Birth after a Pregnancy Loss: Implications for Pregnancy Happiness

Abstract

Many women experience negative emotions following a pregnancy loss. Anxiety about prior reproductive experiences persist for women, even during subsequent pregnancies. Very little research has considered the interaction between pregnancy loss and pregnancy intentions for happiness about pregnancy. Using data from the 2002-2013 NSFG, we explore the implications of a prior pregnancy loss for happiness about a subsequent pregnancy that ends in birth. We compared births classified as on-time, mistimed, unwanted, and ambivalent. 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.

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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), such as continuously comparing pregnancy symptoms as a way to reassure themselves that the current pregnancy is still viable (Côté-Arsenault & Mahlangu, 1999). Depression is more common among new mothers who experienced a prior loss (Räisänen 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 (Blackmore, Côté-Arsenault, Tang, & Glover, 2011; Cordle & Prettyman, 1994). 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 (Côté-Arsenault et al., 2006) and a higher importance of motherhood (Shreffler, Tiemeyer, Meadows, McQuillan, & Greil, 2018). Less is known, however, about how women feel after a subsequent pregnancy 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 happier about a birth that occurred after a pregnancy loss compared to births that do not occur after a pregnancy loss. Happiness is a positive indicator of maternal well-being related to a birth that

follows a pregnancy loss. We also consider how the intendedness of the birth 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% of all clinically-recognized 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 (Saraiya et al., 1999). Women experience a variety of psychological distress outcomes following miscarriage, including grief, anxiety, depression, stress, and guilt (Leppert et al., 1993; McCarthy et al., 2015); often these adverse outcomes are sustained over time (Lee, Slade, & Lygo, 1996; Shreffler, Greil, & McQuillan, 2011). Pregnancy loss can be particularly distressing when it occurs along with other reproductive events, such as infertility, other pregnancy losses, and when the pregnancy was intended (Shreffler et al., 2011).

Happiness about pregnancy following a loss

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 et al., 2004). Happiness about a pregnancy, even if it is unintended, is associated with lower psychosocial and biological stress (Aiken et al., 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). 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 (Sable & Libbus, 2000). 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. The limited studies on maternal happiness, and the lack of research that simultaneously assesses pregnancy intentions, prior pregnancy loss, and happiness about a birth 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 NSFG, a multistage area probability design survey, provides most of the national estimates related to fertility since 1965 (Lepkowski et al., 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 in which 12,279 females were interviewed between 2006 and 2010, and 5,601 females were interviewed 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. Our outcome variable, happiness about a specific pregnancy, was only asked of births occurring within 3 years of the interview date, restricting our sample to 6,668 births (5,738 individual women). Finally, we used listwise deletion to select only cases with no missing values on our focal variables, resulting in 6,640 (5,721 inividual women) observations for our 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." We recoded the scale into a binary construct where 6 to 10 was coded = 1 "happy" and 1 to 5 = 0 "not happy". To measure pregnancy intentionality, we used the conventional NSFG constructed measure with 6 categories: later/overdue, right time, too soon, didn't

care/ambivalence, unwanted, don't know/not sure. We recoded the variable by collapsing two categories, later/overdue and right time, and didn't care/ambivalence with don't know/not sure, creating a four category intentions measure, on-time, mistimed, unwanted, ambivalence (don't know/didn't care).

The next set of variables includes pregnancy loss and behaviors. We first 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 positive; that is, for each specific birth, if the difference between pregnancy order and birth order was positive, 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.

Our 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 response 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. 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 33% of births occurred after a prior pregnancy loss. Roughly 80% of the sample reported being happy about their pregnancies, and the reported level of happiness did not vary by prior pregnancy loss. The intentions status of births varied by prior pregnancy loss: births occurring to women who experienced a prior loss were more likely to report the conception was on-time or overdue, and were less likely to report the conception as mistimed.

We also found differences by birth order. Births occurring to women with no history of loss were more likely to be first births (44%) than births occurring to women with a history of loss (29%). Maternal age at birth also varied by pregnancy loss. Mothers with a history of loss were on average 2.5 years older than mothers with no history of loss. 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 and standard errors estimated using logistic regression to predict happiness about a conception. We estimated three models. 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. In model 3, we included interactions between pregnancy loss and pregnancy intention (for birth occurring after a pregnancy loss), and loss and birth order.

In the first model, pregnancy loss had a minimal effect on happiness about a pregnancy. As anticipated, relative to first births, mothers with more children had significantly lower odds of reporting being happy about their pregnancy. Older and married mothers had significantly higher odds of being happy about the pregnancy, as were Hispanics (compared to whites) and Catholic women (compared to women with no religious affiliation).

In model 2, we added the pregnancy intentions variable. As we 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 reported they did not know or care (OR=.11, $p < .001$) relative to births that were on-time.

The last model includes the interaction terms, prior pregnancy loss and pregnancy intention, and prior pregnancy loss and birth order. To facilitate interpretation, we present the predicted probabilities of being happy about pregnancy in Figures 1 and 2. We found that pregnancy intention moderates the association between pregnancy loss and happiness about a subsequent birth, but only for those whose intentions for conception were ambivalent (don't know/don't care). Figure 1 shows that births occurring to women without a history of loss who were also ambivalent about a subsequent birth were over two times as likely to be happy about their pregnancy compared to women who were ambivalent and had a history of prior pregnancy loss. The patterns suggest that pregnancy loss and indifference have implications for happiness about a conception. In Figure 2, we graphed the results for the interaction between prior pregnancy loss and birth order. Prior pregnancy loss prior to the 2nd, but not the 3rd birth, is associated with lower odds of being happy about a pregnancy, relative to first births.

Discussion

This study contributes to the body of literature on pregnancy loss, intentions and happiness in three ways. First, we examined the correlations between experiencing a prior pregnancy loss and happiness about a subsequent birth. Women's reproductive events do not occur as singular events; indeed, the first pregnancy and its outcome continue to influence how women feel about subsequent pregnancies and births. Second, we included a separate category for ambivalent pregnancy intentions. Very few studies utilizing NSFG data include the ambivalent category, in part because of sample size. 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, 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. Lastly, we considered the birth order of the 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 3 or higher.

Limitations

Although the study highlights new insights about the connections between prior pregnancy loss, intentions, and happiness about a subsequent pregnancy, there are several limitations to the study. First, our analysis did not include an indicator of the type of pregnancy loss experienced. 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 might prevent an analysis of the women as separate groups. Furthermore, the sequence and order of the type of pregnancy loss is even more difficult to parse out. Future research should consider using a sequence analysis of pregnancy outcomes.

Pregnancy intendedness remains a difficult concept to measure, and the meaning of ambivalence is unclear. It remains unclear whether the ambivalence is a reflection of orientation toward pregnancy, that is, either having an orientation that pregnancy is not something that can be controlled, or if it is an orientation that pregnancies should be controlled. For women who reported ambivalent intentions, particularly those with a history of prior pregnancy loss, lower levels of happiness may reflect a lower level of self-efficacy.

Additionally, this analysis focuses on retrospective reports of pregnancy intentions. There is evidence that over time, women report different levels of intending (Hayford & Guzzo, 2014). Longitudinal data would provide more confidence in timing and recall. Finally, it remains unclear why attitudes towards second births would differ due to the experience of a prior pregnancy loss, but not first, third, or higher birth orders. It is possible that for women who had at least one live birth, but experienced a loss before or after that birth were more reluctant to feel happy about a subsequent pregnancy. Women with at least two live births may have felt more confident about their ability to have a third child, either biologically or because of life circumstances. Future research should explore patterns of losses, by loss type, and sequence across pregnancies and births, to establish patterns (potentially latent profiles) of reproductive sequences and happiness about a pregnancy.

Conclusion

We found that experiencing a pregnancy loss on its own is not associated with a lower level of happiness with a subsequent birth. We also found that pregnancy loss significantly modifies the effect of pregnancy intention on pregnancy happiness. Women who had experienced a pregnancy loss and had ambivalent intentions about a subsequent pregnancy were less likely to report being happy about that pregnancy. It is possible that trying to get pregnant is more salient for women who have experienced a pregnancy loss because of concerns about their fecundity. Birth order also significantly modified the effect of a prior pregnancy loss, but only for second births and not first, third, or higher order births.

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Table 1. Descriptive Statistics By Pregnancy Loss for all Birth Orders (Birth is Unit of Analysis)

	Prior Pregnancy Loss		No Prior Pregnancy Loss		Total	
	M/%	SD	M/%	SD	M/%	SD
Happiness about pregnancy	.80		.79		.79	
Pregnancy Intention						
On-time	.68		.62		.64	
Mistimed	.17		.25		.22	
Unwanted	.14		.13		.13	
Ambivalence	.01		.01		.01	
Birth Order						
First Birth	.29		.44		.39	
Second Birth	.34		.32		.33	
3rd or Higher Birth	.37		.23		.28	
Age at pregnancy	29.02	5.83	26.48	5.88	27.32	6.35
Marital status during pregnancy						
Married	.62		.60		.61	
Cohabitating	.21		.20		.21	
Divorced/Separated/Widowed	.05		.03		.04	
Single	.12		.17		.15	
Medicaid paid for delivery	.41		.41		.41	
Education (yrs)	13.26	2.73	13.24	2.81	13.25	2.96
Race/Ethnicity						
White	.58		.57		.58	
Hispanic	.18		.22		.21	
Black	.18		.14		.15	
Other	.06		.07		.06	
Religion						
None	.18		.16		.16	
Catholic	.24		.28		.27	
Protestant	.50		.48		.48	
Other	.09		.09		.09	
N pregnancies	2190		4450		6640	
N women	1929		3828		5721	

Table 2. Logistic Regression Models Predicting Happiness about Pregnancy (Birth is unit of analysis, n=6,640)

	Happy OR(SE)	Happy OR(SE)	Happy OR(SE)
Prior Pregnancy Loss	1.07	.95	1.67*
	(.11)	(.11)	(.43)
Pregnancy Intention			
Mistimed		.09***	.09***
		(.01)	(.01)
Unwanted		.04***	.04***
		(.01)	(.01)
Ambivalence		.11***	.27**
		(.06)	(.12)
Birth Order			
2nd Birth	.78*	.83	1.06
	(.08)	(.09)	(.13)
3rd or higher Birth	.40***	.63**	.70*
	(.05)	(.09)	(.12)
Age at Pregnancy	1.07***	1.03**	1.03**
	(.01)	(.01)	(.01)
Marital Status at Pregnancy			
Cohabitating	.54***	.79	.78
	(.06)	(.10)	(.10)
Divorced/Separated/Widowed	.34***	.50**	.50**
	(.07)	(.12)	(.12)
Single	.32***	.61**	.61**
	(.04)	(.09)	(.09)
Medicaid paid for delivery	.83	.92	.89
	(.09)	(.11)	(.11)
Education(yrs)	1.01	1.00	.99
	(.02)	(.02)	(.03)
Race/Ethnicity			
Hispanic	1.37*	1.68***	1.69***
	(.17)	(.24)	(.25)
Black	.87	.92	.91
	(.10)	(.13)	(.13)
Other	1.16	1.19	1.16
	(.22)	(.24)	(.25)
Religion			
Catholic	1.43*	1.33	1.34
	(.22)	(.22)	(.22)
Protestant	1.15	1.19	1.22
	(.16)	(.17)	(.18)
Other	1.25	1.26	1.28
	(.26)	(.27)	(.28)
Interactions			
Pregnancy Loss X Mistimed			1.00
			(.27)
Pregnancy Loss X Unwanted			.84
			(.24)
Pregnancy Loss X Ambivalence			.11*

	(.11)
Pregnancy Loss X 2nd Birth	.40***
	(.11)
Pregnancy Loss X 3rd Birth	.65
	(.18)

Source: 2002-2013 NSFG
Ref Categories: Intention= On-Time, Birth Order= First Birth, Race/Ethnicity=White, Religion=None; Marital Status=Married
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

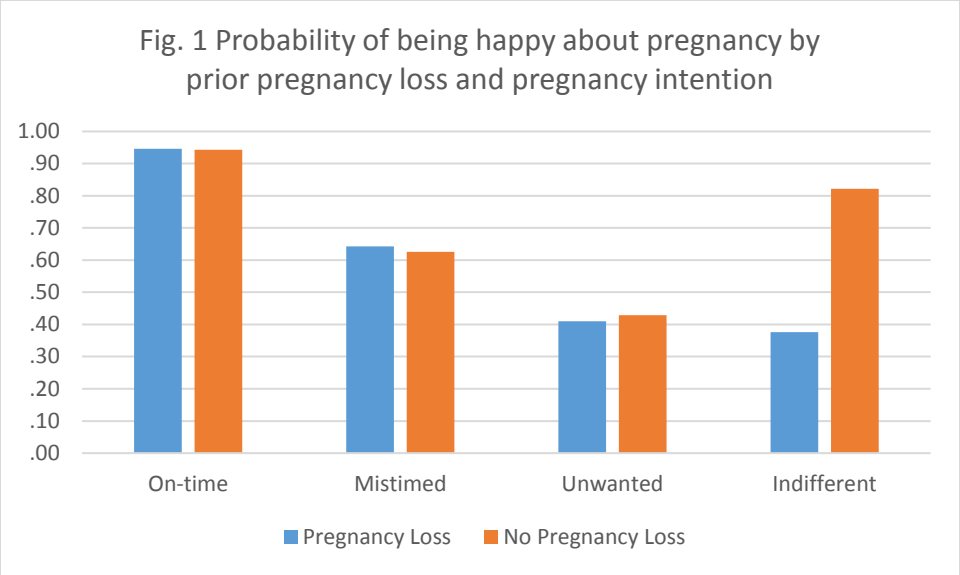
Fig. 1 Probability of being happy about pregnancy by prior pregnancy loss and pregnancy intention
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
.00
On-time
Mistimed
Unwanted
Indifferent
Pregnancy Loss
No Pregnancy Loss

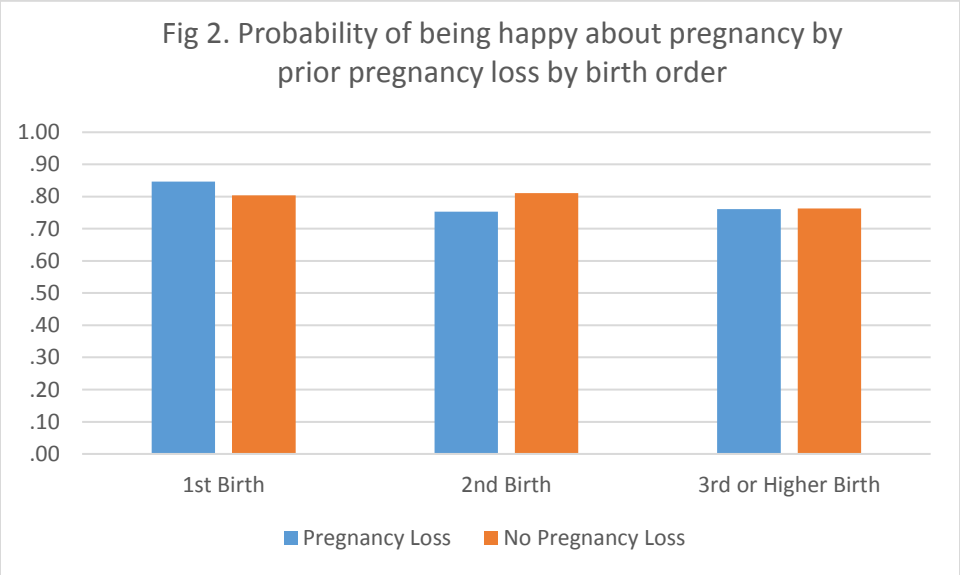
Fig 2. Probability of being happy about pregnancy by prior pregnancy loss by birth order
1.00
.90
.80
.70
.60
.50
.40
.30
.20
.10
.00
1st Birth
2nd Birth
3rd or Higher Birth
Pregnancy Loss
No Pregnancy Loss