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Pregnancy happiness: implications of prior loss and pregnancy intendedness

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Abstract

Objective: This study aimed to examine the interaction between pregnancy loss and pregnancy intentions on women’s happiness about a subsequent pregnancy.

Background: Anxiety about prior loss persist for women, even during subsequent pregnancies. It is unclear from prior research, whether a prior pregnancy loss shapes attitudes towards and feelings about a subsequent birth.

Methods: Using data from the 2002–2013 National Survey of Family Growth (NSFG), we used logistic regression analyses to explore the implications of a prior pregnancy loss for happiness about a subsequent pregnancy that ends in a live birth. We compared births classified as on-time, mistimed, unwanted, and ambivalent.

Results: Births were more likely to be characterized as on-time if they occurred following a pregnancy loss, and women were less likely to report being happy about a conception if they were ambivalent about the conception and experienced a previous loss. Overall, pregnancy loss alone was not associated with lower levels of happiness about a subsequent birth.

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Conclusions: Pregnancy loss can be a highly distressing experience, women's happiness about a subsequent pregnancy is not reduced due to prior pregnancy loss. Future research should explore why women who were ambivalent about pregnancy reported lower levels of happiness following a loss.

Keywords: Attitudes, miscarriage, mother/s, pregnancy, psychosocial factors

Feelings of anxiety and fear are common among women who become pregnant again following a pregnancy loss (Côté-Arsenault & O'Leary, 2015). Women report constant reminders of the loss during a subsequent pregnancy (Chez, 1995; Côté-Arsenault & Morrison-Beedy, 2001; Lee, McKenzie-McHarg, & Horsch, 2013), such as continuously comparing pregnancy symptoms as a way to reassure themselves that the current pregnancy is still viable (Côté-Arsenault & Mahlangu, 1999). Postpartum depression is more common among new mothers who experienced a prior loss (Räsänen et al., 2013), with some women reporting symptoms of post-traumatic stress (Hutti, Armstrong, Myers, & Hall, 2015; O'Leary, 2005).

Despite the negative emotions that often accompany a subsequent pregnancy following a loss, the majority (50–85%) of women who experience a loss become pregnant again, with many pregnancies occurring less than a year after the loss (Blackmore, Côté-Arsenault, Tang, & Glover, 2011; Cordle & Prettyman, 1994; Wojcieszek et al., 2018). Although research has largely focused on negative emotions and psychological well-being after a pregnancy loss, there is evidence that becoming pregnant after a pregnancy loss is associated with feelings of hope and optimism that the subsequent pregnancy will result in a live baby (Campbell-Jackson, Bezance, & Horsch, 2014; Côté-Arsenault, Donato, & Earl, 2006) and a higher importance of motherhood (Shreffler, Tiemeyer, Meadows, McQuillan, & Greil, 2018; McQuillan, Greill, Shreffler, & Tichenor, 2008). We know less, however, about how women feel about a subsequent pregnancy that ends in live birth. Published research tends to focus on long-term adverse effects of pregnancy loss, such as problems with fostering secure attachment relationships with subsequent children (O'Leary, Gaziano, & Thorwick, 2006) and lingering depression and anxiety (Blackmore et al., 2011). In this study, we utilize national data to examine if women felt more or less happy about a pregnancy (that resulted in a birth) occurring after a pregnancy loss compared to pregnancies that do

not occur after a pregnancy loss. Happiness is a positive indicator of maternal well-being related to a pregnancy that follows a pregnancy loss. We also consider how the intendedness of the pregnancy interacts with a prior loss to impact happiness.

Literature review

Childbirth after pregnancy loss

Pregnancy loss is a relatively common experience among women of childbearing age. Approximately 14–20% of all pregnancies in the United States result in miscarriage, or a loss during the first twenty weeks of pregnancy, and another 0.5% result in stillbirth, a loss after the twentieth week (Rossen, Ahrens, & Branum, 2018; Saraiya, Berg, Shulman, Green, & Atrash, 1999). Women experience a variety of psychologically distressing outcomes following miscarriage, including grief, anxiety, depression, stress, and guilt (Leppert, & Pahlka, 1984; McCarthy et al., 2015; Mcgee, PettyJohn, & Gallus, 2018); often these adverse outcomes are sustained over time (Shreffler, Greil, & McQuillan, 2011; Swanson, Connor, Jolley, Pettinato, & Wang, 2007). Pregnancy loss can be particularly distressing when it occurs along with other reproductive events, such as infertility, other pregnancy losses, and whether the pregnancy was intended (Shreffler et al., 2011).

Happiness about pregnancy following a loss

Studies on happiness situate the concept within the subjective well-being (SWB) framework (Kashdan, Diener, & King, 2008). As opposed to negative affect and psychological disorders, SWB includes life satisfaction, positive and negative experiences (Diener, 2013). Happiness and life satisfaction are frequently used interchangeably, especially when measurement reflects evaluation of one's life across multiple domains (Allen, Sin, & Martin, 2013; Hagstrom & Wu, 2016; Kashdan et al., 2008). SWB studies also examine happiness related to specific domains (Bojanowska & Zalewska, 2016). Studies on SWB that are domain specific frequently focus on mental, physical, economic and social domains, but studies of perinatal positive indicators of well-being

remain scarce. Allan et al. (2013) state that 'perinatal well-being includes: physical, psychological, social, spiritual, economical, and ecological dimensions' (p.395). For pregnant women, the emotional, psychological and physiological changes experienced during pregnancy uniquely influences their evaluation of these domains.

In the US, happiness is frequently associated with positive feelings, individually experienced as something to achieve (Oishi, Graham, Kesebir, & Galinha, 2013). Pregnancy is both a developmental process and a social event (Côté-Arsenault & Denney-Koelsch, 2016), where a healthy pregnancy and child is the goal. Cultural narratives valorizing motherhood complicate the pregnancy experience for many women. During pregnancy, and indeed even prior to getting pregnant (Waggoner, 2015), women experience considerable internal and social pressure to sacrifice for their baby (Bessett, 2010; Markens, Browner, & Press, 1997). Women report feeling internal and external pressure to have a perfect pregnancy, and experience distress when they do not always feel the positive emotions associated with pregnancy (Evens, Morrell, & Spiby, 2017; Staneva, Bogossian, Morawska, & Wittkowski, 2017; Staneva & Wigginton, 2018). Adverse events during pregnancy, and perinatal loss or stillbirth, induce feelings of guilt and anxiety during subsequent pregnancies (Côté-Arsenault & O'Leary, 2015; Gaudet, 2010; Gold, Sen, & Leon, 2018). Prior pregnancy losses therefore may complicate feelings of happiness and ability to feel joy during a subsequent pregnancy (O'Leary, 2009).

The public health impact of unintended pregnancy is considerable: women who carry an unintended pregnancy to term are more likely to delay prenatal care, use alcohol and tobacco, and experience low infant birth weight, preterm birth, and maternal morbidity and mortality (Kost & Lindberg, 2015; Shah, Balkhair, Ohlsson, Beven, Scott, & Frick, 2011). Although pregnancy intentions are important to assess because of their implications for healthy pregnancies and child outcomes, pregnancy happiness is also an important indicator of pregnancy desirability with implications for other outcomes (Speizer, Santelli, Afaible-Munsuz, & Kendall, 2004). Happiness about a pregnancy, even if it is unintended, is associated with lower psychosocial and biological stress (Aiken, Dillaway, & Mevs-Korff, 2015). Happiness about a pregnancy may also have important implications for future maternal and child health; women who reported higher levels of happiness when they found out they were pregnant, for example, are

more likely to breastfeed (Hartnett, 2012; Kost & Lindberg, 2015) and less likely to use substances during pregnancy (Blake, Kiely, Gard, El-Mohandes, & El-Khorazaty, 2007). Despite this evidence that pregnancy happiness has implications for understanding maternal behaviors, health, and well-being, previous research on pregnancy happiness has focused primarily on disentangling it from pregnancy intentions, rather than on predictors of pregnancy happiness, *per se*.

Unsurprisingly, pregnancy intentions are strongly, though not entirely, correlated with happiness (Aiken et al., 2015; Sable & Libbus, 2000; Santelli, Lindberg, Orr, Finer, & Speizer, 2009). Examining the influence of trying to get pregnant on levels of happiness may provide insight to the meaning of terms across different groups of women. For example, Hartnett (2012) found that Hispanic women reported being happier about unintended pregnancies compared to white and black women, particularly among foreign-born Hispanics. A history of pregnancy loss may further complicate the association between trying to get pregnant and happiness about the pregnancy. The limited studies on maternal happiness, and the lack of research that simultaneously assesses pregnancy intentions, prior pregnancy loss, and happiness about a pregnancy raises the following questions: Do women who experienced a prior pregnancy loss have the same feelings of happiness about a pregnancy as women who did not experience a prior loss? Does this association differ depending upon whether or not the women were trying to conceive?

Data and methods

Sample

The National Survey of Family Growth (NSFG), a multistage area probability design survey, provides most of the national estimates related to fertility since 1965 (Lepkowski, Mosher, & Davis, 2006). The target population for the NSFG is men and women between the ages of 14–45 years old in the United States. We combined cases from cycle 6 (2002) and 2006–2013 years of the NSFG. Cycle 6 of the NSFG conducted in-person interviews with 7,643 females in 2002. In 2006, the NSFG switched to a continuous design, interviewing 12,279 females between 2006 and 2010, and 5,601 females between 2011 and 2013.

We combined the data files for a total of 25,523 observations. We restricted the analytical sample to women with at least a one pregnancy and at least one birth, reducing the sample size to 14,237.

To examine the association between prior pregnancy loss and a subsequent birth, we use births as the unit of analysis. We merged the pregnancy file data for years 2002–2013 with the respondent file, and restricted the analytical sample to pregnancies that ended in a live birth resulting in 30,110 observations. The outcome variable, happiness about a specific pregnancy, was only asked of births occurring within 3 years of the interview date, restricting the sample to 6,668 births (5,738 individual women). Finally, we used listwise deletion to select only cases with no missing values on the focal variables, resulting in 6,640 (5,721 individual women) observations for the analytic sample.

The NSFG oversampled by age, sex and race. If more than one eligible respondent lived in the sampled household, screeners used a computer program to select one sampled respondent per household. The NSFG includes base weights, post-stratified adjusted weights and population weights. Because the NSFG employed a multistage stratified sample design with clustering, we use the survey-provided weights, strata and clustering variables. Furthermore, we followed Kost and Lindberg's (2015) strategy of using the respondent's identification number as a clustering variable to account for multiple birth observations by the same mother.

Concepts & measures

For happiness about pregnancy, respondents were asked, 'On this scale, a 1 means that you were very unhappy to be pregnant and a ten means that you were very happy to be pregnant.' Because there was considerable clustering of responses in a few categories, we followed Hartnett's (2012) approach and recoded the scale into a binary construct with 6 to 10 coded as 1 for 'happy' and 1 to 5 were coded as 0 for 'not happy'. Sensitivity analyses comparing results using the dichotomous measure with the original ordinal scale measure did not have substantively different results (available upon request). We measure *pregnancy intentionality* with the conventional NSFG constructed measure with 6 categories: later/overdue, right time, too soon, didn't care, unwanted, don't know. Most researchers combine the later/

overdue, right time, don't know, and didn't care categories into one group (Mumford, Sapra, King, Louis, & Louis, 2016). We collapsed the later/overdue and right time categories together into '*On-Time*' and combined don't know and didn't care into a separate '*Ambivalence*' category because women with a history of prior pregnancy loss may have more ambivalent desires for a pregnancy. The resulting pregnancy intention measure has four categories: on-time, mistimed, unwanted, and ambivalent (don't know/didn't care).

The next set of variables includes pregnancy loss and behaviors. We created 'prior pregnancy' from a survey constructed variable indicating pregnancy order of the conception. NSFG also constructed a birth order variable for every birth. We created a dichotomous variable indicating if the difference between pregnancy order and birth order was greater than zero; that is, for each specific birth, if the difference between pregnancy order and birth order was greater than one, the respondent experienced a *pregnancy loss* (due to induced abortion, miscarriage, or stillbirth) prior to that birth. We also control for *birth order* in the regression models using a three-category measure including first birth, second birth, and 3 or higher birth order.

The measures of first birth context include *age*, *union status* and *medical insurance* status at first birth. We measure *age* in years. We used the constructed variable for *relationship union status* at the time of birth and collapsed the responses into the following categories: separated, divorced and widowed compared to married, cohabiting and single. Because the United States did not have universal health insurance during the study time period, health insurance is an important proxy for access to affordable medical care. We included a dichotomous variable indicating whether the delivery of the specific birth was paid for by *Medicaid*. Social class was measured by the respondent's years of completed *education* at the time of interview. We also include *race/ethnicity/ nativity status* and *religion* as additional potentially relevant background variables. To reduce the risk of disclosure, the publicly available NSFG datasets only include recoded variables collapsing groups for both race/ethnicity and religion. We used the publicly available categories to create dummy variables to use in analyses. The race/ethnicity variable includes four dummy variables: *white*, *Hispanic*, *black* and *other*. Religion was also coded into four dummy variables: *none*, *Catholic*, *Protestant*, and *other*.

Results

Table 1 shows the weighted descriptive statistics for births and respondent characteristics by prior pregnancy loss status, as well as for the full sample. About 67% of births occurred after no pregnancy loss, 22% occurred after one pregnancy loss and 11% after two or more

Table 1. Descriptive statistics by pregnancy loss for all birth orders (Birth is unit of analysis).

	No Prior Pregnancy Loss (67%)		1 Prior Pregnancy Loss (22%)		2 or More Prior Pregnancy Losses (11%)		Total	
	M/%	SD	M/%	SD	M/%	SD	M/%	SD
Happiness about pregnancy (% Happy)	79%		83%		74%		79%	
Birth Order								
First Birth	44%		33%		22%		39%	
Second Birth	32%		34%		32%		33%	
3rd or Higher Birth	23%		33%		46%		28%	
Pregnancy Intention								
On-time	62%		69%		66%		64%	
Mistimed	25%		19%		14%		22%	
Unwanted	13%		12%		17%		13%	
Ambivalence	1%		0%		3%		1%	
Age at pregnancy	26.48	5.88	28.37	5.76	30.22	5.73	27.32	6.35
Marital status during pregnancy								
Married	60%		62%		61%		61%	
Cohabiting	20%		23%		18%		21%	
Divorced/Separated/Widowed	3%		3%		8%		4%	
Single	17%		11%		12%		15%	
Medicaid paid for delivery	41%		40%		41%		41%	
Education (years)	13.24	2.81	13.33	2.71	13.12	2.71	13.25	2.96
Race/Ethnicity								
White	57%		60%		57%		58%	
Hispanic	22%		19%		15%		21%	
Black	14%		17%		21%		15%	
Other	7%		4%		8%		6%	
Religion								
None	16%		18%		19%		16%	
Catholic	28%		26%		20%		27%	
Protestant	48%		48%		53%		48%	
Other	9%		9%		7%		9%	
N pregnancies	4450		1406		784		6640	
N women	3828		1255		697		5721	

losses. Roughly 80% of the sample reported being happy about their pregnancies, and the reported level of happiness varied by prior pregnancy loss, with women who experienced one loss reporting higher levels of happiness at the time of pregnancy discovery (83%), followed by women with no losses (79%), and lastly women with two or more losses (74%).

There is a bivariate association of the prior pregnancy loss status of births and birth order. A higher percentage of births occurring to women with no history of loss were first births (44%) than births occurring to women with a history of one loss (33%) or two losses (22%). Births occurring to women with two or more losses were more likely to be 3rd or higher order births (46%) compared to the percentage of 3rd or higher births to women with no prior pregnancy losses (23%) or one prior pregnancy loss (33%). There is also an association of the intention's status of births and prior pregnancy loss status: a higher percentage of births occurring to women who had no prior pregnancy loss were reported as mistimed (25%) than those with one (19%) or two or more (14%) prior losses. The smallest proportion of unwanted births occurred to women with one prior pregnancy loss (12%) and the highest proportion to women with two or more prior pregnancy losses (17%).

The average maternal age at birth was highest for births to women with two or more pregnancy losses ($M = 30.22$), followed by one prior loss ($M = 28.37$) and no prior losses ($M = 26.48$). The characteristics of mothers—marital status at time of birth, Medicaid, education, and race/ethnicity—did not differ by pregnancy loss status.

Multivariate results

Table 2 shows the odds ratios, coefficients and standard errors estimated from three logistic regression models of happiness about a pregnancy. The first model included prior pregnancy loss, birth order, birth context, and sociodemographic characteristics of the mother. Model 2 added pregnancy intentions to the model. Model 3 adds interactions of pregnancy loss with pregnancy intention (for birth occurring after a pregnancy loss) and loss with birth order.

In the first model, one prior pregnancy loss was associated with significantly higher odds of being happy about a pregnancy ($OR = 1.33$, $p < .01$). As anticipated, relative to first births, mothers with one

Table 2. Logistic regression models predicting happiness about pregnancy (Birth is unit of analysis, n = 6,640).

	Model 1			Model 2			Model 3		
	OR	b	SE	OR	b	SE	OR	b	SE
Prior Pregnancy Losses (Ref Cat = No Loss)									
1 Prior Pregnancy Loss	1.33**	.28	(.14)	1.20	.18	(.14)	2.03*	.71	(.65)
2+ Prior Pregnancy Loss	.73	-.31	(.13)	.62*	-.48	(.13)	1.12	.11	(.43)
Birth Order (Ref Cat = 1 st Birth)									
2nd Birth	.79*	-.24	(.08)	.83	-.19	(.09)	1.05	.05	(.12)
X 1 Pregnancy Loss							.48*	-.74	(.14)
X 2+ Pregnancy Loss							.33*	-1.10	(.16)
3rd or higher Birth	.41***	-.90	(.05)	.65**	-.44	(.10)	.68*	-.38	(.12)
X 1 Pregnancy Loss							.68	-.38	(.22)
X 2+ Pregnancy Loss							.79	-.24	(.34)
Pregnancy Intention (Ref Cat = On-Time)									
Mistimed				.09***	-2.38	(.01)	.09***	-2.35	(.01)
X 1 Pregnancy Loss							.87	-.14	(.26)
X 2+ Pregnancy Loss							1.04	.04	(.41)
Unwanted				.04***	-3.27	(.01)	.04***	-3.20	(.01)
X 1 Pregnancy Loss							.75	-.29	(.25)
X 2+ Pregnancy Loss							.88	-.13	(.38)
Ambivalent				.12***	-2.12	(.06)	.27**	-1.31	(.12)
X 1 Pregnancy Loss							.88	-.12	(.88)
X 2+ Pregnancy Loss							.06*	-2.75	(.09)
Age at Pregnancy	1.07***	.07	(.01)	1.04**	.04	(.01)	1.03**	.03	(.01)
Marital Status during Pregnancy (Ref Cat = Married)									
Cohabiting	.54***	-.62	(.06)	.79	-.24	(.11)	.78	-.24	(.10)
Divorced/Separated/Widowed	.35***	-1.05	(.07)	.53**	-.64	(.12)	.53**	-.64	(.13)
Single	.32***	-1.14	(.04)	.62**	-.48	(.10)	.61**	-.50	(.10)
Medicaid paid for delivery	.83	-.19	(.09)	.91	-.09	(.11)	.88	-.12	(.11)
Education (in years)	1.01	.01	(.02)	.99	-.01	(.02)	.99	-.01	(.02)
Race/Ethnicity (Ref Cat = White)									
Hispanic	1.36*	.31	(.17)	1.66***	.51	(.24)	1.67***	.51	(.25)
Black	.88	-.13	(.10)	.94	-.07	(.13)	.92	-.08	(.13)
Other	1.22	.20	(.23)	1.27	.24	(.26)	1.23	.20	(.27)
Religion (Ref Cat = None)									
Catholic	1.41*	.35	(.21)	1.32	.28	(.22)	1.32	.28	(.22)
Protestant	1.15	.14	(.16)	1.19	.17	(.18)	1.22	.20	(.18)
Other	1.22	.20	(.26)	1.22	.20	(.27)	1.22	.20	(.27)

child (OR = .79, $p < .05$) or two or more children (OR = .41, $p < .01$) had significantly lower odds of reporting being happy about their pregnancy. Each year older is associated with higher odds of happiness about a birth (OR = 1.07 $p < .01$). Compared to births to married women, the odds that women who were cohabiting (OR = .54 $p < .001$), divorced/separated/widowed (OR = .35, $p < .01$), or single (OR = .32, $p < .001$) report being happy about a conception were significantly lower. The odds that women report being happy about conceptions resulting in a birth is higher for women who are Hispanic (OR = 1.36, $p < .05$; compared to white) and Catholic (OR = 1.41, $p < .05$; compared to women with no religious affiliation).

In model 2, we added the pregnancy intentions variable. As anticipated from prior research, women were significantly less likely to report being happy about a pregnancy if it was mistimed (OR = .09, $p < .001$), unwanted (OR = .04, $p < .001$), or if they were ambivalent (OR = .12, $p < .001$) compared to reports about births that were on-time. Controlling for pregnancy intention status also changed the coefficients for prior pregnancy loss in model 2. If the pregnancy occurred after one prior pregnancy loss, the odds ratio is smaller and not significant, and the odds ratio for two or more prior pregnancy losses is associated with a larger odds ratio that is now statistically significant. A few other indicator variables are no longer statistically significant controlling for pregnancy intention status (e.g. second birth, cohabiting, Catholic).

The last model includes the interaction terms for prior pregnancy loss with pregnancy intention and prior pregnancy loss with birth order. Because the meaning of the coefficients for the interaction terms comes from combining several coefficients, we facilitate interpretation with graphs of the predicted probabilities of pregnancy happiness in Figures 1 and 2. The figures show that intention status moderates the association of pregnancy loss and happiness about a subsequent pregnancy that resulted in birth, but only for those whose intentions for conception were ambivalent (don't know/don't care) and had two or more losses. **Figure 1** shows that births occurring to women without a history of loss who were also ambivalent about a subsequent birth were over four times as likely to be happy about their pregnancy compared to women who were ambivalent and had a history of two or more prior pregnancy loss. The results suggest that pregnancy loss

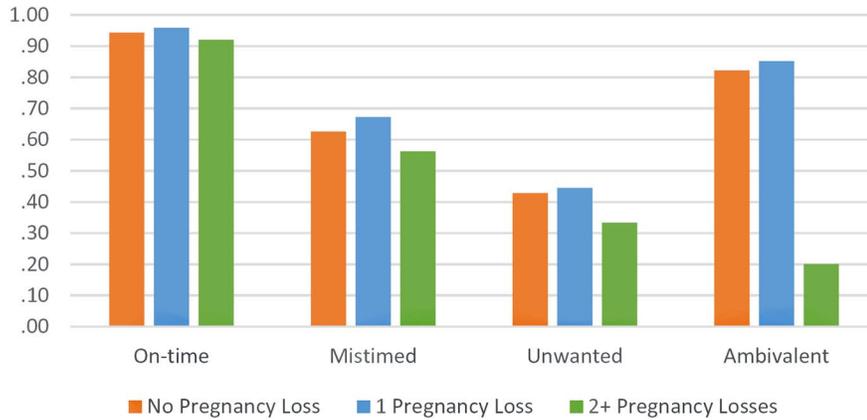


Figure 1. Probability of being happy about pregnancy by prior pregnancy loss and pregnancy intention.

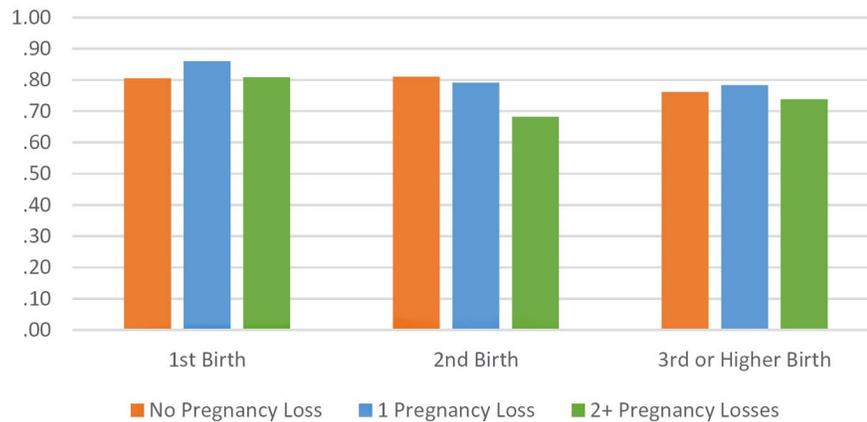


Figure 2. Probability of being happy about pregnancy by prior pregnancy loss and by birth order.

and ambivalence have implications for happiness about pregnancy. **Figure 2** provides a graph of the results for the interaction between prior pregnancy loss and birth order. The coefficient indicating the association of the second birth with happiness about the pregnancy is for those with no prior pregnancy loss in model 3 because the interaction terms for one and two or more are in the model. The main effect of second birth is not significant, but the interaction terms for first or two or more pregnancy losses are significant. There are substantially lower odds of reporting being happy about a pregnancy leading to a second birth if the birth follows a pregnancy loss. In contrast, the main effect for the third or higher births is significant and

indicates that women have lower odds of reporting happiness about a third birth. Pregnancy loss does not modify the association between 3rd and higher order births and happiness.

In this study, we asked: Do women who experienced a prior pregnancy loss have the same feelings of happiness about their pregnancies as women who did not experience a prior loss? Does prior pregnancy loss modify the association of pregnancy intention and birth order with happiness about pregnancy? The answer to the first question is yes, there is a direct association of prior pregnancy loss with happiness about pregnancy, women with one prior loss had the highest happiness and women with two or more pregnancy losses had the lowest happiness. The answer to the second question is that there is a modest and partial interaction of pregnancy intention with prior pregnancy loss (only those with two or more losses who are ambivalent about their pregnancies differ from those with no losses) and birth order (second births are associated with substantially lower happiness if they follow prior pregnancy losses).

Discussion

This study contributes to the body of literature on pregnancy loss, pregnancy intentions and happiness in three ways. First, the odds of reporting happiness about pregnancies resulting in a birth is higher for women with a prior pregnancy loss compared to those with no pregnancy loss. Therefore, reproductive events do not occur isolated from other experiences; indeed, the first pregnancy and its outcome continue to influence how women feel about subsequent pregnancies and births. Although many women with a history of pregnancy loss experience negative emotions (e.g. anxiety, hypervigilance and delayed attachment) in subsequent pregnancies (Côté-Arsenault & Morrison-Beedy, 2001; Côté-Arsenault & O'Leary, 2015; Gaudet et al., 2010; Gold et al., 2018; Lee et al., 2013) having one prior pregnancy loss is associated with higher odds of being happy about a birth.

Second, we examined the influence of intendedness of a subsequent pregnancy on happiness. Although many women conceive again following a pregnancy loss (Blackmore et al., 2011; Cordle & Prettyman, 1994; Wojcieszek et al., 2018), most of the extant research is on the experience (e.g. anxiety, attachment, healthcare utilisation)

of a subsequent pregnancy rather than the intendedness. Couples with a history of loss may be more likely to try again as soon as possible after a loss (Wheeler, 2000), however, data to assess this research question are limited. Alternatively, the feeling of uncertainty many women experience after a pregnancy loss (Côté-Arsenault & O'Leary, 2015) may make them less likely to want to actually try for another pregnancy.

Very few studies utilizing NSFG data include the ambivalent category of pregnancy intentions, in part because of small sample sizes in each cycle who reported ambivalence towards a particular pregnancy. Pooling multiple years and cycles of NSFG data provided us with enough cases to make meaningful comparisons. We did not find that prior pregnancy loss on its own resulted in lower odds of being happy about a later pregnancy (when pregnancy intentions were controlled for), but for women with a history of loss, having ambivalent intentions about a subsequent pregnancy was associated with a significantly lower probability of being happy about that pregnancy. It could be that these are the women who have difficulty with attachment following pregnancy loss; women who experience greater distress about prior pregnancy losses may be reluctant to prevent a pregnancy but then are less able to feel attachment to their babies who survive. Future research should consider whether or not women with multiple losses are less likely to plan a future pregnancy because of low self-efficacy or a low sense of power to control the outcome of a pregnancy. Women with multiple losses may benefit from targeted counseling to determine readiness for a subsequent pregnancy (Wheeler, 2000). Making a conscious and informed decision to try and get pregnant again may give women a sense of control, yet it could also give false hope. Given the association between pregnancy intention and maternal health during pregnancy, future research should also explore if women with a history of loss and ambivalence are more likely to experience pregnancy complications and engage in riskier behaviors.

We also considered the birth order of each specific pregnancy for happiness about pregnancy. A conception leading to the second birth is not significantly associated with lower levels of happiness about a conception, except for women with a history of pregnancy loss. We did not find significant differences for first births or birth orders of three or higher.

Limitations

The strength of the current study is the new insights provided about the connections between prior pregnancy loss, intentions, and happiness about a subsequent pregnancy. All studies, however, have limitations. The current analysis did not include an indicator of the type of pregnancy loss experienced, and induced abortions are often underreported (see, for example, Tierney, 2019). Therefore, differences in happiness about pregnancies that do or do not occur after a prior pregnancy loss may be larger than presented here because some women who had abortions could be in the 'no loss' category. The approach we took in this paper was not to separate out pregnancy losses that occurred by stillbirth, spontaneous (i.e. miscarriage), or induced abortion. Rather, we approached loss as a broad measure of reportable prior pregnancies that did not result in a live birth. One of the challenges associated with examining specific types of pregnancy loss is the complication related to multiple outcomes of multiple pregnancies. In many instances, women might experience both miscarriage and induced abortions, but small cell sizes prevent an analysis of the women in separate groups. Furthermore, the sequence and order of the type of pregnancy loss is quite complicated to parse out and beyond the scope of this paper. Future research should consider using a sequence analysis of pregnancy outcomes as a way to summarise complex pregnancy histories.

Pregnancy intendedness remains a difficult concept to measure, in part because the meaning of ambivalence is unclear (Tiemeyer, 2018). Ambivalence could reflect an orientation toward pregnancy viewing it as something that cannot be controlled or as something that should not be controlled. For at least some women who reported ambivalent intentions, particularly those with a history of prior pregnancy loss, pregnancy might be viewed as something that happens to them (lower self-efficacy) rather than something that they decided to engage in (higher self-efficacy).

Ideally, reports of pregnancy intentions would precede births, but in the NSFG, pregnancy intentions are retrospective reports. There is evidence that over time, women report different levels of intending for the same birth (Guzzo & Hayford, 2014). Longitudinal data would provide more confidence in timing and recall of pregnancy intentions for each birth. There is no theoretical or prior research finding to explain

why prior pregnancy loss has different associations with pregnancy happiness based upon birth order. One reason why second births are associated with lower happiness after a prior pregnancy loss could be that for women who had at least one live birth but experienced a loss before or after that birth, there is a reluctance to feel happy about a subsequent pregnancy because of lack of trust that the child will be okay. Women with at least two live births may feel more confident about their ability to have a third child because they know their bodies can sustain a pregnancy. Yet as with many studies, the results raise new questions. There is a need for future research to explore patterns of losses by loss type and sequence across pregnancies and births. There is a need to establish patterns (potentially latent profiles) of reproductive sequences and happiness about a pregnancy. Finally, it is possible that future datasets will keep the rich pregnancy history feature of NSFG and include multiple indicators of psychological states such as depression or anxiety. Unfortunately, the present study is limited to the 'happiness' measure available in the NSFG.

Conclusion

We anticipated that the context of experiencing a pregnancy loss would be associated with a lower level of happiness with a subsequent birth but did not find that to be the case. Instead, happiness about pregnancy is virtually the same across births regardless of whether or not women experienced a prior pregnancy loss. We did find, however, that that pregnancy loss modifies the association of pregnancy intention with pregnancy happiness. Women who experienced two or more pregnancy losses and had ambivalent intentions about a subsequent pregnancy were less likely to report being happy about that pregnancy compared to those who intended and did not have a prior loss. Shreffler et al (2016) found that women who think of themselves as infertile or sub-fertile are more likely to report ambivalent pregnancy intentions; thus, it might be that a pregnancy loss heightens concerns about fecundity and therefore reduces happiness about a subsequent pregnancy. Because other studies found associations between happiness and maternal health (Blake et al., 2007; Kost & Lindberg, 2015), clinicians may be able to offer targeted treatment and advice by

asking women with a history of pregnancy loss about both intentions and happiness about a pregnancy. For women with a history of pregnancy loss, discussions with their doctors about conflicting emotions and fears may reassure women and potentially reduce experiencing guilt for feeling anything other than happiness about their pregnancy.

Prior pregnancy loss status also modified the association of birth order and happiness about a pregnancy. As described above, women with second births who had prior pregnancy losses had substantially lower predicted probability of happiness about the pregnancy compared to women who did not have a prior loss or birth. We conclude that the prevailing impression of lingering negative effects of prior pregnancy loss on the experience of subsequent childbearing is not necessarily the case and is complicated by pregnancy intentions and birth order. The overall pattern from nationally representative data is that most women are happy about their pregnancies regardless of whether or not they follow a pregnancy loss.

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