Examining the association of abortion history and current mental health: A reanalysis of the National Comorbidity Survey using a common-risk-factors model

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ABSTRACT

Using the US National Comorbidity Survey (NCS), Coleman, Coyle, Shuping, and Rue (2009) published an analysis indicating that compared to women who had never had an abortion, women who had reported an abortion were at an increased risk of several anxiety, mood, and substance use disorders. Here, we show that those results are not replicable. That is, using the same data, sample, and codes as indicated by those authors, it is not possible to replicate the simple bivariate statistics testing the relationship of ever having had an abortion to each mental health disorder when no factors were controlled for in analyses (Table 2 in Coleman et al., 2009). Furthermore, among women with prior pregnancies in the NCS, we investigated whether having zero, one, or multiple abortions (abortion history) was associated with having a mood, anxiety, or substance use disorder at the time of the interview. In doing this, we tested two competing frameworks: the abortion-as-trauma versus the common-risk-factors approach. Our results support the latter framework. In the bivariate context when no other factors were included in models, abortion history was not related to having a mood disorder, but it was related to having an anxiety or substance use disorder. When prior mental health and violence experience were controlled in our models, no significant relation was found between abortion history and anxiety disorders. When these same risk factors and other background factors were controlled, women who had multiple abortions remained at an increased risk of having a substance use disorder compared to women who had no abortions, likely because we were unable to control for other risk factors associated with having an abortion and substance use. Policy, practice, and research should focus on assisting women at greatest risk of having unintended pregnancies and having poor mental health—those with violence in their lives and prior mental health problems.

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Introduction

Recently, Coleman, Coyle, Shuping and Rue (henceforth CCSR, 2009) published an analysis finding that US women who reported having had an abortion had higher rates of several mental health disorders as diagnosed according to the guidelines of the Diagnostic and Statistical Manual III Revised (DSM III-R, American Psychiatric Association, 1987). These disorders included panic disorders and attacks, post-traumatic stress disorder, agoraphobia, alcohol and drug abuse and dependence, bipolar disorder, mania, and depression (CCSR, 2009). Using a U.S. nationally representative data set designed to measure the prevalence and correlates of DSM-III-R mental disorders, the National Comorbidity Survey (NCS), CCSR (2009) concluded, "The results of this study revealed that women

who have aborted are at a higher risk for a variety of mental health problems including anxiety (panic attacks, panic disorder, agoraphobia, PTSD), mood (bipolar disorder, major depression with and without hierarchy) and substance abuse disorders when compared to women without a history of abortion after controls were instituted for a wide range of personal, situational, and demographic factors" (p. 775). Here, we test the replicability of their findings. That is using the same data, sample, and coded variables as indicated by those authors, we examined whether the simple bivariate statistics (found in Table 2 of CCSR, 2009) presenting the relationship of ever having had an abortion to each mental health disorder are replicable when no factors are controlled for in models. Furthermore, we test whether having multiple, one, or no abortions is associated with having subsequent mental health problems among ever-pregnant women when considering and not considering alternative explanations (i.e., when controlling and not controlling for common risk factors).

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Conceptual frameworks

Abortion as a traumatic experience

Various conceptual frameworks for understanding how having an abortion may relate to subsequent mental health have been hypothesized (see Major et al., 2009 for a review). Coleman et al. (2009) conceptualize having an abortion as a traumatic experience leading to mental health problems (e.g., CCSR, 2009; Reardon, 1987; Reardon, Strahan, Thorp, & Shuping, 2004; Rue, Coleman, Rue, & Reardon, 2004). This framework contends that having an abortion, independent of other life circumstances, is a traumatic experience with consequences similar to other traumatic experiences, such as rape or war. Support for this framework originally came from qualitative interviews with women who were recruited because they deemed a prior abortion experience as highly stressful (Speckhard & Mufel, 2003; Speckhard & Rue, 1992, 1993). More recently, quantitative studies, including the one described in great detail here, have offered evidence for this framework (for a review, see the American Psychological Association [APA], 2008; Major et al., 2009; or Robinson, Stotland, Russo, Lang, & Occhiogrosso, 2009).

While published studies other than CCSR (2009) claim that having an abortion is a precursor to poor mental health, many other studies and reviews have not found this (for a review, see APA, 2008; also see Charles, Polis, Sridhara, & Blum, 2008; Major et al., 2009; Robinson et al., 2009). It may appear, therefore, that there is a scientific debate in which some research studies find support for abortion as a cause of psychological problems, while other studies do not. Unfortunately, this debate is a false one, because many studies claiming to find support that abortion causes poor mental health frequently suffer from several methodological limitations, such as 1) using inappropriate comparison groups, 2) failing to control for prior mental health, and 3) not considering alternative explanations (Charles et al., 2008; Major et al., 2009; Robinson et al., 2009; Steinberg & Russo, 2009). More importantly, in some cases, findings simply have not been replicable (e.g., see Russo & Schmiege, 2005). For example, using the same data, same sample, and correct coding, Russo and Schmiege (2005) could not replicate the findings of Reardon and Cougle (2002). Thus, the first analysis here will test whether the findings of CCSR (2009) are replicable using the same dataset, same sample, and same coding.

Abortion within a stress and coping model

Instead of conceptualizing having an abortion as a traumatic experience, others conceptualize it as a potential stressor, similar to other possible life stressors. This and other related frameworks emphasize the variability in women's experiences following an abortion, acknowledging that some women will have negative psychological outcomes following an abortion (Adler et al., 1990, 1992; Major et al., 2009). However, at the aggregate level, many studies and reviews of the literature find that most women do not have psychological problems following an abortion (Adler et al., 1990, 1992; Charles et al., 2008; Major et al., 2009; Robinson et al., 2009). Women likely to have negative psychological outcomes following an abortion are those least apt to cope with *any* stressful life event including giving birth to an unwanted pregnancy. Because the work using the stress and coping perspective has focused on explaining psychological variation among women having abortions (e.g., Cozzarelli, Major, Karrasch, & Fuegen, 2000; Cozzarelli, Sumer, & Major, 1998; Major & Gramzow, 1999; Major et al., 2000; Major, Richards, Cooper, Cozzarelli, & Zubek, 1998), much of this research emphasizes the immediate circumstances and context surrounding the abortion, such as pregnancy intention, social support, expectations for coping with abortion, emotions or mental health before the

procedure, and influence of protestors, in understanding psychological adjustment after an abortion. While this work seeks to understand what explains psychological adjustment to an abortion, it does not compare the psychological adjustment of women having an abortion to women having other pregnancy outcomes.
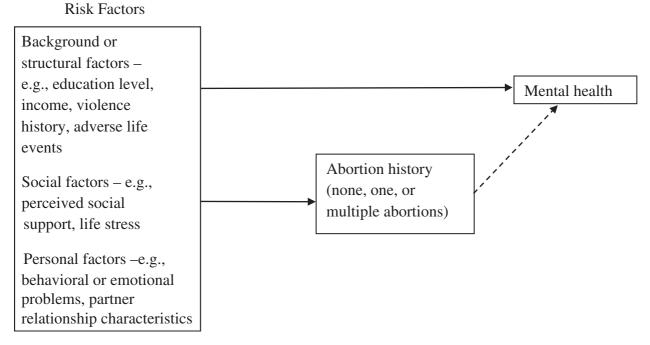
Common risk factors approach

In contrast to the stress and coping framework, the common-risk-factors approach compares the psychological outcomes of women having abortions with those having other pregnancy outcomes, emphasizing the role of sociodemographic, structural, and other risk factors in explaining post-abortion and post-pregnancy mental health. Often, the factors considered in this perspective go beyond the immediate pregnancy context and encompass distal factors such as socioeconomic status, violence history, or prior mental health. Previous research shows that these factors are associated with having an abortion (Fisher et al., 2005; García-Moreno, Jansen, Ellsberg, Heise, & Watts, 2005; García-Moreno & Stöckl, 2009; Jones, Darroch, & Henshaw, 2002; Russo & Denious, 2001, 1998; Steinberg, Becker, & Henderson, in press; Steinberg & Russo, 2008; Taft & Watson, 2008) as well as with mental health problems (Breslau, Kendler, Su, Gaxiola-Aguilar, & Kessler, 2005; Kessler, Davis, & Kendler, 1997; Kessler et al., 1994; Neumann, Houskamp, Pollock, & Briere, 1996). Therefore, it is important to control for these factors when examining how abortion, compared to other pregnancy outcomes, relates to subsequent mental health, as some studies do (e.g., Russo & Denious, 1998, 2001; Steinberg et al., in press; Steinberg & Russo, 2008; Taft & Watson, 2008). When analyses do not control for these risk factors, the relationship of pregnancy outcome (abortion versus other pregnancy outcomes) and mental health may be significant, as depicted in Fig. 1, because of common risk factors. When risk factors are accounted for in analyses, however, this framework posits that the relationship of abortion and mental health will not be significant (or at least will be significantly reduced). That is, if a relationship between abortion and mental health is found, it is likely to be spurious or driven by factors associated with both having an abortion and mental health. In the second part of our study, we provide analyses with and without controlling for risk factors.

Comparing the stress and coping model and common risk factors approach

The latter two perspectives, abortion within a stress and coping model and the common-risk-factors approach, are not competing, but rather complementary. They ask and answer different questions, shedding light from different angles on how pregnancy outcomes, and particularly abortion, relate to subsequent mental health. The stress and coping perspective aims to understand the contextual factors and immediate psychological mechanisms of coping with an abortion, while the common-risk-factors perspective aims to test whether women who have abortions are at an increased risk of subsequent mental health problems compared to women with other pregnancy outcomes (usually women choosing to give birth). Another difference between these two frameworks has been the methodologies used. Studies using the stress and coping perspective usually involve data collected prospectively and designed to assess the current coping and personal resources, relationship characteristics, and mental health among women having abortions, while many studies using the common-risk-factors approach are secondary data analyses of large data sets collected for purposes other than examining the relation between abortion and mental health.

In understanding the mental health sequelae of women having abortions compared to women having other pregnancy outcomes,

Risk Factors

Fig. 1. Depiction of the common-risk-factors approach among women who have ever been pregnant. A solid line indicate a significant association is expected in the common-risk-factors approach. We do not mean to suggest the dashed line indicates we may expect a significant relationship when no factors are controlled for in analyses. When the risk factors are included in the model, no significant relationship is expected (or at least it is expected to be reduce). This model shows that the reason for the relationship between abortion history and mental health is the risk factors common among women having abortions and mental health problems. The no-abortion group is comprised of women who have been pregnant but have not had any abortions.

it is important to consider immediate circumstances such as coping, personal, and economic resources, pregnancy intention, and social support, along with other more distal risk factors such as violence history, prior mental health, and sociodemographic characteristics. However, when using secondary data (as is the case when using the common-risk-factors approach), often the immediate circumstances are not available. Thus, research using the common-risk-factors approach has focused on more distal factors, such as violence experience, rather than the immediate pregnancy context.

The CCSR (2009) study and our reanalysis are based on a secondary data analysis, so we do not have immediate contextual factors such as pregnancy intention, personal or economic resources, or relationship factors at the time of the abortion or other pregnancy outcomes. Moreover, we compare women who have abortions to other groups of women. Therefore, we draw mainly from the common-risk-factors framework, contending that distal factors related to having an abortion are also related to having poor mental health.

In Analysis Set 2, we test whether the data fit the abortion-as-trauma framework or the common-risk-factors perspective. According to the abortion-as-trauma framework, the relation between abortion and mental health should be significant with and without controlling for other risk factors. According to the common-risk-factors framework, if a relation between abortion and mental health is found when no risk factors are controlled for in analyses, it is because of common risk factors among women having abortions and women having mental health problems. Therefore, when we control for these other factors, the relationship of abortion and mental health should no longer be significant (or at least significantly reduced). Before doing this, we first test the replicability of CCSR (2009) because they used the same outcome, mental health at time of interview, from the same data as we use in Analysis Set 2.

Analysis Set 1

CCSR's (2009) findings are inconsistent with other published research using the same dataset and sample: women who completed Part II of the National Comorbidity Survey (NCS; e.g., Cairney, Pevalin, Wade, Veldhuizen, & Arboleda-Florez, 2006). Thus, the aim of Analysis Set 1 is to test whether the findings in Table 2 of CCSR (2009) are replicable. CCSR (2009) report current (i.e., 1-month[1]) mental health disorder by ever having had an abortion, for all women who completed the Part II questionnaire of the NCS. They compared women who ever aborted (unweighted $n = 399$) to women who never aborted (unweighted $n = 2650$), and their sample size in each group is consistent with the codebook data from the NCS (Kessler, 2002). The total unweighted sample of CCSR ($N = 3049$) is five less than the total unweighted sample of women from Cairney et al., 2006 ($N = 3054$) because five women who completed Part II did not answer the abortion question. Moreover, CCSR (2009) and Cairney et al. (2006) report that their statistics are based on weighted data. Consequently, the prevalence statistics among all women regardless of whether they had ever had an abortion in CCSR (2009) and among all women in Cairney et al. (2006) and CCSR (2009) should be compatible. However, they are not. For instance, CCSR (2009) report that 40.6% of women who aborted and 26.6% of women who did not abort had depression (without hierarchy). Given the weighted sample size in each group (see Table 1 below) and the percent in each group with depression, we can calculate the percent of all women who had current (or 1-month) depression; it is 28.4% of all women in CCSR. This statistic, however, is more than twice as large as the percent of all women with depression (13.0%) in the past *year*

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[1] Current, 1-month, or 30-day mental status indicates whether or not the person had the disorder within a month of the interview.

Table 1
Percent of women with disorder, by abortion history.

	CCSR (2009)		Current reanalysis	
	Abortion	No abortion	Abortion	No abortion
Unweighted N	399	2650	399	2646
Weighted N	Not reported	Not reported	350	2583
Diagnosis				
Panic disorder	11.0	6.3	1.9	1.8
Panic attacks	18.0	12.3	3.5	3.1
PTSD	19.8	11.5	4.5	2.8
Agoraphobia w/or w/o panic disorder	18.0	11.2	6.0	2.5
Agoraphobia w/o panic disorder	14.0	8.4	5.1	1.6
Alcohol abuse w/or w/o dependence	36.8	16.3	4.0	1.0
Alcohol abuse w/o dependence	14.6	7.8	0.3	0.4
Alcohol dependence	23.4	9.6	5.5	1.5
Drug abuse w/or w/o dependence	23.6	9.7	1.8	0.5
Drug abuse w/o dependence	9.5	4.1	0.1	0.07
Drug dependence	16.7	6.9	2.2	1.0
Bipolar 1	5.4	2.1	0.6	0.8
New mania	1.7	0.5	0.0	0.2
Major depression w/o hierarchy	40.7	26.6	8.3	5.5
Major depression w/hierarchy	36.5	23.0	7.9	4.6

reported by Cairney et al. (2006) and 1.4 times as large as the percent of all women with *lifetime* (20.0%) depression reported by Bassuk, Buckner, Perloff, and Bassuk (1998). Certainly, the percent of all women with depression in the past month cannot be larger than the percent of all women with depression in the past year or in their lifetime. Similar discrepancies are found between Cairney et al. (2006) and CCSR (2009) for *all* the disorders examined in both studies, including new mania, panic disorder, agoraphobia without panic disorder, alcohol abuse without dependence, alcohol dependence, drug abuse without dependence, and drug dependence. Other published studies support the statistical findings of Cairney et al. (2006) and Bassuk et al. (1998) and directly contradict those of CCSR (2009) (e.g., Blazer, Kessler, McGonagle, & Swartz, 1994; Kessler et al., 1994; Kessler, Rubinow, Holmes, Abelson, & Zhao, 1997; Kessler, Sonnega, Bromet, Hughes, & Nelson, 1995; Magee, Eaton, Wittchen, McGonagle, & Kessler, 1996). Therefore, in Analysis Set 1, we conduct the same analysis as CCSR (2009), using the same data and codes and doing exactly what they outlined in their study, to test whether their findings are replicable.

Method

Sample

The US National Comorbidity Survey (NCS) is an epidemiologic investigation designed to study the prevalence and correlates of DSM III-R disorders. The NCS was the first survey to administer a structured psychiatric interview to a nationally representative sample (see Zhao, Kessler, & Wittchen, 1994 for diagnostic criteria). The survey was fielded between 1990 and 1992 with a household-based sample of more than 8000 female and male respondents ages 15 to 54. In the NCS, data on previous events or experiences in the participants' lives are collected retrospectively, and based on participants' responses, the NCS staff computed participants' lifetime, 1-year, 6 month, and 1 month occurrence of each disorder. In addition, for those who had a disorder, information on the age of

the first and most recent onset are provided in the data. Because complex survey techniques were used to collect the data, survey design factors are applied to our analysis to account for the effects of stratification, clustering, and weighting on our estimates.

Weighted and unweighted sample sizes are used to describe our sample. A subsample of the original respondents (unweighted and weighted $n = 5877$) completed the NCS Part II survey that included, among other measures, reproductive history information (see Kessler, Davis, et al., 1997; Kessler, Rubinow, et al., 1997 for how the Part II subsample was selected, and Kessler, Little, & Groves, 1995, and Kessler et al., 1994 for sample design and field procedures of the NCS). Comparisons of the Part II NCS demographic distributions with census data have shown that the sample was representative of the 1989 U.S. population (Kessler, Little, et al., 1995; Kessler, Sonnega, et al., 1995). Of the 5877 (weighted $n = 5877$) respondents, 3054 (weighted $n = 2939$) were women. CCSR (2009) state that "The current sample… included all women for whom there was data available on all variables of interest: 399 women who had either one (77%) or more (23%) abortions and 2650 women who did not report an abortion." When we ran a frequency distribution on the appropriate variable (variable V5016), we obtained the same unweighted sample sizes for the abortion and no-abortion groups and the same unweighted percentage of women who reported one versus multiple abortions among those reporting an abortion.[2] Moreover, this same unweighted frequency distribution may be found in the NCS codebook (Kessler, 2002). CCSR (2009) also state, "Deriving accurate results from the NCS results requires application of correct sample weights. In this study, necessary weighting was conducted as advised by the NCS authors in order to achieve nationally representative results." We note that 4 women who reported that they did not have an abortion (in variable V5016) did not have a Part II weight value, which means these women could not be used in analyses in which weights are taken into account. Therefore, given that the analyses of CCSR (2009) took the necessary weighting into account, their analysis, like ours, was conducted on the unweighted sample of 399 women (weighted $n = 350$) who had an abortion and the unweighted sample of 2646 women (weighted $n = 2583$) who did not have an abortion.

Measures

Mental health outcomes

Participants were designated (by NCS staff, after data collection) as currently having a disorder based on their responses to questions in Version 1 of the World Health Organization Composite International Diagnostic Interview (CIDI), a structured interview designed to assess DSM III-R mental disorders. In other words, these disorders are already coded in the data file using a published standard; users of the NCS data do not have to code whether or not participants had a disorder. An NCS clinical reappraisal study found good test-retest reliability and procedural validity of all the diagnoses in the CIDI compared to clinical reassessments with the exception of mania (Kessler et al., 1998), suggesting mental health diagnoses are valid. Diagnoses in the data include current diagnosis, past-6-months diagnosis, one-year diagnosis, and lifetime diagnosis. CCSR (2009) state, "The psychiatric illnesses were assessed as 'present' or 'absent' at the time of data collection,

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[2] We note that the sum of the abortion group plus the no abortion group is slightly less than the total number of women who answered Part II of the NCS, the part of the questionnaire which had the abortion questions. This is because some (unweighted $n = 9$) women who answered Part II of the NCS did not answer whether they had ever had an abortion or not. In addition, four women who answered the abortion variable did not have a weight for Part II.

providing assurance that in most cases, the abortion preceded the diagnosis." Therefore, it appears they used the current (1-month or 30-day) diagnosis.

The mental health disorders diagnosed at the time of interview that were used by CCSR (2009) are reported here. They include panic disorder, panic attacks, post-traumatic stress disorder, agoraphobia with or without panic disorder, agoraphobia without panic disorder, alcohol abuse with or without dependence, alcohol abuse without dependence, alcohol dependence, drug abuse with or without dependence, drug abuse without dependence, drug dependence, bipolar I, new mania, major depression without hierarchy, and major depression with hierarchy.

Abortion group

Women who did not answer the abortion question or who did not have a Part II weight value were not included in analyses, as CCSR (2009) also would have had to have done, given that they stated they used weights in their analyses. Therefore, women who reported having had an abortion (unweighted $n = 399$, weighted $n = 350$) were compared to women who reported not having had an abortion (unweighted $n = 2646$, weighted $n = 2583$). To be clear, the unweighted sample size of the abortion group we report here is exactly what CCSR (2009) reported, but the unweighted sample of the no-abortion group we report here is 4 less than the unweighted sample size reported by CCSR (2009). Note that because CCSR (2009) state that they used the appropriate weights in their analyses, their unweighted sample size in the no-abortion group had to have been 2646, as four women of the 2650 women who reported having had no abortion did not have a Part II weight value. Consequently, our Analysis Set 1 and their analyses were conducted on the same samples.

Analyses

We computed the prevalence of mental health disorders by ever having had an abortion and compare this to the findings of CCSR (2009). The survey design features of the NCS, which included weighting, stratification, and clustering, were accounted for in all of our analyses (Stata 10.1: College Station, TX).

Results

Table 1 reports our findings on the prevalence of mental health disorders by abortion history compared to the findings reported by CCSR (2009). In every case, the proportions reported by CCSR (2009) are much larger, sometimes more than 5 times as large, as those found in our analyses. The statistics we found in our reanalysis of the data are consistent with other published results on the 30-day prevalence of these mental disorders among women in the NCS data (e.g., Bassuk et al., 1998; Blazer et al., 1994; Eaton, Kessler, Wittchen, & Magee, 1994; Magee et al., 1996). In other words, our findings are consistent with previous research estimating the percent of all women with these mental disorders in the past month and using the same data, while CCSR's (2009) findings are not. In addition, it was not possible to replicate CCSR's (2009) Tables 3–5 because it is unclear how categorical covariates such as marital status, race, or religion were entered into CCSR's (2009) models. Such variables should be entered categorically, where one category serves as the reference, in order to have accurate meaning in the analyses. However, it appears they were entered as continuous measures, rendering the results uninterpretable.

Analysis Set 2

In Analysis Set 2, we extend the work of Steinberg and Russo (2008) and Steinberg et al. (in press), who used the same dataset,

and test whether women's risk of having any mood, anxiety, or substance use disorder increases as women have more abortions. Based on the conceptual framework of abortion-as-trauma, we may expect women who had multiple abortions to have poorer mental health than those having one abortion, who we may expect to have poorer mental health than those having no abortions. Moreover, if abortion causes mental health problems, these associations should remain (at the same strength) when other risk factors are considered in the analyses. In contrast, the common-risk-factors approach, which conceptualizes similar life circumstances and events among women having both abortions and poor mental health, posits that if a relationship between abortion and mental health is found when no other factors are controlled in the analyses, it is due to other factors—structural, personal, psychological, or social ones. Thus, when these other factors are included in the analyses, the relation of abortion and mental health should not be significant (or should be significantly reduced). Analysis Set 2, therefore, examined the relation of abortion history (zero, one, or multiple abortions) to mental health with and without controlling for other risk factors.

Method

Sample

A subsample of women from the NCS described in Analysis Set 1 was used for Analysis Set 2. Instead of using all women who completed Part II of the NCS, we used women who reported having had a pregnancy end in delivery, miscarriage/stillbirth, or abortion prior to the survey administration and who did not have missing values for the abortion or Part II weight variable (unweighted $n = 2070$). We then excluded five women who were missing information needed to compute the age at which a first or only abortion occurred. Therefore, our final unweighted sample size was 2065 (394 abortion and 1671 no abortion).

Mental health outcomes

As in Analysis Set 1 and CCSR (2009), we looked at mental health diagnoses within the past 30 days (also known as at the time of the interview). Unlike CCSR (2009), who used 15 separate diagnoses, we examined whether participants were diagnosed with any mood disorder, anxiety disorder, or substance use disorder at the time of interview. We did this because we did not want to increase our chances of finding an effect that does not truly exist—i.e., inflate our alpha value. Moreover, because few women were diagnosed as having a particular disorder at the time of interview, there may be low power to detect a relationship between abortion history and an individual mental health disorder; by combining disorders classified by the DSM III-R as mood, anxiety, and substance use disorders, we increased the number of women classified as having a disorder at the time of the interview thereby increasing our chance of finding an actual effect.

Mood disorders

Women who were coded by NCS staff as having depression, dysthymia, bipolar I disorder, or mania within the thirty days preceding the interview were coded as having a mood disorder at the time of the interview. Mood disorders in the NCS data were divided by NCS staff into those with or without hierarchy, signifying stricter versus looser conditions for meeting diagnostic criteria of a disorder. Thus, those who met criteria for a disorder with hierarchy (stricter version) also met criteria for the disorder without hierarchy (looser version).

Anxiety disorders

We included women who had generalized anxiety disorder (GAD) with or without hierarchy, social anxiety, simple phobia, panic disorder, panic attacks, agoraphobia with or without panic disorder, or post-traumatic stress disorder (PTSD) within the thirty days preceding the interview as having an anxiety disorder at the time of the interview.

Substance use disorders

Women who were classified as having alcohol or drug abuse with or without dependence or alcohol or drug dependence within the last month and who were also coded as having a lifetime diagnosis of the respective disorder were coded as having a substance use disorder at the time of the interview.

Abortion history

Women were asked if they had ever had an abortion, and if they reported having had one, they were asked how many they had undergone. If they had only one abortion, women reported when (month and year) they had it, and if they reported more than one, they reported their age at the first one and the month and year of the most recent one. Women who reported having never had an abortion but who reported a previous pregnancy or pregnancies end in either miscarriage/stillbirth or delivery were coded as having had no abortions (weighted $n = 1706$). Women who reported one abortion were coded as having had one abortion (weighted $n = 284$) and women who reported more than one abortion were reported as having had multiple abortions (weighted $n = 63$). Variables that were coded as occurring before the first abortion for the two abortion groups were coded as occurring before the first pregnancy for the no-abortion group. It should be noted that for the abortion groups (one or multiple abortions), the first abortion was not necessarily the first pregnancy. For the one- and multiple-abortion groups, 64.4% (weighted $n = 183$) and 56.3% (weighted $n = 35$) respectively had a first pregnancy end in abortion. Therefore, it is possible that an experience that occurred before a first abortion occurred after a first pregnancy for those in the only abortion groups.

Risk factors

We divided our risk factors into four categories in order to describe them here, similar to those used by Steinberg et al. (in press), with the addition of one category, namely, other pregnancies.

Sociodemographic factors

Because previous research has found that sociodemographic factors such as income, age at pregnancy, race, and marital status are related both to having an abortion and having poor mental health, we controlled for these factors (Jones et al., 2002; Kessler et al., 1994; Steinberg et al., in press; Steinberg & Russo, 2008). Income and marital status were assessed at the time of the interview. Age at first abortion was used for women who reported at least one abortion and age at first pregnancy was used for women who did not report any abortions.

Violence

A growing body of literature has found that having an abortion is associated with experience of violence in women's lives (Fisher et al., 2005; García-Moreno et al., 2005; García-Moreno & Stöckl, 2009; Russo & Denious, 2001, 1998; Steinberg et al., in press; Steinberg & Russo, 2008; Taft & Watson, 2008). We assessed whether women had experienced sexual or physical violence before their first abortion or, if they had had no abortions, before their first pregnancy. In addition, we assessed whether women reported any intimate partner violence with any partner ever. We classified a woman as having experienced intimate partner violence if she reported that a partner had ever done any of the following: pushed, grabbed or shoved her, thrown something at her, slapped or spanked her, kicked, bit, or hit her with a fist, hit or tried to hit her with an object, beaten her up, choked her, or burned or scalded her.

Prior mental health

We coded whether women reported a mood, anxiety, or substance use disorder *before* their first abortion or if they had no abortion, *before* their first pregnancy. A strong predictor of developing a mental health problem is having had a past mental health problem (Kessler et al., 2003). While we could have controlled for mental health at any time before the current month, we did not because this would not have been such a clean or strong test of the competing frameworks, abortion-as-trauma versus the common-risk-factors perspectives.

Other pregnancies

Information on number of miscarriages and births is also part of the NCS Part II questionnaire. We coded women as having had no, one or multiple miscarriages. Women were asked "How many children do you have, including step children and others you helped raise?" They were then asked about only their first eight children, including whether he/she was her natural child or not. We coded the number of natural children a woman reported, up to eight. Women who reported five or more births (unweighted $n = 72$, weighted $n = 76$) were combined with women who had four births.

Analyses

We conducted three analyses, each with three outcomes: mood, anxiety, or substance use disorders. In these analyses, we first tested whether there was a relation between abortion history and mental health. This first analysis was a logistic regression model assessing whether abortion history (0, 1, or multiple abortions) predicted mood, anxiety, or substance use disorders at the time of the interview, without any other potential risk factors included in the model. Recall, that in both the abortion-as-trauma and the common-risk–factors frameworks, a significant relation may emerge when no factors are controlled in analyses. The second analysis looked at the relation of abortion and mental health controlling only risk factors that occurred prior to the first abortion or first pregnancy (if the woman had had no abortions). Specifically, we controlled for prior violence experience and prior mental health. In this way, we could assess how factors that occurred before the abortion might have been driving any relation between abortion history and subsequent mental health. In our third analysis, we adjusted the model for sociodemographic factors (racial identification and income and marital status at time of interview) and other risk factors including ever experience of a intimate partner violence, age at first abortion or first pregnancy if no abortion, and number of previous miscarriages and births. While some of these events occurred after the first abortion or pregnancy, they occurred before or concurrently with the mental health diagnosis. Like Analysis Set 1, the survey design features of the NCS, which included weighting, stratification, and clustering, are accounted for in all of our analyses (Stata 10.1: College Station, TX).

Results

Descriptive statistics

Table 2 presents the relationship between the risk factors and abortion history. We tested whether distributions of race, marital

Table 2
Descriptive statistics of study variables, by number of abortions.

	No abortions	One abortion	Multiple abortions (2+)	Significant differences
Unweighted N	1671	303	91	
Weighted N	1706	284	63	
Sociodemographic factors				
Age at first abortion/pregnancy	22.0	22.4	21.6	–
Income (%)				–
$0–19,999	28.7	22.6	33.0	
$20,000 – $34,999	25.9	22.1	20.9	
$35,000 – $69,999	33.7	36.4	31.3	
$70,000 and more	11.7	18.9	14.9	
Race/ethnicity (%)				1 v 0, 2 + v 1
White	75.7	65.8	78.9	
Black	12.7	21.8	5.7	
Hispanic	8.4	10.3	11.2	
Other	3.3	2.1	4.2	
Marital status (%)				1 v 0
Married/cohabiting	77.5	62.5	67.9	
Sep/div/wid	16.4	20.1	21.6	
Never married	6.1	17.4	10.6	
Violence experience (%)				
Prior sexual violence	15.0	24.3	26.9	1 v 0, 2 + v 0
Prior physical violence	10.0	13.6	21.8	2 + v 0
Ever experienced IPV	30.8	24.3	40.7	2 + v 1
Mental health (%)				
Prior mood disorder	8.5	18.2	24.4	1 v 0, 2 + v 0
Prior anxiety disorder	28.4	31.4	50.9	2 + v 0, 2 + v 1
Prior substance disorder	12.2	23.2	17.5	1 v 0
Other pregnancies				
Miscarriages (%)				–
No miscarriages	70.7	74.8	60.0	
One miscarriage	20.0	13.9	27.5	
Multiple miscarriages	9.4	11.3	12.5	
Number of births	2.14	1.36	1.42	1 v 0, 2 + v 0

Note. Age at first abortion/pregnancy signifies age at first abortion for the abortion groups and age at first pregnancy for the no-abortion groups. Prior signifies before the first abortion for the abortion groups and before the first pregnancy for the no-abortion group. IPV = intimate partner violence; Sep/div/wid = separated, divorced or widowed category. Race, marital status, and miscarriages were tested using chi-square tests of distributional differences. All others statistics were t-tests of differences. Marital status and poverty level were status at time of interview. Last column shows which groups differ significantly, $p < 0.05$: 1 v 0 = 1 vs. 0 abortions, 2 + v 0 = Multiple vs. 0 abortions, 2 + v 1 = Multiple vs. 1 abortion groups differ.

status, or miscarriage history differed by abortion history using chi-square statistics. For all other study variables, we tested whether they differed by abortion history using t-statistics from logistic or linear regression models. Noteworthy are the findings regarding violence and prior[3] mental health differences between women who had had one, multiple, or no abortions. Women having multiple abortions had higher rates of prior sexual violence (26.9%), physical violence (21.8%), mood disorders (24.4%), and anxiety disorders (50.4%) compared to women having no abortions (14.9%, 10.0%, 8.5%, and 28.4% respectively), $ps < 0.05$. They also had higher rates of prior anxiety disorders (50.4%) and intimate partner violence (40.7%) compared to women having one abortion (31.4% and 24.3 respectively), $ps < 0.05$. Women having one abortion had higher rates of prior sexual violence (24.3%) and mood disorders (18.2%) compared to women who had no abortions, $ps < 0.05$.

Table 3 presents a descriptive analysis of the relationship of the risk factors and mental health disorders at the time of the interview. We see that women having any of the mental health disorders were more likely to have experienced sexual or physical violence before their first abortion (or first pregnancy if they reported no abortions), $ps < 0.005$. In addition, women with mood or substance use disorders were more likely to experience intimate partner violence at some time in their lives, $ps < 0.001$. We also see that women having more miscarriages were more likely to have mood or anxiety disorders, $ps < 0.005$. There was also a tendency for

women having more births to be more likely to have mood disorders, $p < 0.10$, and the more births a woman had had, the less likely she had a substance use disorder, $p < 0.005$.

Unadjusted models

Our first analyses tested the relations of abortion history to mood, anxiety, or substance use disorders using bivariate logistic regression models. Table 4 and the first column of Table 5 present the findings from these analyses. No differences were found by abortion history in mood disorders at the time of the interview. Women who had had multiple abortions were more likely to have anxiety disorders (31.0%) compared to women who had had no abortions (16.1%) or one abortion (17.7%), $ps \leq 0.01$. Women who had had multiple abortions or one abortion were more likely to have substance use disorders (11.9% and 5.2% for multiple and one abortion) compared to women who had had no abortions (3.5%), $ps \leq 0.01$. There was also a tendency for women who had multiple abortions to be more likely to have substance use disorders at the time of the interview, $p < 0.06$.

Adjusted models

The second analyses tested the relationship of abortion history to mood, anxiety, or substance use disorders, controlling for violence experience and mental health both prior to the first abortion or first pregnancy if the woman had no abortions. These analyses were the cleanest test of the model depicted in Fig. 1. As seen in column two of Table 5, three of the five effects of the abortion history variable that were significant (or marginally

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[3] Recall that prior refers to the anytime before the first or only abortion for women having multiple or one abortion. For women having no abortions it refers to the anytime before the first pregnancy.

Table 3
Descriptive statistics of study variables, by type of mental disorders at time of interview.

	Mood disorder			Anxiety disorder			Substance use disorder		
	Present	Not present	p	Present	Not present	p	Present	Not present	p
Unweighted N	191	1874		450	1615		90	1975	
Weighted N	143	1910		344	1709		65	1988	
Sociodemographic factors									
Age at first abort/preg	20.8	22.2	0.01	21.2	22.2	0.0005	21.2	22.1	n.s.
Income categories (%)			0.04			0.08			0.03
$0–19,999	34.6	27.5		33.8	26.9		47.0	27.4	
$20,000–34,999	32.3	24.6		26.1	25.0		21.1	25.3	
$35,000–69,999	27.3	34.5		31.3	34.5		20.1	34.4	
$70,000 and more	5.9	13.3		8.8	13.6		11.8	12.8	
Race/ethnicity (%)			n.s.			n.s.			n.s.
White	69.3	74.8		73.1	74.7		81.2	74.2	
Black	17.6	13.4		15.1	13.4		11.0	13.8	
Hispanic	10.5	8.6		9.1	8.6		7.0	8.8	
Other	2.6	3.2		2.6	3.3		0.8	3.2	
Marital Status (%)			0.01			n.s.			0.005
Married/cohabiting	63.7	76.0		74.5	75.3		61.4	75.6	
Sep/div/wid	27.0	16.3		15.9	17.3		22.0	16.9	
Never married	9.3	7.7		9.6	7.4		16.6	7.5	
Violence experience (%)									
Prior sexual violence	26.5	15.9	0.01	26.7	14.6	0.0005	31.7	16.1	0.005
Prior physical violence	26.0	9.7	0.0005	19.5	9.1	0.0005	30.4	10.12	0.0005
Ever experienced IPV	47.6	28.9	0.0005	36.3	28.9	0.06	50.2	29.5	0.001
Mental health (%)									
Prior mood disorder	35.6	8.4	0.0005	21.3	8.1	0.0005	26.1	9.8	0.0005
Prior anxiety disorder	65.1	26.8	0.0005	76.4	20.0	0.0005	61.6	28.4	0.0005
Prior substance disorder	18.9	13.5	0.08	19.5	12.7	0.001	65.4	12.2	0.0005
Other pregnancies									
Miscarriages (%)			0.0005			0.005			n.s.
No miscarriages	59.0	71.8		65.4	72.0		60.2	71.3	
One miscarriage	18.5	19.4		18.2	19.6		21.3	19.3	
Multiple miscarriages	22.5	8.8		16.4	8.4		18.6	9.5	
Number of births	2.2	2.0	0.08	2.1	2.0	n.s.	1.5	2.0	0.005

Note. Age at first abort/preg signifies age at first abortion for the abortion groups and age at first pregnancy for the no-abortion groups. Prior signifies before the first abortion for the abortion groups and before the first pregnancy for the no-abortion group. IPV = intimate partner violence; Sep/div/wid = separated, divorced or widowed category. Race, marital status, and miscarriages were tested using chi-square tests of distributional differences. All others statistics were *t*-tests of differences. Marital status and poverty level were status at time of interview.

significant) when no factors were included in the model became non-significant when prior risk factors were included, supporting the notion that what drives the relation between abortion and mental health is factors common among women having abortions and women with poor mental health. The significant relations that remained after controlling for prior risk factors was multiple versus one or zero abortions and substance use disorders. Women who reported having had multiple abortions were 4.0 times as likely to have substance use disorders compared to women who had had no abortions, $p < 0.05$. In addition, women who had multiple abortions were 2.8 times more likely to have substance use disorders compared to women who had had only one abortion, $p = 0.05$.

The third analyses included risk or demographic factors that are associated with current mental health that did not necessarily occur before the first abortion or pregnancy (if the woman had no abortions), but did occur before or concurrently with the mental

Table 4
Percent (weighted *n*) of women with disorder type within each group.

	No abortions	One abortion	Multiple abortions (2+)
Unweighted N	1678	303	91
Weighted N	1706	284	63
Type of disorder			
Mood disorders	6.5[a] (112)	8.8[a] (25)	11.9[a] (7)
Anxiety disorders	16.1[a] (275)	17.7[a] (50)	31.0[b] (20)
Substance use disorders	2.5[a] (43)	5.2[b] (15)	11.9[b] (8)

Note. Within each row, percentages with different superscripts are significantly different, $p < 0.05$.

health outcomes. As seen in column three of Table 5, the only significant effect was between multiple versus no abortions. Again women who had had multiple abortions were 3.7 times as likely to have a substance use disorder compared to women who had had no abortions, $p < 0.05$. There was also a tendency for women who had multiple abortions to have a substance use disorder compared to women who had only one abortion, $p < 0.07$. Table 6 presents the models with all risk and sociodemographic factors included in the

Table 5
Odds and adjusted odds ratio (and 95% CI) of abortion history variable in the three analyses, by type of disorder.

	No risk factors	Prior risk factors only	All risk factors
Mood disorders			
Multiple vs. 0 abortions	1.9 (0.9–4.3)	1.0 (0.4–2.5)	1.0 (0.4–2.7)
Multiple vs. 1 abortions	1.4 (0.5–3.9)	0.9 (0.3–2.7)	0.8 (0.3–2.7)
1 vs. 0 abortions	1.4 (0.8–2.3)	1.1 (0.6–1.9)	1.2 (0.7–2.0)
Anxiety disorders			
Multiple vs. 0 abortions	2.3 (1.4–3.9)*	1.4 (0.7–2.6)	1.5 (0.8–2.8)
Multiple vs. 1 abortions	2.1 (1.2–3.6)*	1.4 (0.7–2.7)	1.5 (0.8–2.9)
1 vs. 0 abortions	1.1 (0.7–1.7)	1.0 (0.6–1.6)	1.0 (0.7–1.6)
Substance use disorders			
Multiple vs. 0 abortions	5.2 (2.2–12.2)*	4.0 (1.5–11.0)*	3.7 (1.2–11.7)*
Multiple vs. 1 abortions	2.5 (1.0–6.2) †	2.8 (1.0–7.8)*	3.0 (0.9–9.7) †
1 vs. 0 abortions	2.1 (1.1–4.0)*	1.4 (0.8–2.5)	1.2 (0.6–2.5)

Note. Prior risk factors includes mood, anxiety, and substance use disorders as well as physical or sexual violence before the first abortion if in the abortion group or before the first pregnancy if in the no-abortion group. All risk factors includes prior risk factors and race, marital status and poverty level at the time of the interview, age of first abortion or pregnancy if had no abortions, and number of lifetime miscarriages and births. *$p \leq 0.05$, †$p < 0.10$.

Table 6
Final model, adjusted for all risk factors.

	Mood disorders	Anxiety disorders	Substance use disorders
Abortion history			
Multiple	1.0 (0.4–2.7)	1.5 (0.8–2.8)	3.7 (1.2–11.7)*
One[a]	1.2 (0.7–2.0)	1.0 (0.7–1.6)	1.2 (0.6–2.5)
None[a]	1.0	1.0	1.0
Sociodemographic factors			
Income			
$0–19,999	1.1 (0.42–2.94)	1.1 (0.6–2.3)	0.7 (0.2–2.2)
$20,000–34,999	1.7 (0.65–4.40)	1.1 (0.5–2.2)	0.4 (0.1–1.3)
$35,000–69,999	1.3 (0.49–3.42)	0.9 (0.5–1.7)	0.3 (0.1–1.1) †
$70,000 or more[a]	1.0	1.0	1.0
Race			
Black	1.4 (0.74–2.63)	1.3 (0.8–2.3)	1.2 (0.5–2.7)
Hispanic	1.5 (0.70–3.35)	0.9 (0.6–1.5)	0.9 (0.3–2.9)
Other	0.9 (0.26–3.27)	0.8 (0.3–2.2)	0.2 (0.0–2.1) †
White[a]	1.0	1.0	1.0
Marital status			
Sep/div/wid	1.7 (1.1–2.8)*	0.7 (0.4–1.2)	1.4 (0.6–3.2)
Never married	1.6 (0.8–3.2)	1.0 (0.6–1.9)	1.6 (0.5–5.0)
Married[a]	1.0	1.0	1.0
Age at first ab/preg	0.9 (0.9–1.0)*	1.0 (0.9–1.00)*	0.9 (0.8–1.0) †
Violence experience			
Prior sexual violence	0.8 (0.5–1.5)	1.0 (0.6–1.5)	0.9 (0.5–1.7)
Prior physical violence	1.7 (1.0–2.7)*	1.1 (0.7–1.8)	1.9 (0.8–4.4)†
Ever experienced IPV	1.6 (1.0–2.7)*	1.1 (0.7–1.5)	2.7 (1.3–5.7)*
Prior mental health			
Prior mood disorder	5.4 (3.2–9.1)*	1.7 (1.1–2.5)*	0.9 (0.4–2.0)
Prior anxiety disorder	3.5 (2.5–4.9)*	12.3 (8.4–17.9)*	2.2 (1.1–4.4)†
Prior substance use disorder	0.1. (0.5–1.5)	1.0 (0.6–1.5)	13.6 (7.5–24.8)*
Other pregnancies			
Miscarriages			
Multiple vs. zero	2.6 (1.4–4.8)*	2.0 (1.2–3.4)*	2.4 (1.0–5.3)†
One vs. zero	0.9 (0.5–1.5)	0.9 (0.6–1.4)	1.2 (0.6–2.6)
Number of births	1.3 (1.1–1.5)*	1.1 (0.9–1.2)	0.7 (0.5–1.0)*

Age at first ab/preg signifies age at first abortion for the abortion groups and age at first pregnancy for the no-abortion group. Prior signifies before the first or only abortion for the abortion groups and before the first pregnancy for the no-abortion group. IPV = intimate partner violence; Sep/div/wid = separated, divorced or widowed category. Marital status and poverty level were status at time of interview.
*$p \leq 0.05$; †$p < 0.10$.
[a] reference group.

models. Women who were younger at the time of their first abortion or pregnancy if they had had no abortions, those with violence in their lives, or those with prior mental health disorders were more likely to have mental health disorders at the time of the interview.

Discussion

We reanalyzed the NCS data to test whether the analyses conducted by CCSR (2009) examining mental health disorders by ever having had an abortion were replicable, and they were not. In fact, the statistics we found are vastly different form the statistics reported by CCSR (2009). We did not test the replicability of the statistics in which CCSR (2009) controlled for other factors (Table 3 to 5) because findings from Table 2 were not replicable and because their multivariate models were performed in an apparently inappropriate way. Consequently, in Analysis Set 2 we conducted a new analysis examining the relationship of abortion history to mental health at the time of interview, using more appropriate methodological and data analytical techniques.

In Analysis Set 2 we examined how having 0, 1, or multiple abortions related to mental health disorders. This is only one of a handful of studies to examine how multiple versus one versus zero abortions relates to mental health (Russo & Dabul, 1997; Russo & Zierk, 1992; Steinberg & Russo, 2008; Taft & Watson, 2008), and is

only the second study to look at this relationship using measures consistent with DSM III-R diagnosis of mental health disorders. This study extends Steinberg and Russo's (2008) study that used the NCS to examine how multiple versus one versus zero abortion related to only GAD, PTSD, or social anxiety and that used only women who had abortions or deliveries on their first pregnancy. Here, we used women who had ever been pregnant (including women whose first pregnancy ended in a miscarriage or delivery) and examined several mental health disorders.

We also tested whether our findings support the abortion-as-trauma or the common-risk-factors framework. Consistent with other studies and reviews (Major et al., 2009; Robinson et al., 2009; Steinberg et al., in press; Steinberg & Russo, 2008), the findings here support the perspective of the common-risk factors approach. That is, in this study, factors that were associated with a higher likelihood of a woman having an abortion or multiple abortions —such as sexual and other violence and prior mental health problems—were also associated with her chances of having mental health disorders. These common risk factors suggest that a relation between abortion and mental health disorders may be expected when no risk factors are included in the model. As we saw, there were four significant (and one marginally significant) associations between abortion history and having any anxiety or substance use disorder. However, three of these were spurious, because when risk factors occurring before the first abortion or first pregnancy (if no abortion) were included in the model, the association of abortion history and mental health became non-significant. For the significant effect that remained, that between multiple versus zero abortions and substance use disorders, the relationship was reduced by approximately a quarter, suggesting support for the common-risk-factors perspective. Moreover, there are other known predictors of subsequent mental health that we were unable to control for, such as pregnancy intention, social support at the time of the abortion, or self-blame for pregnancy, that are predictors of post-abortion mental health (Major et al., 1990; Mueller & Major, 1989; Steinberg & Russo, 2008). It is possible that inclusion of such measures would further reduce the significance of abortion history.

This study is one of the first to highlight that in a nationally representative sample prior psychological health, particularly mood and anxiety disorders, were much more prevalent in women having multiple abortions compared to women having one or no abortions (see Table 2). While this may not be surprising given that mental health disorders are correlated with risky sexual behaviors that lead to unintended pregnancy (e.g., Berenson, Breitkopf, & Wu, 2003; DiClemente et al., 2001; Lehrer, Shrier, Gortmaker, & Buka, 2006; Ramrakha, Caspi, Dickson, Moffitt, & Paul, 2000; Walsemann & Perez, 2006), most research in the abortion and mental health literature has controlled for pre-pregnancy mental health because it is strongly related to subsequent mental health (e.g., Steinberg & Russo, 2008). Our study shows pre-pregnancy mental health should be taken into account because it is a risk factor for having both subsequent abortions and later mental health problems, showing that psychological factors are a common-risk-factor. In addition, these findings suggest that focusing on abortion as the cause of mental health problems is not warranted. If instead we focus on understanding how prior and existing contextual, psychological, and structural factors lead to having unintended pregnancies, abortions, and subsequent mental health problems, we may not only be better positioned to promote mental well-being, but also to prevent future unintended pregnancies.

Our findings also demonstrated that factors occurring before the first abortion or pregnancy (if never had an abortion) accounted for the relation of abortion and subsequent mental health, supporting other work (Steinberg et al., in press). Moreover, the odds ratio of

the abortion history variables in models which controlled for factors only before the first abortion or pregnancy did not appear to change much from models which also controlled for sociodemographic factors, other pregnancy events, and ever experience of intimate partner violence (see Table 5 last two columns). This underscores the importance of considering factors prior to having an abortion when examining the relation of abortion and subsequent mental health.

The strong significant predictors of mental health at the time of the interview were prior mental health problems and some types of violence experience. In contrast to other research which has found prior sexual violence to be a predictor of post-pregnancy mental health in fully adjusted models (Steinberg et al., in press; Steinberg & Russo, 2008), we did not find a significant association in our fully adjusted model. This may have been because prior sexual violence shared overlapping variance with other significant predictors in the model such as prior physical violence. Alternatively, prior sexual violence may have led to prior mental health problems, or a higher risk of experiencing intimate partner violence (Campbell, Greeson, Bybee, & Raja, 2008; Daigneault, Hérbert, & McDuff, 2009; Maniglio, 2009), which were both predictors of current mental health in the fully adjusted model. In unadjusted analyses, the bivariate relation of prior sexual violence to current mental health was significant. Therefore, prior mental health and intimate partner violence may have mediated the effect of prior sexual violence and current mental health. Future research should examine in more depth how different forms of violence (e.g., childhood sexual violence, childhood physical violence intimate partner violence) and mental health problems together relate to subsequent pregnancy outcomes and post-pregnancy mental health.

Using secondary data to examine the relation of abortion history and mental health has limitations besides the inability to control for pregnancy context. First, the time from the first abortion or first pregnancy to the current mental health state varied for women. In fact, for the thirteen women (unweighted sample size) who had had multiple abortions and substance use at the time of the interview, the time from the most recent abortion to the interview ranged from 1.75 to 23 years before the interview, with the median time span being approximately 6 years. Events between the first or most recent abortion and the time of substance use diagnosis that are associated with having both, such as other experiences of violence not considered here, may be driving the relationship of multiple abortions and substance use disorder. We did not test this here, however. Future research could seek to understand with more nuance what explains a significant relation between multiple abortions and substance use.

Another limitation of this analysis is that we do not know the effect of underreporting of abortions. We estimate that approximately 40% of abortions were reported in these data (Steinberg et al., in press). Previous research suggests that women with better mental health are more likely to not report having an abortion (Jagannathan, 2001; Schmiege & Russo, 2005). If this were the case, then our analysis would be a conservative one in that the true relations between abortion history and mental health would be less than what were found here.

Conclusions

Because of the potential for confounding, published research claiming to find relations between abortion and poor mental health indicators should be subjected to scrutiny and reanalysis. Using the same data and conducting the same analyses as CCSR (2009), we found that their results were not replicable, nor did our numbers approach theirs in the case of 15 mental health disorders. Moreover, we found little support for the abortion-as-trauma framework.

Instead, our findings suggest that structural, psychological, and sociodemographic risk factors associated with both having an abortion and having poor mental health drive a relationship between abortion and mental health. Therefore, policy, practice, and research should focus on addressing the correlates of having mental health problems, such as violence and prior mental health problems.

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