Do Depression and Low Self-Esteem Follow Abortion Among Adolescents? Evidence from a National Study

By Jocelyn T. Warren, S. Marie Harvey and Jillian T. Henderson

Jocelyn T. Warren is research associate and postdoctoral fellow, and S. Marie Harvey is chair and professor, both at the Department of Public Health, Oregon State University, Corvallis. Jillian T. Henderson is assistant professor, University of California, San Francisco, Bixby Center for Global Reproductive Health.

CONTEXT: *A 2008 report by the American Psychological Association found no evidence that an induced abortion causes mental health problems in adult women. No conclusions were drawn with respect to adolescents because of a scarcity of evidence.*

METHODS: *Data from the National Longitudinal Study of Adolescent Health were used to examine whether abortion in adolescence was associated with subsequent depression and low self-esteem. In all, 289 female respondents reported at least one pregnancy between Wave 1 (1994–1995) and Wave 2 (1996) of the survey. Of these, 69 reported an induced abortion. Population-averaged lagged logistic regression models were used to assess associations between abortion and depression and low self-esteem within a year of the pregnancy and approximately five years later, at Wave 3 (2001–2002).*

RESULTS: *Abortion was not associated with depression or low self-esteem at either time point. Socioeconomic and demographic characteristics did not substantially modify the relationships between abortion and the outcomes.*

CONCLUSIONS: *Adolescents who have an abortion do not appear to be at elevated risk for depression or low self-esteem in the short term or up to five years after the abortion.*

The purported psychological risks of terminating a pregnancy have increasingly been used to justify restricting women's access to abortion.[1,2] In the Supreme Court's 2007 decision upholding the ban on so-called partial-birth abortions, Justice Anthony Kennedy wrote: "While we find no reliable data to measure the phenomenon, it seems unexceptionable to conclude some women come to regret their choice to abort.... Severe depression and loss of esteem can follow."[3] In 2010, Nebraska mandated in the Women's Health Protection Act that providers screen women seeking abortion for "physical, psychological, emotional, demographic or situational" risk factors. Providers who do not comply fully with the law will be liable for damages, including "wrongful death."[4]

The risks to women's mental health assumed by these legal decisions have been tested, with varying degrees of scientific rigor and with conflicting results. Some studies have found that women with a history of abortion have higher rates than others of some types of depression disorders,[5–7] anxiety,[8] bipolar disorder[6,7] and schizophrenia,[7] and more mental health problems overall.[6,7,9,10] Other studies have found no association between abortion and adverse outcomes, including depression, anxiety and low self-esteem.[11–16] In 2006, the American Psychological Association convened an expert panel to review empirical studies published since 1989. The panel found no credible evidence that terminating an unwanted pregnancy causes mental health problems in adult women; it also noted that some studies suffered from serious methodological flaws or failed to control for well-known confounding factors, and it recommended further research to address these shortcomings.[17] It could draw no conclusions about abortion's effects on the mental health of adolescents because too few studies had been conducted. Nevertheless, a presumed high risk of psychological harm from abortion is one justification given for laws that mandate parental involvement in adolescents' abortion decisions.[18]

Adolescents are a particularly important population to consider with respect to the possible effects of abortion. Since the vast majority of their pregnancies are unintended,[19] differences in their psychological outcomes due to the degree to which a pregnancy was initially wanted are likely minimal. Most studies of abortion in adolescence have compared psychological outcomes in adolescents with those in adult women.[12,20,21] Such comparisons do not, however, directly address the question of whether abortion has adverse psychological effects for adolescents.

Few studies have compared adolescents who had an abortion with peers who did not. Zabin and colleagues[16] assessed psychological functioning and educational and economic outcomes among adolescents who sought pregnancy tests at Baltimore family planning clinics. The adolescents who had an abortion did not differ significantly from their peers on measures of psychological functioning at baseline, and at a two-year follow-up, they were doing as well as or better than those who had not been pregnant and those who had given birth. Another study attempted to overcome the limited generalizability of earlier work

by using nationally representative survey data to compare adolescents who terminated an unintended pregnancy with those who carried an unintended pregnancy to term.[22] In that study, abortion was positively associated with receipt of psychological counseling and sleep problems; however, because all items were measured within the previous year, the researchers could not determine whether abortion preceded or followed the outcomes, or whether an unobserved covariate was responsible for the association.

In the study described in this article, we examined whether abortion in adolescence was followed by depression and low self-esteem, using data from the National Longitudinal Study of Adolescent Health (Add Health).[23] We have attempted to extend previous research by including validated psychological measures, controlling for mental health prior to the pregnancy and assessing outcomes at two time points.

METHODS
Data and Sample
Add Health is an ongoing, nationally representative study of U.S. adolescents who were in grades 7–12 in 1994–1995. Systematic sampling methods were used to construct a sample of schools that were representative with respect to region of the country, urbanicity, size and ethnic distribution of the student body, and school type (i.e., public, private or parochial).[24] Data for this study were drawn from the first three survey waves, which were conducted in 1994–1995, approximately one year later (when respondents were aged 13–18) and about five years after that (in 2001–2002). Respondents were interviewed at home, and all data were recorded on laptop computers. For sensitive topics, such as sexual behavior and pregnancy, data were collected via audio computer-assisted self-interview, in which adolescents listened to questions through earphones and entered their responses into a computer. Wave 3 respondents are representative of the same population as the Wave 1 sample when sampling weights are utilized.[24] Data security plans were approved by the University of North Carolina at Chapel Hill and Oregon State University, and all study procedures were approved by Oregon State University's institutional review board.

We constructed the analytic sample on the basis of respondents' self-reported pregnancy histories. Pregnancies that had been completed after the respondent's Wave 1 interview date were retained for analysis. The resolution dates of 60 pregnancies could not be determined—nine because the month was reported, but the year was not; 17 because the respondent did not answer the question; and 34 because the respondent said she did not know the month and year of resolution. Four pregnancies that ended in 1996 but were missing the month were retained because all Wave 1 interviews were completed by December 1995. No pregnancies reported in 1995 were missing the month of completion. The analytic sample consisted of the 292 respondents who reported at least one completed pregnancy between Waves 1 and 2; of these, 99% had full information on the study variables for Wave 2 outcomes, and 78% had all information for Wave 3 outcomes. The attrition rate for the analytic sample is comparable to the overall Add Health attrition rate from Wave 1 to Wave 3 (77%).

Measures
•*Pregnancy.* In Wave 2, female respondents who reported ever having had sexual intercourse were asked a series of questions about pregnancy. First they were asked, "Have you ever been pregnant? Be sure to include if you are currently pregnant and any past pregnancy that ended in an abortion, stillbirth, miscarriage or a live birth after which the baby died." Respondents who answered in the affirmative were then asked how many times they had been pregnant, when each pregnancy had ended and its outcome (i.e., whether they were still pregnant or they had had a live birth, a stillbirth, a miscarriage or an abortion).

We distinguished pregnancies that were wanted at the time from those that were not by examining responses to the question "Before you got pregnant, did you want to get pregnant by your partner at that time?" Response options were "definitely no," "probably no," "neither wanted nor didn't want," "probably yes" and "definitely yes"; a pregnancy was considered unintended if the respondent chose any of the first three options. Unintended pregnancy and miscarriage were used to identify subpopulations for supplementary analyses.

•*Depression.* A modified version of the Center for Epidemiologic Studies Depression scale (CES-D)[25] was used to assess depressive symptoms. The CES-D is a well-validated epidemiological screening tool widely used in adult and adolescent populations.[26–29] Items gauge the frequency of symptoms such as having trouble keeping focused, feeling depressed and being too tired to do things in the previous seven days; responses are scored on a four-point scale from 0, indicating "never or rarely," to 3, indicating "most of the time or all of the time." For the Add Health surveys, two of the original scales' 20 items (frequency of crying and restless sleep) were rephrased to refer to the previous 12 months; because of the different time period, these two items were not included in the measures created for this study. Items that were positively worded were reverse-coded so that the higher the score, the greater the depressive symptoms.

Waves 1 and 2 of Add Health included 18 items, whose scores were summed for a total CES-D score. For the Wave 1 items, scores ranged from 0 to 54 (Cronbach's alpha, 0.88). For Wave 2, scores ranged from 0 to 47 (Cronbach's alpha, 0.88). Roberts and colleagues[30] determined that a cut point of 24 provides an optimal balance between the sensitivity and specificity of the CES-D for predicting major depressive disorder among female adolescents. We adjusted that for the reduced number of items, and set 22 as the cut point to indicate high depressive symptom levels among female respondents at Waves 1 and 2. The Wave 1 measure of prior depression was included as a covariate in analyses.

TABLE 1. Percentage of female adolescents who reported a pregnancy between Waves 1 and 2 of the National Longitudinal Study of Adolescent Health (Add Health), by selected characteristics, according to whether they had an abortion

Characteristic	Abortion (N=69)	No abortion (N=220)
Race/ethnicity		
White	63.5 (0.07)	60.1 (0.07)
Black	19.5 (0.06)	25.6 (0.05)
Hispanic	10.6 (0.04)	13.7 (0.05)
Other	6.3 (0.03)	1.5 (0.05)
Household structure		
Two-parent	52.3 (0.08)	38.5 (0.05)
Single-parent	43.4 (0.08)	42.1 (0.05)
Other	4.4 (0.03)	19.3 (0.04)***
Federal assistance	10.0 (0.04)	20.0 (0.03)*
Depression		
Wave 1	16.1 (0.05)	24.3 (0.04)
Wave 2	14.1 (0.05)	18.2 (0.03)
Wave 3	16.9 (0.07)	20.5 (0.04)
Low self-esteem		
Wave 1	18.4 (0.07)	26.4 (0.03)
Wave 2	28.1 (0.06)	27.1 (0.04)
Wave 3	32.8 (0.10)	35.9 (0.05)

*p<.05. ***p<.001. *Notes:* Data are weighted. Wave 1 was conducted in 1994–1995, Wave 2 in 1996 and Wave 3 in 2001–2002. Race and ethnicity, household structure and federal assistance were measured at Wave 1; percentages for race and ethnicity and for household structure may not add to 100.0 because of rounding. Whites and blacks are non-Hispanic; Hispanics are members of any race. Differences between groups are based on adjusted, design-based Pearson chi-squares. Figures in parentheses are standard errors.

The Wave 3 Add Health interview contained only nine CES-D items; scores were summed for a total CES-D score (range, 0–25; Cronbach's alpha, 0.83). (The CES-D scale has been shortened to as few as four items and found to retain predictive power similar to that of the full scale;[31] the abbreviated scale used in Wave 3 has been used in other studies of depression, including studies of alcohol use,[32] social inequality[33] and smoking.[34]) Following Gotlib

TABLE 2. Odds ratios (and 95% confidence intervals) from logistic regression analyses assessing the likelihood that adolescents who had a pregnancy between Add Health Waves 1 and 2 subsequently developed depression, by selected characteristics

Characteristic	Depressed at Wave 2		Depressed at Wave 3	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Abortion	0.74 (0.30–1.84)	0.75 (0.27–2.09)	0.79 (0.27–2.31)	0.69 (0.24–2.01)
Prior depression	na	3.68 (1.61–8.43)***	na	2.01 (0.93–4.33)†
Age	na	0.89 (0.64–1.23)	na	0.74 (0.52–1.05)†
Race/ethnicity				
White (ref)	na	1.00	na	1.00
Black	na	1.12 (0.35–3.57)	na	0.77 (0.28–2.13)
Hispanic	na	1.08 (0.38–3.10)	na	0.98 (0.37–2.58)
Other	na	3.81 (0.61–23.63)	na	0.06 (0.01–0.62)*
Household structure				
Two-parent (ref)	na	1.00	na	1.00
Single-parent	na	1.04 (0.39–2.77)	na	0.71 (0.25–2.03)
Other	na	0.92 (0.25–3.41)	na	0.51 (0.12–2.26)
Federal assistance	na	1.24 (0.51–3.00)	na	0.28 (0.08–0.95)*
F(df)‡	0.43(1, 128)	1.66(9, 119)	0.19(1, 127)	2.80(9, 119)*

*p<.05. ***p<.001. †p<.10. ‡Adjusted Wald results. *Notes:* Abortion was assessed at Wave 2; all other variables at Wave 1. Data are weighted, and analyses are corrected for complex sample design. ref=reference group. na=not applicable because unadjusted odds ratios were not calculated. Age is a continuous variable; all other characteristics for which no reference group is shown are dichotomous.

and colleagues,[35] we used a cut point of one standard deviation above the sample mean to identify respondents with major depressive disorder at Wave 3. The unweighted sample mean was 6.2, with a standard deviation of 4.6. The cutoff score was rounded to 11.

•*Self-esteem.* Self-esteem was measured by an abridged version of the Rosenberg Self-Esteem Scale.[36] Respondents were asked their level of agreement with the following statements: "You have many good qualities"; "You have a lot to be proud of"; "You like yourself just the way you are"; "You feel you are doing things just about right"; "You feel socially accepted"; and "You feel loved and wanted." (The last two items were not included at Wave 3.) Responses were on a five-point scale ("strongly agree" to "strongly disagree"). Scale scores were created by averaging the items (range, 1–5; Cronbach's alpha, 0.85 for Wave 1, 0.86 for Wave 2 and 0.91 for Wave 3); the higher the score, the lower the self-esteem. Following Goodman and Whitaker,[37] we defined low self-esteem as being in the highest quartile on this scale.

•*Controls.* We controlled for a number of characteristics measured at Wave 1 that may be related to adolescent pregnancy or psychological distress. Age was calculated by subtracting the Wave 1 interview date from the respondent's date of birth. Race and ethnicity were measured using questions that assessed Hispanic origin and racial background. From this information, the following mutually exclusive categories were created: Hispanic (all races), non-Hispanic black, non-Hispanic white and non-Hispanic other (primarily Asian or Pacific Islander). Household structure was determined from household roster information. Respondents were asked to list all household members and the relationship of each to themselves. From this information, we created a variable to indicate whether the respondent lived with two parents (including stepparents), with one parent (including a stepparent) or in some other arrangement (e.g., in a group home, with grandparents). A proxy measure of family economics was created from adolescents' report of whether a resident parent had ever received federal assistance, such as welfare. Other measures of family economics—family income and parental education level—could not be used in these analyses because of high levels of missing data.

In previous work, socioeconomic and demographic characteristics have not predicted persistent depression among Add Health respondents.[38] We included these variables, however, because economic hardship may predictor abortion and risk of depression or low self-esteem.[39]

Analysis
Population means and proportions were calculated to describe the sample of adolescents who reported at least one pregnancy between Waves 1 and 2. Differences between adolescents who reported abortion and adolescents who did not were tested using Pearson's chi-square and t statistics. We used logistic regression to model associations between abortion and depression and low

self-esteem, employing procedures for population-average models.[40,41] We first assessed unadjusted associations between abortion and the outcomes, and then included lagged measures of the outcomes (Wave 1 measures of depression and low self-esteem) and the control variables. Lagged measures were included as controls for psychological functioning prior to the pregnancy, and the control variables were included to test whether they modified the relationship between abortion and the outcomes. Adjusted odds ratios and Wald statistics are reported for all models.

Because Add Health used a complex sampling design, all analyses were adjusted for potential design effects with survey procedures and appropriate subpopulation commands in Stata, version 10. Weights were assigned according to Add Health specifications to yield nationally representative population estimates.[42] Because estimations using weighted data and adjusting for the complex survey design may be conservative, we also conducted the same analyses with unweighted data; results did not differ notably from those reported here. In addition, we conducted analyses to test the robustness of our findings across different specifications of our final model. In the first set of analyses, we limited the sample to adolescents who reported an unintended pregnancy (82% of the overall sample). In the second set, we excluded women with miscarriage (24% of the full sample). Limiting the sample did not change the principal findings; thus, we present here the models using the full analytic sample. Given that our results may be conservative, we include those with an alpha level of .10.

RESULTS

Of the 289 respondents who had been pregnant between the first two survey waves, 69 reported a pregnancy ending in abortion.* Respondents who had had an abortion were similar in age to those reporting other outcomes (mean, 16.7–16.8 years); the racial and ethnic composition of the two groups also was essentially the same (Table 1). Smaller proportions of respondents in the abortion group than of others lived in households without a parent (4% vs. 19%) and in households in which at least one parent had received federal assistance (10% vs. 20%). The proportions with depression and low self-esteem did not differ significantly between the two groups.

In the logistic regression analysis (Table 2), abortion was not associated with depression at Wave 2 or Wave 3, and the relationship was not modified by the inclusion of the control variables. The only predictor of depression at Wave 2 was prior depression (odds ratio, 3.7). In the Wave 3 model including the control variables, "other" race or ethnicity and receipt of federal assistance were negatively associated with depression (0.1 and 0.3, respectively), and prior depression had a marginally significant positive association. We found no significant interactions between the variables in predicting either depression outcome.

Results for low self-esteem (Table 3) were similar to those for depression. Abortion was not associated with the

TABLE 3. Odds ratios (and 95% confidence intervals) from logistic regression analyses assessing the likelihood that adolescents who had a pregnancy between Add Health Waves 1 and 2 subsequently exhibited low self-esteem, by selected characteristics

Characteristic	Low self-esteem at Wave 2		Low self-esteem at Wave 3	
	Unadjusted	Adjusted	Unadjusted	Adjusted
Abortion	1.05 (0.52–2.14)	1.33 (0.65–2.71)	0.87 (0.33–2.27)	0.89 (0.33–2.41)
Prior low self-esteem	na	7.60 (3.15–18.33)***	na	1.53 (0.69–3.37)
Age	na	0.80 (0.62–1.03)†	na	0.99 (0.73–1.35)
Race/ethnicity				
White (ref)	na	1.00	na	1.00
Black	na	0.86 (0.37–2.00)	na	0.50 (0.20–1.27)
Hispanic	na	0.98 (0.38–2.55)	na	0.98 (0.42–2.31)
Other	na	1.05 (0.31–3.61)	na	0.29 (0.04–2.17)
Household structure				
Two-parent (ref)	na	1.00	na	1.00
Single-parent	na	0.89 (0.37–2.11)	na	1.10 (0.46–2.66)
Other	na	1.05 (0.24–2.90)	na	0.68 (0.22–2.13)
Federal assistance	na	0.83 (0.21–2.50)	na	1.28 (0.46–3.55)
F(df)	0.02(1, 127)	3.56(9, 119)***	0.08(1, 128)	0.63(9, 119)

***p<.001. †p<.10. *Notes:* Abortion was assessed at Wave 2; all other variables at Wave 1. Data are weighted, and analyses are corrected for complex sample design. ref=reference group. na=not applicable. Age is a continuous variable; all other characteristics for which no reference group is shown are dichotomous.

outcome at either time point, in unadjusted or adjusted analyses. Low self-esteem prior to the pregnancy was the only significant predictor of low self-esteem, and only at Wave 2 (odds ratio, 7.6); age approached significance in the Wave 2 model.

DISCUSSION

Although prior studies have examined a range of mental health outcomes and their relationship with abortion, this study is the first to use both depression and low self-esteem as outcomes with a nationally representative sample of adolescents. The young women in this study who had an abortion were no more likely to become depressed or have low self-esteem within the year of the pregnancy or five years later than were their peers whose pregnancies did not end in abortion. Consistent with previous studies of abortion and psychological outcomes, the strongest predictors of depression and low self-esteem were prior depression and prior low self-esteem.[13,14] However, in contrast to other studies, ours found no association between abortion and negative outcomes either before or after adjustment for possible confounders. Fergusson and colleagues[10] found that young women who had an abortion had higher rates of prior depression than both nonpregnant peers and those who carried a pregnancy to term. Depression in that study was measured at age 15, which was, in many cases, a number of years before the pregnancy. In our study, depression was measured in the year before the pregnancy and thus may be a more precise adjustment.

A previous study using Add Health data found that adolescents who had an abortion were more likely than their peers who carried an unintended pregnancy to term to have sleep problems and receive emotional or psycho-

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*Some 158 women reported a live birth, one a stillbirth and 69 a miscarriage; 16 respondents reported multiple pregnancies.

logical counseling.[22] However, the items on which the outcomes were based and the pregnancy questions all referred to the previous 12 months. Thus, the direction of the relationship between the variables could not be established. In this study, the depression items referred to the previous seven days, and the self-esteem items to perceptions at the time of the interview; thus, the temporal relationships between abortion and the outcome measures were better defined.

An important limitation in abortion research using self-reported data is the likelihood of underreporting of abortion. Analyses of data from the 1995 National Survey of Family Growth indicated that approximately 60% of abortions were reported by women younger than 20.[43] To determine the extent of underreporting in Add Health, we generated abortion estimates and compared them with national estimates for 1995.[44] Following expert recommendation,[45] we focused on the abortion ratio (the ratio of abortions per 100 pregnancies ending in abortion or live birth within a 12-month period). The national abortion ratio for women aged 15–19 in 1995 was 34.6.[44] For our sample, the ratio (based on 69 abortions and 158 live births) was 30.3. Thus, according to these estimates, 87% of abortions among Add Health respondents were reported. Although this appears to be an improvement over other national samples, our findings could be biased if adolescents who failed to report an abortion were more likely than those who reported this outcome to be depressed or have low self-esteem at the follow-up interviews.

Further limitations must also be considered in interpreting the findings. The lack of association between abortion and our outcomes could reflect other factors, including insufficient sample size to detect an effect. Although Add Health is a large study, adolescent abortion is a relatively uncommon event; thus, the number of cases available for analysis is far smaller than the total number of young women interviewed. Furthermore, some unobserved common factors (such as a family history of mental illness) may drive both the decision to abort (or not abort) and adverse changes in mental health. The failure to include such factors could have biased the estimates. In addition, Add Health is a school-based survey and thus excludes adolescents who were not enrolled in school at baseline. Adolescents who dropped out of school may be under-represented in this study. Additionally, the CES-D was developed to be used in large population studies and is predictive of, but not diagnostic of, major depression.

Finally, because this study was intended to address the effect of abortion, we did not compare adolescents who became pregnant with their nulliparous peers to examine whether pregnancy itself contributes to poor mental health outcomes. A previous analysis of Add Health data found that teenage mothers had higher levels of psychological distress than their childless peers before and after they became pregnant.[46] Childbearing itself was not associated with the development of distress, but social disadvantage was strongly related to poor mental health.

Opponents of legalized abortion have suggested that abortion is a traumatic event with severe consequences for women's mental health. However, the results of this study and the best evidence available[47] indicate that abortion does not cause either depression or low self-esteem among women, including adolescents. Yet despite professional consensus, women in some parts of the United States are advised during preabortion counseling that they are jeopardizing their mental health by having an abortion.[48] Paradoxically, laws mandating that women considering abortion be advised of its psychological risks may jeopardize women's health by adding unnecessary anxiety and undermining women's right to informed consent.

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Author contact: *jocelyn.warren@oregonstate.edu*