

Depression and unwanted first pregnancy: longitudinal cohort study

Sarah Schmiege, Nancy Felipe Russo

Abstract

Objective To examine the outcomes of an unwanted first pregnancy (abortion *v* live delivery) and risk of depression and to explain discrepancies with previous research that used the same dataset.

Design Longitudinal cohort study.

Setting Nationally representative sample of US men and women aged 14-24 in 1979.

Participants 1247 women in the US national longitudinal survey of youth who aborted or delivered an unwanted first pregnancy.

Main outcome measures Clinical cut-off and continuous scores on a 1992 measure of the Center for Epidemiological Studies depression scale.

Results Terminating compared with delivering an unwanted first pregnancy was not directly related to risk of clinically significant depression (odds ratio 1.19, 95% confidence interval 0.85 to 1.66). No evidence was found of a relation between pregnancy outcome and depression in analyses of subgroups known to vary in under-reporting of abortion. In analyses of the characteristics of non-respondents, refusal to provide information on abortion did not explain the lack of detecting a relation between abortion and mental health. The abortion group had a significantly higher mean education and income and lower total family size, all of which were associated with a lower risk of depression.

Conclusions Evidence that choosing to terminate rather than deliver an unwanted first pregnancy puts women at higher risk of depression is inconclusive. Discrepancies between current findings and those of previous research using the same dataset primarily reflect differences in coding of a first pregnancy.

Introduction

Analysis of the US national longitudinal survey of youth by Reardon and Cogle¹ reported that women who abort an unintended first pregnancy are at higher risk of clinical depression than those who carry an unintended first pregnancy to term. The coding and analysis of that trial's data, however, show flaws. The most critical of these are misidentification of unwanted first pregnancies and exclusion of women at highest risk of depression associated with early child-bearing.

We examined the relation between the outcome of an unwanted first pregnancy (abortion *v* live delivery) and depression, unadjusted and adjusted for relevant social and personal factors. These analyses test the same hypotheses as that of Reardon and Cogle, but with more precise coding of variables and appropriate criteria for sample selection.

We then analysed the relation between abortion and depression across groups known to vary in rates of under-reporting of abortion, and we examined the

relation between refusals to submit a confidential card containing information on abortion and depression.

Finally, we examined the possibility of indirect relations between pregnancy outcome and depression through the effect of abortion on social outcomes known to relate to mental health.

Methods

Participants were women from the US national longitudinal survey of youth, a probability sample of civilian men and women aged 14-21 years in 1979, the year the survey began. A total of 1247 were identified as having an unwanted first pregnancy that ended in a live delivery or abortion. Our sample size is either 1247 or 1004, depending on whether we adjusted for explanatory variables. Year of first pregnancy ranged from 1970 to 1992.

Construction of variables

We measured depression using the 1992 Center for Epidemiological Studies depression scale. A standard cut-off score dichotomised participants into high (score > 15) or low risk (score ≤ 15) categories.¹ We also carried out parallel analyses using the continuous version of the scale.

All explanatory variables had been used by Reardon and Cogle and all were significantly correlated with outcome measures in both their and our study. Outcome measures included race, age at first pregnancy, and 1992 measures for education, income, and marital status.

We identified women whose first pregnancy was unwanted and resulted in a live birth or abortion. We constructed our variables using coding language provided by staff of the national longitudinal survey of youth. Respondents indicated the outcome of a first ever pregnancy by interview, beginning in 1983 and continuing across subsequent interviews in 1984 and every two years thereafter. We linked the responses to the outcome of first pregnancy. We assumed that first pregnancies terminated by abortion were unwanted unless otherwise specified.

Using this coding approach, we identified a smaller number of eligible women than in the previous study. As with the previous study, we identified 4463 women with 1992 scores on the Center for Epidemiological Studies depression scale. Both studies seemed to use the same variable to assess whether the pregnancy was wanted; the difference seems to be in the variables used to identify first pregnancy. Contrary to the previous study, we did not exclude women in the delivery group with subsequent abortions. See bmj.com.

Department of Psychology UCB 345, University of Colorado, Boulder, CO 80309-0345, USA

Sarah Schmiege
postdoctoral research associate

Department of Psychology, Arizona State University, Box 871104, Tempe, AZ 85287-1104, USA

Nancy Felipe Russo
regents professor

Correspondence to:
N F Russo
nancy.russo@asu.edu

BMJ 2005;331:1303-6



This is the abridged version of an article that was posted on bmj.com on 28 October 2005: <http://bmj.com/cgi/doi/10.1136/bmj.38623.532384.55>

Table 1 Proportion of participants in high risk category for depression and mean continuous scores, stratified by pregnancies before 1980 and those occurring from 1980 onwards

Subgroups	No (%) in high risk category for depression*	Odds ratio (95% CI)	P value	Mean (SD) depression score	Mean difference (95% CI)	P value
Delivery group:						
Before 1980†	109/310 (35)			13.5 (10.6)		
After 1980	111/457 (24)	0.59 (0.43 to 0.81)	0.001	10.7 (9.4)	2.81 (1.38 to 4.23)	0.002
Abortion group:						
Before 1980	59/225 (26)	0.66 (0.45 to 0.96)	0.028	10.9 (9.6)	2.66 (0.91 to 4.41)	0.003
After 1980	55/232 (24)	0.57 (0.39 to 0.84)	0.004	10.8 (10.4)	2.73 (0.95 to 4.52)	0.003

n=23 cases missing due to no data on year first pregnancy began.

*Center for Epidemiological Studies depression scale score greater than 15.

†Reference group. For each comparison the pre-1980 delivery group was coded as 0 and each other group coded as 1 so that odds ratios less than 1.0 indicate greater depression in the pre-1980 delivery group.

Analysis plan

We compared the statistics of the sampling approach used here with that used in the previous study. Next we examined the relation between pregnancy outcome and depression. Logistic regression analyses predicted cut-off scores on the depression scale from pregnancy outcome, unadjusted and adjusted for explanatory variables. We used ordinary least squares regression for parallel analyses predicting continuous scores for depression.

Under-reporting of abortion may lead to failures in detecting a link between abortion and depression.^{1 2} Under-reporting has been shown to differ across subgroups of individuals,³ so we examined the relation between pregnancy outcome and depression across the following groups: white versus black married and unmarried women and Catholic versus non-Catholic women. We also addressed under-reporting by examining differences in depression between those who did and did not submit the confidential abortion card used by the national longitudinal survey of youth. See bmj.com.

Results

The appropriateness of our sampling approach was assessed over that of the previous study for the testing of the research questions. An abbreviated form of the Rotter internal-external locus of control scale was used in the Reardon and Cogle¹ study in an attempt to account for “prior psychiatric state.” Because this scale was administered in 1979, the authors excluded all women who had experienced their first pregnancy

before that time, including most (339 of 425) teenage pregnancies.

We examined the relation between depression and pregnancy outcome, stratified by a dichotomous variable for year of pregnancy, to statistically compare the two sampling approaches (table 1). Women in the pre-1980 delivery group had a significantly greater risk of experiencing depression than women in the other three groups.

Primary analyses for our study were thus based on all women for whom unwanted first pregnancies could be identified. For comparison purposes with Reardon and Cogle’s study, we also carried out analyses predicting depression scores from pregnancy outcome on a subsample of women (n = 689) whose pregnancy occurred between 1980 and 1992, adjusting for 1979 Rotter scores.

Pregnancy outcome did not predict depression scores in either the full sample or in the subsample of pregnancies occurring between 1980 and 1992, even when adjusted for personal and social indicators (table 2).

Under-reporting of abortion

We found no evidence for an association between abortion and depression across the subgroups (see bmj.com).

Among the 4306 women in the larger sample who had both a depression score and abortion card information, 24.5% of women (1025/4190) who submitted the card were in the high risk group compared with 12.9% (15/116) of women in the refusal group ($\chi^2 = 8.19, P = 0.004$). The mean continu-

Table 2 Odds ratios (95% confidence intervals) predicting depression cut-off scores from pregnancy outcome and β coefficients (SE) showing mean differences in depression continuous scores by pregnancy outcome, in full sample and subsample of post-1979 pregnancies, unadjusted and adjusted for explanatory variables

Sample and group	Logistic regression predicting depression cut-off scores*					Ordinary least squares regression predicting depression continuous scores				
	No (%) exceeding cut-off score	Unadjusted odds ratio (95% CI)	P value	Adjusted	P value	Mean (SD)	Unadjusted β (SE)	P value	Adjusted β (SE)	P value
Full sample:										
Delivery group (n=768)	220 (28.6)	0.82 (0.64 to 1.07)	0.14	1.19 (0.85 to 1.66)†	0.30	11.8 (9.95)	-1.07 (0.58)	0.06	0.38 (0.68)*	0.58
Abortion group (n=479)	119 (24.8)	—	—	—	—	10.8 (9.9)	—	—	—	—
Post-1979 pregnancies:										
Delivery group (n=457)	111 (24.3)	0.97 (0.67 to 1.40)	0.87	1.33 (0.84 to 2.10)‡	0.23	10.7 (9.4)	0.07 (0.78)	0.93	0.92 (0.87)†	0.29
Abortion group (n=232)	55 (23.7)	—	—	—	—	10.8 (10.4)	—	—	—	—

Pregnancy outcome coded 0 for delivery and 1 for abortion; higher depression scores indicate greater levels of depression. Odds ratios greater than 1.0 and positive β coefficients indicate higher risk of depression in abortion group.

*Greater than 15.

†Adjusted for race, age at first pregnancy, and 1992 marital status, education, and family income.

‡Adjusted for 1979 measure of Rotter internal-external locus of control, race, age at first pregnancy, and 1992 marital status, education, and family income.

Table 3 Indirect effect analyses to examine differences in mean (SD) education, income, and family size across delivery and abortion groups and to examine education, income, and family size as predictors of cut-off scores for depression (logistic regression) and continuous scores for depression (ordinary least squares regression)

Variable	Delivery group	Abortion group	<i>t</i> test comparing groups	P value	Odds ratio (95% CI)	P value	β (SE)	P value
Education	12.25 (2.07)	13.34 (2.33)	8.70	<0.001	0.83 (0.78 to 0.89)	<0.001	-0.764 (0.128)	<0.001
Income	3.15 (2.10)	4.15 (2.44)	7.06	<0.001	0.77 (0.72 to 0.84)	<0.001	-1.034 (0.131)	<0.001
Family size	2.68 (1.21)	1.24 (1.17)	-20.80	<0.001	1.13 (1.02 to 1.25)	<0.05	0.752 (0.234)	<0.001

Pregnancy outcome coded 0 for delivery and 1 for abortion.

For income variable, mean of 3.15 corresponds to income in range \$20 001 (£11 400; €16 632) to \$30 000, and mean of 4.15 corresponds to income range \$30 001 to \$40 000.

Positive *t* values comparing variables across groups indicate higher scores in abortion group; negative values indicate lower scores in abortion group.

Odds ratios less than 1 and negative β coefficients indicate that greater income and education are associated with decreased depression; larger family size is associated with increased depression, as evidenced by the odds ratio greater than 1 and positive β coefficient.

ous score for the refusal group was significantly lower than that for the group that submitted the card (7.9 v 10.7; $t=2.99$, $P=0.003$).

Indirect effects analyses

We found no evidence that terminating compared with delivering an unwanted first pregnancy changes risk for subsequent depression. This does not mean that the outcome of an unwanted first pregnancy has no relation to risk of depression. The abortion group had significantly higher mean education and income and lower total family size (table 3), consistent with previous analyses of the national longitudinal survey of youth.⁴

Separate regression analyses of each social variable (with pregnancy outcome also included in each model) found higher education and income predicted a lower risk of depression and larger family size predicted a higher risk of depression (table 3).

Discussion

Our results provide no support for the claim by Reardon and Cogle¹ that terminating an unwanted first pregnancy contributes to risk of subsequent depression. Our finding that the group that delivered before 1980 had a significantly higher risk of depression than all other groups directly contradicts this claim, particularly for younger women. These results cannot be reasonably explained by under-reporting of abortion. Indeed, finding that depression scores for the group that refused to fill out a confidential abortion card were significantly lower than for the reporting group suggests that women who are willing to disclose abortion are also more willing to disclose stigmatising mental health problems, such as depressive symptoms—that is, they exhibit a form of “over-reporting bias.”

The observed association of abortion with education and income is consistent with the literature on the negative effects of early and unwanted childbearing. Research has found that pre-existing mental health is the more important predictor of mental health after pregnancy, regardless of how the pregnancy is resolved.^{4,5}

Inconsistencies between our findings and those from the Reardon and Cogle study can primarily be explained by differential coding of key variables and sample selection. Given that the numbers used in our study are based on coding language used by staff of the survey, we believe they provide the most accurate variable definition. The previous study's exclusion of a

major proportion of adolescent pregnancies is a fatal flaw.

Several limitations remain. The research focuses only on first pregnancies. The process selected only women whose unwanted first pregnancies ended in abortion or a live birth, excluding women who had a stillbirth, miscarriage, or who were pregnant at the time of their most recent interview. In addition, recall difficulties of participants were more likely here than in the previous study because the total sample included pregnancies occurring before 1980. Furthermore, the dataset had missing data. Only 272 of the 1820 women missing data on depression were, however, identified as eligible (having an unwanted first pregnancy). Finally, for some participants the time from first pregnancy to measurement of depression was long, with the time varying across participants, complicating the interpretation of a causal relation.

What is already known on this topic

Well designed studies have not found that abortion contributes to an increased risk of depression

A recent study based on data from the US national longitudinal survey of youth reports a relation between termination of unwanted first pregnancy and risk of depression

What this study adds

The previous relation between termination of unwanted first pregnancy and risk of depression was not found when more appropriate coding and sampling approaches were applied to the same dataset

Abortion may be indirectly associated with a lower risk of depression through beneficial effects on education, income, and control of family size

Women who are willing to disclose abortion may also be more willing to disclose depressive symptoms, exhibiting a form of “over-reporting bias”

Under-reporting of abortion may occur, but does not seem to account for lack of detection of a relation between abortion and depression

We conclude that there is no credible evidence that choosing to terminate an unwanted first pregnancy puts women at higher risk of subsequent depression than does choosing to deliver an unwanted first pregnancy. Delivering a first unwanted pregnancy is, however, associated with lower education and income and larger family size—all risk factors for depression. If the goal is to reduce women's risk for depression, research should focus on how to prevent and ameliorate the effect of unwanted childbearing, particularly for younger women.

We thank Canada Keck (national longitudinal survey of youth) for providing the coding language from which we constructed the variables for first pregnancy outcome and wantedness and Jean Denious for her comments on earlier drafts of the paper.

Contributors: See bmj.com.

Funding: The national longitudinal survey of youth survey is carried out by the Center for Human Resource Research, Ohio State University, and is funded by the Bureau of Labor Statistics, United States Department of Labor.

Competing interests: None declared.

Ethical approval: This study was approved by the institutional review board of Ohio State University.

- 1 Reardon DC, Cogle JR. Depression and unintended pregnancy in the National Longitudinal Survey of Youth: a cohort study. *BMJ* 2002;324:151-2.
- 2 Reardon DC. Clinical depression after unintended pregnancy link to abortion. <http://www.afterabortion.org/news/depressionbmj.html>
- 3 Jones EF, Forrest JD. Underreporting of abortion in surveys of U.S. women: 1976 to 1988. *Demography* 1992;29:113-26.
- 4 Russo NF, Zierk K. Abortion, childbearing, and women's well-being. *Prof Psychol Res Pr* 1992;23:269-80.
- 5 Gilchrist AC, Hanaford PC, Frank P, Kay CR. Termination of pregnancy and psychiatric morbidity. *Brit J Psych* 1995;167:243-8. (Accepted 16 September 2005)

doi 10.1136/bmj.38623.532384.55

The cognitive cost of being a twin: evidence from comparisons within families in the Aberdeen children of the 1950s cohort study

Georgina A Ronalds, Bianca L De Stavola, David A Leon

Department of Epidemiology and Population Health, London School of Hygiene and Tropical Medicine, London WC1E 7HT
Georgina A Ronalds
research assistant
Bianca L De Stavola
reader in biostatistics
David A Leon
professor of epidemiology
Correspondence to: D A Leon
david.leon@lshtm.ac.uk

BMJ 2005;331:1306-9

Abstract

Objectives To determine whether twins have lower IQ scores in childhood than singletons in the same family and, if so, whether differences in fetal growth explain this deficit.

Design Cohort study.

Setting Scotland.

Participants 9832 singletons and 236 twins born in Aberdeen between 1950 and 1956.

Results At age 7, the mean IQ score of twins was 5.3 points lower (95% confidence interval 1.5 to 9.1) and at age 9, 6.0 points lower (1.7 to 10.2) than that of singletons in the same family. Adjustment for sex, mother's age, and number of older siblings had little effect on these differences. Further adjustment for birth weight and gestational age attenuated the IQ difference between twins and singletons: the difference in mean IQ was 2.6 points (−1.5 to 6.7) at age 7 and 4.1 points (−0.5 to 8.8) at age 9.

Conclusions Twins have substantially lower IQ in childhood than singletons in the same family. This effect cannot be explained by confounding due to socioeconomic, maternal, or other family characteristics, or by recruitment bias. The reduced prenatal growth and shorter gestations of twins may explain an important part of their lower IQ in childhood.

Introduction

Most previous studies report that twins have lower cognitive ability than singletons. In a UK study of children born between 1950 and 1954, twins had a deficit in verbal reasoning scores at age 11 of 4.4 points on average.¹ In a US study of hospital births delivered in

1959-65, twins scored lower in cognitive tests at 8 months, 4 years, and 7 years.² In a sample of Australian schoolchildren born in the 1960s, singletons performed better than twins in tests of word knowledge, reading, and numeracy at ages 10 and 14.³ Among 10 year olds in Stockholm born in 1953, singletons had higher verbal ability and numerical test scores than twins.⁴ Recently, a study using the Netherlands twin registry found no evidence for a difference in cognitive ability between singletons and twins in the same family.⁵ However, this study did not adjust for potential confounding factors that vary between siblings in the same family, such as maternal age and order among siblings.

We used a within family design to investigate the deficit in cognition between twins and singletons. Instead of using a twin registry we identified families containing twins and singletons from a representative cohort of all people born in Aberdeen, Scotland, and attending primary school there in 1962. We also take our analysis further than others by looking at how far any true twin deficit results from reduced intrauterine growth of twins or shorter gestation.

Methods

Subjects and data

Our study subjects participated in the Aberdeen children of the 1950s study.⁶ This comprises 12 150 individuals born in Aberdeen between 1950 and 1956 and who took part in the child development survey in



This is the abridged version of an article that was posted on bmj.com on 18 November 2005: <http://bmj.com/cgi/doi/10.1136/bmj.38623.532384.55>