

categorization of their pregnancy loss as miscarriage or stillbirth, and compare these to conventions in the field (e.g., before or after 20 weeks gestation). The labels women use to describe their pregnancy loss may impact their use of support, including access of healthcare resources, and psychological sequelae. For example, if a woman loses a pregnancy at 25 weeks gestation but categorizes the loss as a miscarriage rather than a stillbirth, she may not associate with social stigma related to stillbirth and may therefore experience improved psychological adjustment following the loss.

As previously defined by theorists in the field, social support can be offered in a variety of forms, such as emotional, informational, companionship, and instrumental (e.g., Bicking Kinsey et al., 2015; Cohen & Wills, 1985). Understanding which forms of support, as well as which members of the social network they are provided by, may help specify targets for intervention. For example, if future research were to discover that mothers primarily benefit from companionship support provided by their close friends following pregnancy loss, clinicians may be able to encourage provision of this form of support by a woman's friends through intervention. Additionally, some prior research has examined the impact of pregnancy loss on couples and families, as well as mothers (e.g., Abboud & Liamputtong, 2005). Understanding the unique impacts of pregnancy loss on other members of families, as well as relationships among family members (e.g., couples, parents and children, siblings) may serve to further clarify the role of family as a source of social support for mothers, and subsequently inform family-based interventions (e.g., Cacciatore et al., 2009). Further understanding of women's pregnancy intention, especially as it relates to maternal age, may also clarify differences in psychosocial coping following pregnancy loss. It is possible that pregnancy intention varies based on maternal age, and that perhaps those who lose an intended pregnancy experience greater psychological

maladjustment compared to those who lose an unintended pregnancy. Understanding these relations would help highlight women most vulnerable to psychological symptoms following pregnancy loss, and may also inform targeted intervention. Therefore, future studies should consider assessing women's pregnancy intention when evaluating perceptions of loss.

Although this study included a national, geographically representative sample, other aspects of diversity (e.g., race, religion, socioeconomic status) were less represented. As such, some of the current findings may not be generalizable to the larger U.S. population. It is possible that certain demographic characteristics were less represented due to the online nature of the study (Sparks, 2013). Future projects should consider offering both online and hard, paper copies of the survey to increase accessibility to the research study. It is recommended that recruitment occur at a variety of healthcare settings, including public and private hospitals, as well as smaller, community clinics, both in urban and rural areas across the country. Women from under-resourced communities, or low socioeconomic backgrounds, may be difficult to reach for both research and intervention. In a systematic review of the literature, Bonevski et al. (2014) highlight a number of strategies for recruitment of socially disadvantaged groups including use of: a combination of recruitment methods (e.g., snow-ball sampling, use of social networks, oversampling, etc.) and venues (e.g., radio, social media, community-based organizations and events (e.g., knitting club)), door-to-door recruitment, telephone calling, mailers); detailed handouts at a variety of healthcare settings to address barriers related to busy clinicians and communication skills; inclusive language methods (e.g., translators, Photovoice to tell stories through images); incentives and gifts; and community/participant involvement in intervention/study design. In considering all these possible methods, the researchers highlight the

important role of building trusting relationships within underserved/resourced communities (Bonevski et al., 2014).

The present study also required a shift in study procedures, including changing the title of the study in MTurk and increasing compensation. Future research utilizing MTurk as a recruitment and data collection platform should consider using more specific study titles to target populations of interest (e.g., miscarriage versus stillbirth) and consider higher compensation, which may be more possible outside of the context of a dissertation.

With regard to the content of the survey, this area of research would benefit from a more specific and comprehensive measure of healthcare support tailored for women who have experienced pregnancy loss and sought women's healthcare. Additionally, in developing a measure of healthcare support, researchers should consider creating a global score rather than exclusively subscale scores. Although the specific types of physicians were not identified in the present sample (e.g., general practitioner versus Ob/Gyn), approximately 66% of participants reportedly received prenatal care from a physician. Future studies should further seek to understand whether prenatal healthcare providers specialize in obstetric care, as it may have implications for the specificity of care received. It is possible that healthcare professionals with specified training in obstetrics may feel more competent and have the emotional bandwidth to provide care surrounding pregnancy loss (e.g., Ellis et al., 2016). When evaluating women's healthcare experiences, future researchers should also inquire about women's experiences with medical interventions as a part of the pregnancy loss (e.g., evacuation). It is possible that maternal age and the GA of the pregnancy loss impact the likelihood of medical intervention, and that psychological outcomes are influenced by women's experiences with medical procedures. For example, pregnancies complicated by very younger or older maternal age, and/or

advanced GA, may be more likely to require medical intervention and therefore may also have more stressful or traumatic experiences that impact psychological symptoms following the pregnancy loss.

Recent models of prenatal care also propose group prenatal care visits that may address healthcare costs, limited provider availability, limited time for education and support, and long wait times for appointments. Early research suggests that patients receiving group prenatal care visits report increased knowledge, preparedness for labor and delivery, satisfaction with visits, and breastfeeding initiation in the postpartum (ACOG, 2018b). Future studies may also consider examining use of group visits compared to individual visits for prenatal and/or post-pregnancy loss care as related to psychological outcomes, as this may have implications for the implementation of cost-effective treatment approaches and increased patient satisfaction (e.g., emotional and informational support).

Finally, in considering the structure of the project's survey, participants may appreciate ending their research experience by having the opportunity to reflect on positive experiences, highlighting resilience or strength, or engaging in a positive psychology exercise (e.g., gratitude). Extant research on the construction of studies suggests ending participation on a positive note results in more positive impressions, a psychological heuristic called the peak-end rule (Finn, 2010; Kahneman et al., 1993). Notably, the peak-end rule posits that individuals judge events based on the most intense point and the end of the experience (Kahneman et al., 1993). In light of the present project's potentially emotionally challenging subject, future studies may seek to improve participant experience by constructing a survey with a positive ending. Future projects should also consider examining possible risk and resiliency factors, illustrated by the covariates selected for the present project, such as premorbid mental health diagnoses (Athey & Spielvogel,

2000), presence of children in the home (e.g., Tavoli et al., 2018), income (e.g., Giannandrea et al., 2013), and insurance coverage (e.g., Robertson Blackmore et al., 2011). Understanding the impact of these variables on pregnancy loss outcomes beyond their relation to GA may elucidate additional points for possible prevention and intervention.

## **Conclusion**

The extant body of literature on pregnancy loss has demonstrated a relation between loss, psychological outcomes, and the role of support systems (e.g., Bhat & Byatt, 2016). As nearly 10% of pregnancies in the U.S. result in miscarriage and nearly 1% result in stillbirth, annually, elucidating the specific relations between these factors has important implications for understanding psychological outcomes and opportunities for intervention (ACOG, 2018; CDC, 2017). Unfortunately, pregnancy loss is often experienced as an ambiguous death that may go unrecognized and unsupported by societies with strong pro-natal attitudes (Geller, 2004; van den Akker, 2011). As a result, women may experience several adverse psychological outcomes, including grief, depression, anxiety, and trauma (e.g., Bhat & Byatt, 2016). Review of the literature suggests opportunities for a variety of supportive interventions at numerous levels, including healthcare and social support networks made up of significant others, family, and friends (e.g., Bellhouse et al., 2018; van den Akker, 2011). Using an online survey design, the present study sought to expand our understanding of these relations by examining the timing of pregnancy loss, commonly reported psychological outcomes, and the moderating role of social and institutional support.

Notably, perceived social support was found to buffer the effect of psychological maladjustment following pregnancy loss, particularly among women who experienced miscarriage. Maternal age explained a portion of the variance in this relation for analyses of

depression, anxiety, and trauma. The largest effect of perceived social support was found in examining symptoms of anxiety. Interestingly, these findings were not replicated among women who suffered stillbirth or with perceived healthcare support. Possible limitations that may have resulted in these null findings included a homogenous sample, poor reliability of the measure of healthcare support, changes in compensation of subjects part-way through the study, and the self-reported, retrospective, and cross-sectional nature of the study design. Several study strengths are also highlighted, including novel use of MTurk data collection in a pregnancy loss population, use of psychometrically sound measures, geographic diversity in the sample, and multivariate investigation of understudied population. Practically, the study's findings demonstrate specific implications for assessment and intervention research following pregnancy loss, including use of reliable screening questionnaires, community-based support, and the role of maternal age. While the present study offers additional insight to the experiences and study of women suffering pregnancy loss, several future directions are indicated. Suggestions for future projects include longitudinal design, further elucidation of the type and providers of social support following pregnancy loss, and examining the broader impact of pregnancy loss on families and the subsequent impact of social support. Additionally, future studies should consider methods of data collection that are broader and more inclusive of those without access to technology, as it may impact the diversity of the sample and generalizability of findings. In considering the construction of surveys focused on emotionally taxing subjects such as pregnancy loss, researchers and participants may benefit from closing the survey with an opportunity for a positive experience. Future research should also focus on developing a measure of healthcare support that is specific to pregnancy loss and offer a more comprehensive evaluation of experiences in healthcare. Finally, future projects should also consider examining possible risk

and resiliency factors, perhaps by examining the covariates selected for the present project. A focus on each of these directions for future research will lend itself to a more comprehensive understanding of women's experiences following pregnancy loss. Ultimately, the goal is that such research would inform policy and intervention to improve upon the lives of women with historically marginalized and stigmatized experiences.



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## Appendix A

### Sociodemographic Questionnaire

1. What was your age in years at the time of your pregnancy loss?
2. What is the highest degree of education you had completed at the time of your pregnancy loss?
  - a. Less than 7<sup>th</sup> grade
  - b. Junior high school (7<sup>th</sup> to 9<sup>th</sup> grade)
  - c. Partial high school (10<sup>th</sup> to 12<sup>th</sup> grade)
  - d. High school degree (including GED)
  - e. Partial college (minimum 1 year), Associate degree, or other specialized/technical training
  - f. Standard college or university degree (BA/BS)
  - g. Graduate training with degree (e.g., MA/MS, PhD/MD, etc.)
3. What was your approximate annual household income in the year you lost your pregnancy?
4. Did you have insurance coverage for your medical needs at the time of your pregnancy loss?
5. What state did you live in during your pregnancy loss?
6. What zip code did you reside in during your pregnancy loss?
7. What religion do you identify with?  
Are your eyes purple? Mark yes for this question.
  - a. Yes
  - b. No
8. Are you of Hispanic, Latino, or Spanish origin?
  - a. No, not of Hispanic, Latino, or Spanish origin
  - b. Yes, Mexican, Mexican American, Chicano
  - c. Yes, Puerto Rican
  - d. Yes, Cuban
  - e. Yes, another Hispanic, Latino, or Spanish origin



9. What is your race? Select all that apply.

- a. White (for example, German, Irish, English, Italian, Lebanese, Egyptian, etc.)
- b. Black or African American (for example, African American, Jamaican, Haitian, Nigerian, Ethiopian, Somali, etc)
- c. American Indian or Alaska Native (for example, Navajo Nation, Blackfeet Tribe, Mayan, Aztec, Native Village of Barrow Inupiat Traditional Government, Nome Eskimo Community, etc)
- d. Asian (e.g, Chinese, Filipino, Asian Indian, Vietnamese, Korean, Japanese, Pakistani, Cambodian, Hmong, etc)
- e. Pacific Islander (e.g., Native Hawaiian, Samoan, Chamorro, Tongan, Figian, Marshallese, etc)
- f. Other race not previously listed

## Appendix B

### Reproductive History Questionnaire

1. How many pregnancy losses have you experienced in total (excluding planned abortions)?

2. How many pregnancies have you carried to at least 20 weeks gestation (multiple pregnancies such as twins count as one; live births, stillbirths, and miscarriages each count)?

3. How many times have you been pregnant (live births, stillbirths, and miscarriages each count)?

Please answer the following questions with your most recent (within the last 2 years) pregnancy loss

in mind. If you have experienced more than one pregnancy loss in the last 2 years, please keep in mind the most distressing one as you answer the following questions.

4. How many weeks pregnant were you when you lost your pregnancy?

5. What was the date of this pregnancy loss?

6. How many children did you live with at the time of your pregnancy loss?

7. Did you use any reproductive assistance technology (e.g., IVF) to conceive your lost pregnancy? If so, please specify.

8. Was the pregnancy you lost a planned pregnancy (e.g., did you intend to become pregnant)?

a. Yes

b. No

9. Prior to your most distressing pregnancy loss, how many mental health disorders, such as anxiety or depression, were you diagnosed with? If none, please enter 0.

a. (If any response other than 0) Please list these diagnoses:

10. Are you currently pregnant?

a. Yes

b. No

11. Have you given birth to a child since your most recent pregnancy loss?

a. Yes

b. No

12. Which of the following best describes the type of healthcare organization you received care from following your pregnancy loss?

- a. Community clinic
- b. Private medical office
- c. Public hospital
- d. Private hospital
- e. Home care
- f. Other
- g. None

13. Which of the following best describes the type of healthcare provider that primarily provided you with care following your pregnancy loss?

- a. Nurse (e.g., RN)
- b. Nurse practitioner (e.g., NP)
- c. Physician's assistant (e.g., PA)
- d. Medical physician (e.g., MD, DO, OB/GYN)
- e. Doula
- f. Midwife
- g. Other
- h. None

If you are female, please mark no, never.

Yes, always

No, never

Sometimes, not sure

14. Did you use any online support groups following your pregnancy loss?

- a. Yes
- b. No

15. Do you know what caused/contributed to your pregnancy loss?

- a. If so, please describe.

16. Do you blame yourself or think it is your fault that you lost your pregnancy?

a. Yes

b. No

## Appendix C

### The Perinatal Bereavement Grief Scale (PBGS)

Please consider your thoughts and feelings following your most distressing pregnancy loss in the last 2 years. Please mark if you have felt or thought these things rarely, some of the time, a moderate amount of time, or most of the time in the past week.

	Rarely or none of the time (less than 1 day)	Some of the time (1-2 days)	A moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
1. You found yourself walking like a pregnant woman.	1	2	3	4
2. You felt as if the baby were still inside of you.	1	2	3	4
3. You dreamed you were still pregnant.	1	2	3	4
4. You felt physically ill when you thought about the miscarriage.	1	2	3	4
5. You felt as if you were still pregnant.	1	2	3	4
6. You wanted to hold the baby in your arms.	1	2	3	4
7. You found yourself planning things for the baby as though you were still pregnant.	1	2	3	4
<b>** You must mark a moderate amount of time for this question.</b>	<b>1</b>	<b>2</b>	<b>3</b>	<b>4</b>
8. You found it easy to think about things other than the baby.*	1	2	3	4
9. You patted or held your belly as though you were still pregnant.	1	2	3	4
10. You felt as if there were an empty space inside of you.	1	2	3	4
11. You longed for the baby.	1	2	3	4
12. You felt like wearing maternity clothes.	1	2	3	4
13. You wondered whether you would have a boy or a girl.	1	2	3	4
14. You imagined what the baby would have looked like.	1	2	3	4
15. You dreamt about the baby.	1	2	3	4

\* Reverse coded

Sum items to receive a total score ranging between 15-60.

## Appendix D

### Center for Epidemiological Studies Depression Scale Revised

LAST WEEK

Below is a list of the ways you might have

felt or behaved following your most

distressing pregnancy loss in the last 2

years. Please mark how often you felt this

way following that loss.

	Not at all <i>or</i> Less than 1 day	1-2 days	3-4 days	5-7 days	Nearly every day for 2 weeks
My appetite was poor.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could not shake off the blues.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I had trouble keeping my mind on what I	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I felt depressed.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
My sleep was restless.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I never ate food again.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I felt sad.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could not get going.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Nothing made me happy.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I felt like a bad person.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I lost interest in my usual activities.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I slept much more than usual.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I felt like I was moving too slowly.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I felt fidgety.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I wished I were dead.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I wanted to hurt myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I was tired all the time.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I did not like myself.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I lost a lot of weight without trying to.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

I felt that the rain was wet.	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
I had a lot of trouble getting to sleep.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
I could not focus on the important things.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## Appendix E

### Perinatal Anxiety Screening Scale (PASS)

Please tick the response that **most closely** describes your experience for **every** question. Keep in mind that your responses should reflect your experiences after your most distressing pregnancy loss within the last 2 years.

	Not at all	Sometimes	Often	Almost Always
1. Worry about the baby/pregnancy	0	1	2	3
2. Fear of harm to fertility/ability to have a baby	0	1	2	3
3. A sense of dread that something bad is going to happen	0	1	2	3
4. Worry about many things	0	1	2	3
5. Worry about the future	0	1	2	3
6. Feeling overwhelmed	0	1	2	3
7. Really strong fears about things, eg needles, blood, birth, pain, etc	0	1	2	3
8. Sudden rushes of extreme fear or discomfort	0	1	2	3
9. Repetitive thoughts that are difficult to stop or control	0	1	2	3
10. Difficulty sleeping even when I have the chance to sleep	0	1	2	3
11. Having to do things in a certain way or order	0	1	2	3
12. Wanting things to be perfect	0	1	2	3
13. Needing to be in control of things	0	1	2	3
14. Difficulty stopping checking or doing things over and over	0	1	2	3
15. Feeling jumpy or easily startled	0	1	2	3
16. Concerns about repeated thoughts	0	1	2	3
17. Being 'on guard' or needing to watch out for things	0	1	2	3
18. Upset about repeated memories, dreams or nightmares	0	1	2	3
19. Worry that I will embarrass myself in front of others	0	1	2	3
20. Fear that others will judge me negatively	0	1	2	3
21. Feeling really uneasy in crowds	0	1	2	3
22. Avoiding social activities because I might be nervous	0	1	2	3



23. Avoiding things which concern me	0	1	2	3
24. Feeling detached like you're watching yourself in a movie	0	1	2	3
25. Losing track of time and can't remember what happened	0	1	2	3
<b>**Choose almost always for this question.</b>	<b>0</b>	<b>1</b>	<b>2</b>	<b>3</b>
26. Difficulty adjusting to recent changes	0	1	2	3
27. Anxiety getting in the way of being able to do things	0	1	2	3
28. Racing thoughts making it hard to concentrate	0	1	2	3
29. Fear of losing control	0	1	2	3
30. Feeling panicky	0	1	2	3
31. Feeling agitated	0	1	2	3
Global Score				

### **Women and Newborn Health Service**

### **King Edward Memorial Hospital**

### **Western Australia**

### **Women's Health Care Clinical Care Unit (WHCCU) Department of Psychological Medicine**

**Reference:** Somerville, S., Dedman, K., Hagan, R., Oxnam, E., Wettinger, M., Byrne, S., Coe, S., Doherty, D., Page, A.C. (2014).

The Perinatal Anxiety Screening Scale: development and preliminary validation. *Archives of Women's Mental Health*, DOI: 10.1007/s00737-014-0425-8

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## Appendix F

### PTSD Checklist for DSM-5 (PCL-5)

**Instructions:** Below is a list of problems that people sometimes have in response to a very stressful experience. Please read each problem carefully and then mark the response to indicate how much you have been bothered by your most distressing pregnancy loss within the last 2 years.

In the past month, how much were you bothered by:	Not at all	A little bit	Moderately	Quite a bit	Extremely
1. Repeated, disturbing, and unwanted memories of the stressful experience?	0	1	2	3	4
2. Repeated, disturbing dreams of the stressful experience?	0	1	2	3	4
3. Suddenly feeling or acting as if the stressful experience were actually happening again (as if you were actually back there reliving it)?	0	1	2	3	4
4. Feeling very upset when something reminded you of the stressful experience?	0	1	2	3	4
5. Having strong physical reactions when something reminded you of the stressful experience (for example, heart pounding, trouble breathing, sweating)?	0	1	2	3	4
6. Avoiding memories, thoughts, or feelings related to the stressful experience?	0	1	2	3	4
7. Avoiding external reminders of the stressful experience (for example, people, places, conversations, activities, objects, or situations)?	0	1	2	3	4
8. Trouble remembering important parts of the stressful experience?	0	1	2	3	4

9. Having strong negative beliefs about yourself, other people, or the world (for example, having thoughts such as: I am bad, there is something seriously wrong with me, no one can be trusted, the world is completely dangerous)?	0	1	2	3	4
10. Blaming yourself or someone else for the stressful experience or what happened after it?	0	1	2	3	4
**Realizing that you attended elementary school before high school?	0	1	2	3	4
11. Having strong negative feelings such as fear, horror, anger, guilt, or shame?	0	1	2	3	4
12. Loss of interest in activities that you used to enjoy?	0	1	2	3	4
13. Feeling distant or cut off from other people?	0	1	2	3	4
14. Trouble experiencing positive feelings (for example, being unable to feel happiness or have loving feelings for people close to you)?	0	1	2	3	4
15. Irritable behavior, angry outbursts, or acting aggressively?	0	1	2	3	4
16. Taking too many risks or doing things that could cause you harm?	0	1	2	3	4
17. Being “superalert” or watchful or on guard?	0	1	2	3	4
18. Feeling jumpy or easily startled?	0	1	2	3	4
19. Having difficulty concentrating?	0	1	2	3	4
20. Trouble falling or staying asleep?	0	1	2	3	4

## Appendix G

### Short-Form Patient Satisfaction Questionnaire (PSQ-18)

These next questions are about how you feel about the medical care you received. On the following pages are some things people say about medical care. Please read each one carefully, keeping in mind the medical care you received following your most distressing pregnancy loss within the last 2 years. We are interested in your feelings, good and bad, about the medical care you have received.

How strongly do you AGREE or DISAGREE with each of the following statements?

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
1. Doctors are good about explaining the reason for my pregnancy loss...	1	2	3	4	5
2. I think my doctor's office has everything needed to provide complete medical care...	1	2	3	4	5
3. The medical care I have been receiving is just about perfect...	1	2	3	4	5
**Select disagree for this item...					
4. Sometimes doctors make me wonder if their diagnosis is correct...	1	2	3	4	5
5. I feel confident that I can get the medical care I need without being set back financially...	1	2	3	4	5
6. When I go for medical care, they are careful to check everything when treating and examining me...	1	2	3	4	5
7. I have to pay for more of my medical care than I can afford...	1	2	3	4	5
8. I have easy access to the medical specialists I need...	1	2	3	4	5
9. Where I get medical care, people have to wait too long for follow-up care...	1	2	3	4	5
10. Doctors act too businesslike and impersonal toward me...	1	2	3	4	5

11. My doctors treat me in a very friendly and courteous manner...	1	2	3	4	5
12. Those who provide my medical care sometimes hurry too much when they treat me...	1	2	3	4	5
13. Doctors sometimes ignore what I tell them...	1	2	3	4	5
14. I have some doubts about the ability of the doctors who treat me...	1	2	3	4	5
15. Doctors usually spend plenty of time with me...	1	2	3	4	5
**My dentist provides me with medical care for my pregnancy...					
16. I find it hard to get an appointment for medical care right now...	1	2	3	4	5
17. I am dissatisfied with some things about the medical care I receive...	1	2	3	4	5
18. I am able to get medical care whenever I need it...	1	2	3	4	5

## Appendix H

### Multidimensional Scale of Perceived Social Support

Instructions: We are interested in how you feel about the following statements in relation to your most distressing pregnancy loss in the last 2 years. Read each statement carefully. Indicate how you feel about each statement. When answering questions about the support you received from **friends**, please include any support you received from online support groups.

Circle the “1” if you **Very Strongly Disagree**

Circle the “2” if you **Strongly Disagree**

Circle the “3” if you **Mildly Disagree**

Circle the “4” if you are **Neutral**

Circle the “5” if you **Mildly Agree**

Circle the “6” if you **Strongly Agree**

Circle the “7” if you **Very Strongly Agree**

1. I have a significant other who is around when I am in need.	1	2	3	4	5	6	7
2. I have a significant other with whom I can share my joys and sorrows.	1	2	3	4	5	6	7
3. My family really tries to help me.	1	2	3	4	5	6	7
4. I get the emotional help & support I need from my family.	1	2	3	4	5	6	7
5. I have a significant other who is a real source of comfort to me.	1	2	3	4	5	6	7
6. My friends really try to help me.	1	2	3	4	5	6	7
7. I can count on my friends when things go wrong.	1	2	3	4	5	6	7
8. I can talk about my problems with my family.	1	2	3	4	5	6	7
9. I have friends with whom I can share my joys and sorrows.	1	2	3	4	5	6	7

10. I have a significant other in my life who cares about my feelings.	1	2	3	4	5	6	7
11. My family is willing to help me make decisions.	1	2	3	4	5	6	7
**Choose very strongly agree.	1	2	3	4	5	6	7
12. I can talk about my problems with my friends.	1	2	3	4	5	6	7

## Appendix I

### Qualification Questions

- 1) What was your biological sex assigned at birth?
  - a. Male
  - b. Female
- 2) Are you 18 years of age or older?
  - a. Yes
  - b. No
- 3) Have you experienced a pregnancy loss within the last 2 years?
  - a. Yes
  - b. No
- 4) Was your pregnancy loss a planned abortion?
  - a. Yes
  - b. No
- 5) Did you live in the US and receive healthcare in the US during your pregnancy and its loss?
  - a. Yes
  - b. No
- 6) How many weeks gestation was your most recent pregnancy loss?
  - a. Less than or equal to 20 weeks gestation
  - b. More than 20 weeks gestation



## **Appendix J**

### **Informed Consent Version 1**

Idaho State University (ISU)  
Human Subjects Committee  
Informed Consent Form for Non-Medical Research  
MTurk Participation

#### **CONSENT TO PARTICIPATE IN RESEARCH**

##### **Women's Physical and Emotional Health**

You are asked to be in a research study. The study is conducted by Jessica Riedstra M.S. and her mentor Dr. Nicki Aubuchon-Endsley, faculty in Psychology at Idaho State University (ISU). You are asked because you are an adult (18+ years) who has experienced pregnancy loss in the past 2 years. We plan to enroll 130 women. Participation is voluntary. Read details below before agreeing to participate.

#### **1. STUDY PURPOSE**

The study explores pregnancy loss experiences and different levels of support, including social and healthcare support. Reproductive history and cultural variables will help capture characteristics of women who have experienced pregnancy loss.

#### **2. PROCEDURES**

If you meet eligibility criteria you will be invited to complete an online survey. If you consent, we ask you to answer questions. This includes ethnicity/race, reproductive history, mood/psychological factors, and different types of support.

#### **3. POTENTIAL RISKS AND DISCOMFORTS**

**Questionnaires:** Some questions about experiences and feelings may make you uncomfortable.

##### **Addressing Potential Risks and Discomforts**

If you are uncomfortable you may skip questions or discontinue at any time.  
The procedure may involve unforeseeable risks.

#### **4. ANTICIPATED BENEFITS TO SUBJECTS**

The study is not meant to improve health. It may increase understanding of your thoughts, feelings, and behavior.

#### **5. ANTICIPATED BENEFITS TO SOCIETY**

This study may increase knowledge of pregnancy loss effects on women's psychological health. This may inform provision of various types of support following pregnancy loss.

#### **6. ALTERNATIVES TO PARTICIPATION**

This is not a treatment study. Information is collect for research only. The alternative is not to participate. You may discontinue at any time.

## **7. PAYMENT FOR PARTICIPATION**

You are paid \$1 after completing the online survey. You can only participate in the survey once and will not be compensated for additional participation in the study. In order to receive compensation your participation must meet the following criteria:

- a. Pass at least 3 of 4 of the instruction questions.
- b. Have at least a 95% approval rating on MTurk and have completed at least 50 prior studies.
- c. Pass at least 80% of attention checks.
- d. Complete the survey in 7 or more minutes to ensure quality responses.
- e. Provide answers that make sense given the question.
- f. Must be able to read in English.
- g. You agree to participate in the study.
- h. You are over the age of 18.

If you fail to meet these criteria at any point during the survey or after review of your responses, you will not receive compensation. These guidelines follow MTurk policy stating that “a Requester may reject your work if the HIT was not completed correctly or the instructions were not followed.”

## **8. FINANCIAL OBLIGATIONS**

We do not anticipate personal expenses for your participation in this study.

## **9. PRIVACY AND CONFIDENTIALITY**

### **Data Collection, Storage, and Confidentiality:**

When presenting study results, no information will reveal your identity.

### **Data Disposal:**

All data will be stored until all data is collected and analyzed for research projects.

## **10. PARTICIPATION AND WITHDRAWAL**

Your participation is VOLUNTARY. Non-participation does not affect your relationship with ISU. You may withdraw consent and discontinue at any time without penalty.

## Appendix K

### Informed Consent Version 2

Idaho State University (ISU)  
Human Subjects Committee  
Informed Consent Form for Non-Medical Research  
MTurk Participation

#### **CONSENT TO PARTICIPATE IN RESEARCH**

Late Term Pregnancy Loss and Emotional Outcomes

You are asked to be in a research study. The study is conducted by Jessica Riedstra M.S. and her mentor Dr. Nicki Aubuchon-Endsley, faculty in Psychology at Idaho State University (ISU). We plan to enroll 130 women. Participation is voluntary. Read details below before agreeing to participate.

#### **11. STUDY PURPOSE**

The study explores pregnancy loss experiences (e.g., sadness, worry, grief) and different levels of support, including social and healthcare support. Reproductive history (e.g., history of pregnancy, reproductive loss, obstetric healthcare) and cultural variables (e.g., race/ethnicity) will help capture characteristics of women who have experienced pregnancy loss.

#### **12. PROCEDURES**

If you meet eligibility criteria you will be invited to complete an online survey consisting of 8 questionnaires. The total completion time is approximately 20 minutes. If you consent, we ask you to answer questions. This includes ethnicity/race, reproductive history, mood/psychological factors, and different types of support.

#### **13. POTENTIAL RISKS AND DISCOMFORTS**

**Questionnaires:** Some questions about experiences and feelings include very sensitive issues (e.g., pregnancy loss) and participants may find them upsetting.

#### **Addressing Potential Risks and Discomforts**

If you are uncomfortable you may skip questions or discontinue at any time. At the end of the survey, a debrief of the study will be provided which includes additional resources to help you address distress you may experience. The procedure may involve unforeseeable risks.

#### **14. ANTICIPATED BENEFITS TO SUBJECTS**

The study is not meant to improve health. It may increase understanding of your thoughts, feelings, and behavior.

#### **15. ANTICIPATED BENEFITS TO SOCIETY**

This study may increase knowledge of pregnancy loss effects on women's psychological health. This may inform provision of various types of support following pregnancy loss.

## **16. ALTERNATIVES TO PARTICIPATION**

This is not a treatment study. Information is collect for research only. The alternative is not to participate. You may discontinue at any time.

## **17. PAYMENT FOR PARTICIPATION**

You are paid \$2 after completing the online survey. You can only participate in the survey once and will not be compensated for additional participation in the study. In order to receive compensation your participation must meet the following criteria:

- a. Pass all of the qualifying questions to verify eligibility.
- b. Pass at least 3 of 4 of the instruction questions.
- c. Have at least a 70% approval rating on MTurk and have completed at least 50 prior studies.
- d. Pass at least 80% of attention checks.
- e. Complete the survey in at least 10 minutes but no more than 60 minutes to ensure quality responses.
- f. Complete at least 80% of the survey questions.
- g. Provide answers that make sense given the question.
- h. Must be able to read in English.
- i. You agree to participate in the study.
- j. You are over the age of 18.

If you fail to meet these criteria at any point during the survey or after review of your responses, you will not receive compensation. These guidelines follow MTurk policy stating that “a Requester may reject your work if the HIT was not completed correctly or the instructions were not followed.”

## **18. FINANCIAL OBLIGATIONS**

We do not anticipate personal expenses for your participation in this study.

## **19. PRIVACY AND CONFIDENTIALTIY**

### **Data Collection, Storage, and Confidentiality:**

When presenting study results, no information will reveal your identity.

### **Data Disposal:**

All data will be stored until all data is collected and analyzed for research projects.

## **20. PARTICIPATION AND WITHDRAWAL**

Your participation is VOLUNTARY. Non-participation does not affect your relationship with ISU. You may withdraw consent and discontinue at any time without penalty.

If you have any questions about your rights as a research participant, you may contact the Idaho State University Human Subjects Committee at (208) 282-2179 or by writing to the Human Subjects Committee at Idaho State University, Mail Stop 8046, Pocatello, ID 83209.

## Appendix L

### Instructions and Instruction Questions

Thank you for agreeing to participate in this study. The researchers are interested in looking at women's experiences following pregnancy loss, which can include miscarriage or stillbirth but not planned abortion. In order to participate, you must have experienced a pregnancy loss and must be 18 years or older. Women may experience a variety of emotional reactions following pregnancy loss, and the researchers of this study are interested in investigating how women mentally adjust. Please take your time and respond to each item thoughtfully.

1. What are researchers interested in studying in this project?
  - a. What flavor of ice cream women most crave during pregnancy
  - b. How women mentally adjust after pregnancy loss
  - c. How fathers react to pregnancy announcements
  - d. Whether women get married before they become pregnant
2. Can women experience many different reactions to pregnancy loss?
  - a. Yes
  - b. No
3. How old must you be to participate in this research study?
  - a. 18
  - b. 12
  - c. 60
  - d. 25
4. What do we mean by "pregnancy loss" in this study?
  - a. Miscarriage
  - b. Planned abortion
  - c. Stillbirth
  - d. Both A and C

## **Appendix M**

### **Debrief Form**

The study you have just completed was designed to investigate the experiences of women who have suffered pregnancy loss, their mental health outcomes, and the role of healthcare and social support.

Some of the questions in this survey may have been difficult, and your generosity and willingness to participate in this study are greatly appreciated. If answering any of these questions led you to feel distressed and you would like to speak to someone about your thoughts, please contact your community support systems (community healthcare, community hospitals, local mental health agencies), or call the numbers provided below (feel free to share these resources with others). If you feel you are in immediate danger, call 911.

#### **National Suicide Prevention Lifeline**

Phone: 1-800-273-8255

#### **Mental Health**

Resources for a variety of mental health helplines are available through the National Alliance on Mental Illness: <https://www.nami.org/Find-Support/NAMI-HelpLine/Top-HelpLine-Resources>

Thank you for your participation and for not discussing the contents of the study with other MTurk workers. If you have any questions about the study, please feel free to contact Jessica Riedstra [riedjess@isu.edu] or Dr. Nicki Aubuchon-Endsley [aubunick@isu.edu]. If you would like to obtain a copy of the results of this study once it is complete, please contact Jessica Riedstra. All results are grouped together making individual results unavailable. Your participation, including your name and answers, will be confidential, even when the results are published.

#### **DO NOT FORGET TO:**

Record the unique survey completion code that will be shown after this page. If you were screened out (not eligible for this study) or withdrew before the questionnaire portion began there will be no randomized code presented (a space will be present).

Return to the MTurk window to enter the survey completion code to submit your task and earn compensation.

## Appendix N

### Sociodemographic Data and Reproductive History

**Table N1**

***Sociodemographic Data and Reproductive History***

Race	%
White	87
Black/African American	7
American Indian/Alaska Native	2
Not Hispanic/Latino/Spanish	86
Asian	5
Mexican/Mexican American/Chicano	5
Puerto Rican	2
Cuban	1
Other Hispanic, Latino, or Spanish	4
Other	2
Highest Degree of Education	
Partial high school	1
High school	11
Partial college	42
Standard college or university	36
Graduate training with a degree	11
Religious Preference	
Christian	56
Hindu	3
Muslim	2
Buddhist	1
Jewish	1
Pagan/Witch/Wiccan	3
Agnostic	6
Spiritual	2
Not religious or spiritual	26
Prefer not to respond	.67
Mental Health History (# diagnoses)	
1	13.4
2	17.5
3	8.1
4	2.0
5	.7
Type of Healthcare Organization	
Community clinic	5.37
Private medical office	38.93
Public hospital	38.26
Private hospital	14.77

Home care	1.34
Other	.67
None	.67
<hr/> Type of Healthcare Provider <hr/>	
Nurse	8.72
Nurse practitioner	15.44
Physician's assistant	3.36
Medical physician	66.44
Midwife	3.36
Doula	0
Other	.67
None of the above	2.01
<hr/> Gravidity <hr/>	
1	67.11
2	22.15
3	6.71
4	2.68
5	2.68
6	.67
>6	.67
<hr/> Parity <hr/>	
0	18.92
1	38.51
2	22.30
3	11.48
4	4.05
5	3.38
6	1.35
Prefer not to respond	.67
<hr/> Number of Children in Home <hr/>	
0	42.28
1	28.86
2	14.09
3	11.48
4	2.01
5	.67

*Note.* Categories for race were not mutually exclusive.  $n=149$ .



## Appendix O

### Correlations among Primary Outcome Variables

**Table O2**

*Correlations among Primary Outcome Variables*

	PBGS	PCL-5	PASS	CESD-R
PBGS	1	.694**	.583**	-.707*
PCL-5	.694**	1	.865**	-.790**
PASS	.583**	.865**	1	-.719**
CESD-R	-.707**	-.790**	.719**	1

*Note.* All analyses used Pearson's product moment correlations. PBGS = Perinatal Bereavement Grief Scale; CESD-R = Center for Epidemiological Studies Depression Scale-Revised; PCL-5 = PTSD Checklist for DSM-5; PASS = Perinatal Anxiety Screening Scale.

\*  $p < .05$ . \*\*  $p < .01$ .

## Appendix P

### Relations among Predictor/Outcome Variables, Potential Covariates, and HPSA

**Table P3**

*Relations among Predictor/Outcome Variables, Potential Covariates, and HPSA*

	Mis_Still	PBGS	CESD-R	PCL-5	PASS
Premorbid MH	.761	<b>-.097</b>	<b>.178</b>	<b>-.186*</b>	<b>-.189*</b>
Time	.012	<b>.123</b>	<b>-.102</b>	<b>.064</b>	<b>.028</b>
Losses	<i>1.100</i>	<b>-.012</b>	<b>-.001</b>	<b>-.014</b>	<b>.110</b>
Children	.082	<b>-.028</b>	<b>.006</b>	<b>.031</b>	<b>.071</b>
Age	<b>-.260**</b>	-.190*	.227**	-.306**	-.316**
Insurance	.378	<b>-.093</b>	<b>.045</b>	<b>-.021</b>	<b>-.008</b>
Income	<b>.019</b>	-.127	.216**	-.228**	-.320**
Rurality	.001	<b>-.082</b>	<b>.078</b>	<b>-.109</b>	<u>1.43</u>
HPSA	.033	<b>-.001</b>	<b>.112</b>	<b>-.047</b>	<b>-.102</b>

*Note.* This table compares univariate correlations, point-biserial correlations, chi-squares, and Independent samples *t*-test relations between primary study variables and potential covariates. Relations between primary study variables and HPSA are also noted. Italicized values are chi-squares. Non-italicized values are Pearson's product moment correlations. Bolded values are point-biserial correlations. Underlined values are Independent samples *t*-test *t*-values. Mis\_Still = miscarriage or still birth; PBGS = Perinatal Bereavement Grief Scale; CESD-R = Center for Epidemiological Studies Depression Scale-Revised; PCL-5 = PTSD Checklist for DSM-5; PASS = Perinatal Anxiety Screening Scale; Premorbid MH = Number of premorbid mental health diagnoses at the time of loss; Time = time since pregnancy loss; Losses = total number of pregnancy losses; Children = number of children present in the home at the time of loss; Age = maternal age at time of loss; Insurance = presence of insurance coverage at the time of loss; Income = annual household income at the time of loss; Rurality=rural or urban status based on zip code; HPSA=health provider shortage area.

\*  $p < .05$ . \*\*  $p < .01$ .

## Appendix Q

### Miscarriage versus Stillbirth Group Comparisons

**Table Q4**

*Miscarriage versus Stillbirth Group Comparisons*

Outcome or Covariate	Miscarriage <i>M</i> ( <i>SD</i> )	Stillbirth <i>M</i> ( <i>SD</i> )	<i>t</i>	<i>d</i>
PBGS	34.97 (9.39)	39.26 (8.55)	-2.91**	-.48
PCL-5	30.49 (18.54)	39.89 (19.59)	-3.01**	-.50
PASS	36.66 (20.43)	44.90 (21.75)	-2.38*	-.39
CESD-R	4.88 (1.53)	4.26 (1.48)	2.53**	.42
MSPSS	1.57 (.37)	1.57 (.37)	.04	.01
PSQ_tech_qual	3.46 (.88)	3.23 (.96)	1.55	.26
Age (years)	5.70 (.57)	5.37 (.64)	3.26**	.54

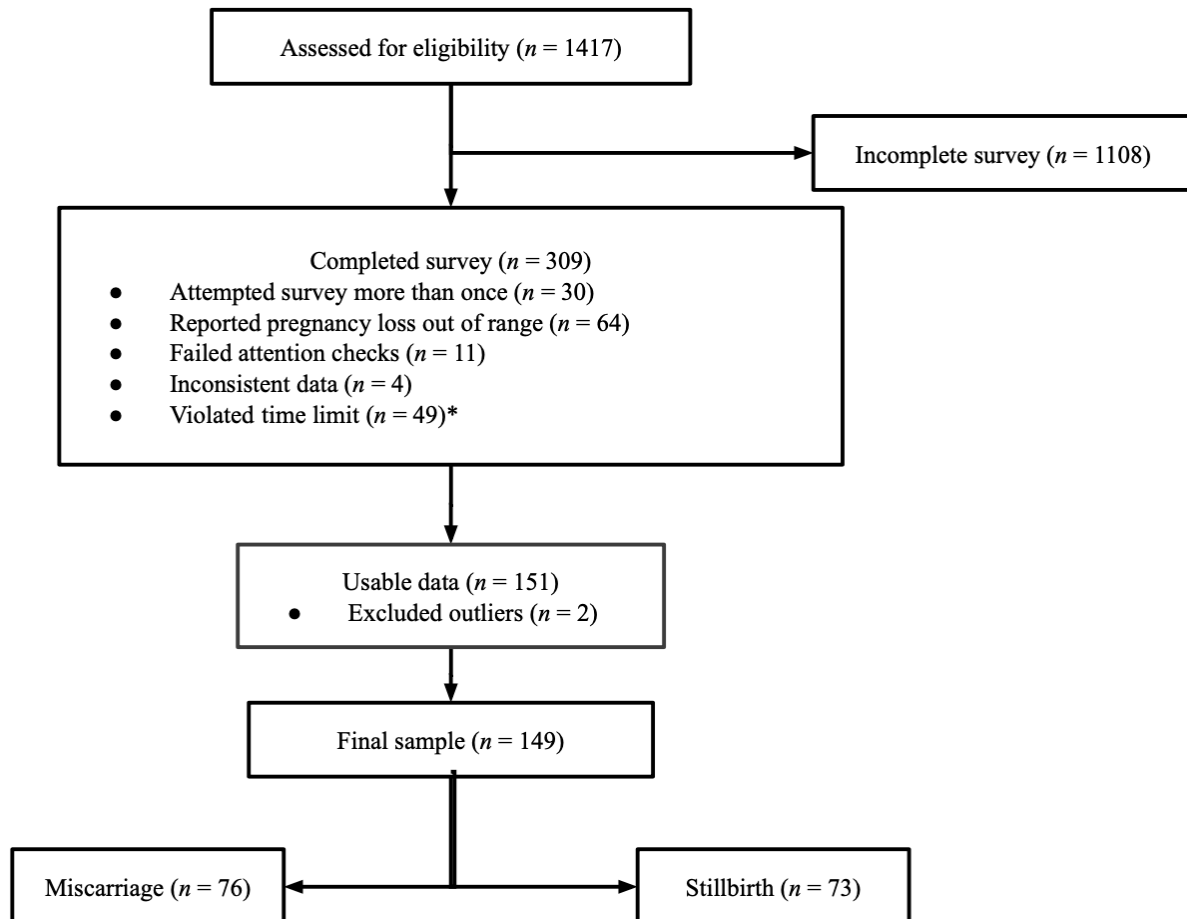
*Note.* Degrees of freedom for all analyses is 147. Analyses utilized transformed data. PBGS = Perinatal Bereavement Grief Scale; CESD-R = Center for Epidemiological Studies Depression Scale-Revised; PCL-5 = PTSD Checklist for DSM-5; PASS = Perinatal Anxiety Screening Scale; Age = maternal age at time of loss; MSPSS = Multidimensional Scale of Perceived Social Support; PSQ\_tech\_qual = Short-Form Patient Satisfaction Questionnaire: Technical Quality score; *M* = mean; *SD* = standard deviation; *t* = *t* statistic; *d* = Cohen's *d*.

\*  $p < .05$ . \*\*  $p < .01$ .

## Appendix R

### CONSORT Flowchart of Participants

#### *CONSORT Flowchart of Participants*



*Note.* This diagram depicts the participants in the present study.

\*participants who violated the time limit for the survey were compensated

## Appendix S

### Descriptives of Primary Predictor and Outcome Variables

**Table S5**

*Descriptives of Primary Predictor and Outcome Variables*

Scale	<i>M</i>	<i>SD</i>
PBGS	37.07	9.21
CESD-R	37.75	14.81
PASS	40.70	21.42
PCL-5	35.09	19.57
MSPSS	5.40	1.21
PSQ-18		
Technical Quality	3.35	.92
General Satisfaction	3.23	.96
Interpersonal Manner	3.60	.99
Communication	3.06	1.03
Financial Aspects	3.13	1.19
Time Spent with Doctor	3.06	1.12
Accessibility and Convenience	3.25	.91

*Note.* This table depicts the mean and standard deviations for primary predictor and outcome variables. *M* = mean; *SD* = standard deviation; PBGS = Perinatal Bereavement Grief Scale; CESD-R = Center for Epidemiological Studies Depression Scale-Revised; PCL-5 = PTSD

Checklist for DSM-5; PASS = Perinatal Anxiety Screening Scale; MSPSS = Multidimensional Scale of Perceived Social Support; PSQ-18 = Short-Form Patient Satisfaction Questionnaire.

**Appendix T**  
**Normality of Distributions**

**Table T6***Normality of Distributions*

	CESD-R	MSPSS	PCL-5	Income	Age
Skew	-4.11	3.70	.57	10.42	3.04
Kurtosis	-.84	.22	-2.08	15.05	.83
Transformed Skew	1.22	1.37	-7.54	1.62	1.51
Transformed Kurtosis	-1.53	-1.50	5.14	.69	-.25

*Note.* This table depicts distribution statistics for variables that required transformation. CESD-R = Center for Epidemiological Studies Depression Scale-Revised; PCL-5 = PTSD Checklist for DSM-5; Income = annual household income at the time of loss; Age = maternal age at time of loss; MSPSS = Multidimensional Scale of Perceived Social Support.