Abortion and mental health disorders: evidence from a 30-year longitudinal study†

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Background
Research on the links between abortion and mental health has been limited by design problems and relatively weak evidence.

Aims
To examine the links between pregnancy outcomes and mental health outcomes.

Method
Data were gathered on the pregnancy and mental health history of a birth cohort of over 500 women studied to the age of 30.

Results
After adjustment for confounding, abortion was associated with a small increase in the risk of mental disorders; women who had had abortions had rates of mental disorder that were about 30% higher. There were no consistent associations between other pregnancy outcomes and mental health. Estimates of attributable risk indicated that exposure to abortion accounted for 1.5% to 5.5% of the overall rate of mental disorders.

Conclusions
The evidence is consistent with the view that abortion may be associated with a small increase in risk of mental disorders. Other pregnancy outcomes were not related to increased risk of mental health problems.

Declaration of interest
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Abstract (3 pages)

Over the past two decades there has been increasing research into mental health outcomes associated with induced abortion. These outcomes include depression, anxiety, substance use and suicidal behaviour and self-harm. The findings from this research have been both controversial and inconsistent, with a number of studies reporting adverse effects associated with abortion but others finding no association. Research in this area has faced a number of complications that have prevented clear conclusions about whether or not exposure to induced abortion is associated with increased (or decreased) risks of mental health problems in women having unwanted pregnancies. First, studies in this area have been subject to a number of threats to validity that include inadequate ascertainment of exposure to abortion, limited assessment of mental health outcomes and failure to control confounding. These threats to validity are pervasive and no existing study has been able to overcome all of them. These technical problems of research design have been exacerbated by the fact that the issue of mental health effects of abortion has been hotly contested by pro-life and pro-choice advocates, resulting in a situation in which weak research evidence has been used to support strongly stated opinions on the harms or benefits associated with abortion.

Finally, there has been an unfortunate tendency in the literature on this topic for study findings to coincide with the ideological views of authors about the desirability of abortion. This combination of limited evidence, controversy and strongly stated opinion has made research into the mental health effects of abortion a contested area and there has been wide variation in scientific views of the matter.

In this paper we report an analysis of data from a 30-year longitudinal study in which we seek to examine the extent to which variations in pregnancy outcomes, including induced abortion, live birth and pregnancy loss, are associated with increased (or decreased) risks of a range of common mental health problems (major depression, anxiety disorders, suicidal ideation, alcohol dependence and illicit drug dependence). This analysis is an extension of an earlier study that examined the links between abortion and mental health in the same birth cohort.

Method
The data used in this analysis were gathered over the course of the Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of a birth cohort of 1265 children born in the Christchurch urban region in New Zealand who have been studied at birth, 4 months, 1 year and annual intervals to age 16 years, and again at ages 18, 21, 25 and 30. The present analysis is based on the cohort of 534 women for whom information on pregnancy history and mental health outcomes was available. However, since not all women were assessed on all occasions, the sample sizes used in the analysis range between 507 and 524, depending on the timing of assessment of pregnancy history and mental health. These samples represent between 80% and 83% of the original cohort of 630 women. All data were collected only on the basis of signed consent from participants. The study had ethical approval from the Canterbury ethics committee.

Pregnancy and abortion (15–30 years)
At each assessment from age 15 to 30 years participants were questioned about any pregnancies occurring since the previous assessment, and the timing and outcome of each reported pregnancy was recorded. Participants were also questioned about their reaction to each pregnancy and the extent to which this had caused them to be upset or distressed. At age 30, as a check on the accuracy of the prospectively gathered pregnancy data, all participants were asked to provide a summary of their full pregnancy history. As well as information on timing and outcome, participants were also questioned about whether the pregnancy was wanted or unwanted, and their initial reaction to the pregnancy at the time. Initial reactions were coded on a 5-point scale from very happy to very unhappy/distressed. Comparison
et al. These analyses produced almost identical conclusions to the results reported here, suggesting that the findings were unlikely to have been influenced by selection bias.

### Results

**Associations between pregnancy outcomes and mental health (15–30 years)**

Online Table DS1 shows the relationships between a series of mental health outcomes during the intervals 15–18, 18–21, 21–25 and 25–30 years and the women’s pregnancy history to ages 18, 21, 25 and 30 respectively. Mental health outcomes include measures of major depression, anxiety disorder, suicidal ideation, alcohol dependence, illicit drug dependence and a count of the total number of mental health problems. Pregnancy history is summarised by four dichotomous measures representing whether the women had experienced any of the following outcomes by a given age: an abortion; a pregnancy loss (miscarriage, stillbirth, ectopic pregnancy); a live birth from a pregnancy that was either unwanted or caused the woman to have an adverse reaction to becoming pregnant; and a live birth with no adverse reaction to the pregnancy. Online Table DS1 reports associations (risk ratios (RRs)) between each measure of pregnancy history and each mental health outcome (see Method). For the measure of total number of mental health problems the RR is estimated by the incidence rate ratio (IRR), and for other outcomes by the RR (risk ratios (RRs)) between each measure of pregnancy history and each mental health outcome (see Method). For the measure of total number of mental health problems the RR is estimated by the incidence rate ratio (IRR), and for other outcomes by the odds ratio (OR). Online Table DS1 leads to the following conclusions.

(a) Exposure to induced abortion was consistently associated with increased rates of mental disorders, with ORs for individual disorders ranging from 1.86 to 7.08. These trends are reflected in the fact that those exposed to abortion between ages 15–30 had overall rates of mental health problems that were 1.54 (95% CI 1.28–1.85) times higher than those not exposed to abortion ($P<0.001$).

(b) Exposure to pregnancy loss was also associated with modest but consistent increases in risks of mental health problems, with ORs for individual disorders ranging from 1.76 to 3.30. These trends are reflected in the fact that, overall, those who had experienced pregnancy loss had rates of mental disorder...
that were 1.49 (95% CI 1.21–1.84) times higher than those who had not (P<0.001).

(c) Having a live birth that was associated with an unwanted/ adverse reaction to pregnancy was associated with modest increases in risks of all individual outcomes except for alcohol dependence. For alcohol dependence the OR was 0.54, and for other disorders it ranged from 1.77 to 2.25. The overall rate of disorder for those who reported an unwanted/adverse reaction was 1.31 (95% CI 1.01–1.69) times higher than for those who did not (P<0.05).

(d) Associations between mental health outcomes and having a live birth with no reported adverse reaction were generally weak and inconsistent, with ORs ranging from 0.72 to 1.41. This trend is reflected in an overall rate of mental disorder that was only 1.03 (95% CI 0.86–1.22) times higher than for those who had not experienced a live birth with no adverse reaction (P>0.75).

Adjustment for associations between pregnancy outcomes

The results in online Table DS1 do not take account of the interrelationships between various pregnancy outcomes, reporting just on the contemporaneous relationships between pregnancy outcomes and mental health. These issues are addressed in Table 1, which shows estimates of the RR between rates of mental health problems and each pregnancy outcome adjusted for other pregnancy outcomes. These estimates were obtained by fitting the random-effects model described in the Method. The associations are reported for two different models: (a) a model in which pregnancy outcomes were assessed concurrently with mental health (as in online Table DS1); and (b) a lagged model in which exposure to the pregnancy outcome occurred in the 5 years prior to the interval in which mental health was assessed. Table 1 leads to the following general conclusions.

Concurrent model

In all cases, RR estimates for exposure to abortion and exposure to pregnancy loss were greater than 1, implying that exposure to these conditions was associated with increased risks of concurrent mental health problems. Overall, those exposed to induced abortion had rates of mental health problems that were 1.49 (95% CI 1.24–1.80) times higher than the rates for those who did not become pregnant (P<0.001), whereas exposure to pregnancy loss was associated with a 1.48 (95% CI 1.19–1.82) times increase (P<0.001). Risk ratios for live birth with an unwanted/adverse reaction tended to be more modest, with an overall rate of mental health problems that was only 1.18 (95% CI 0.91–1.53) times the rate for those who did not become pregnant (P>0.20). In contrast, other live birth was associated with reduced risks of most disorders, with an overall RR of disorder of 0.91 (95% CI 0.75–1.09) compared with women who did not become pregnant (P>0.30).

The 5-year lagged model

The results of the 5-year lagged model were in most respects very similar to the findings from the concurrent model. Exposure to induced abortion was associated with consistently increased risks of mental health problems, with women who had had abortions having overall rates of mental health problems that were 1.48 (95% CI 1.18–1.85) times the rates for those who had not become pregnant (P<0.001). Pregnancy loss was also associated with increased risks of mental health problems, with women who had had such losses having overall rates of mental health problems that were 1.26 (95% CI 0.96–1.67) times higher than those who had not become pregnant (P=0.10). Having a live birth with an unwanted/adverse reaction was associated with a modest increase in rates of internalising disorders (depression, anxiety) and suicidal ideation, but a reduction in the risks of substance use disorders, with an overall RR of disorder of 1.05 (95% CI 0.74–1.49) that was no higher than for those who had not become pregnant (P>0.75). However, in contrast to the concurrent model, those who had a live birth without an adverse reaction appeared to have elevated risks of subsequent disorder for most mental health outcomes (particularly for anxiety disorder and suicidal ideation). Overall, having an other live birth was associated with a 1.27 (95% CI 1.00–1.61) times increase in rates of mental disorder (P=0.05).

Covariate adjusted results

A limitation of the analysis in Table 1 is that the associations between pregnancy outcomes and mental health do not take into account potential confounding factors that might be associated with increased risks of various pregnancy outcomes and/or mental health outcomes. To address this issue the associations in Table 1 were adjusted for a series of confounding covariates (see Method). These covariates included measures of: childhood socio-economic circumstances; childhood family functioning; parental adjustment; exposure to abuse in childhood; individual characteristics; educational achievement; adolescent adjustment; and time-dynamic lifestyle and related factors.

Table 2 shows the estimated covariate adjusted RR and 95% CIs for each mental health outcome estimated by the concurrent and lagged models. After adjustment, both sets of models yielded a similar set of conclusions.

(a) For both models there was consistent evidence that even after extensive covariate adjustment, exposure to abortion was associated with a modest but detectable increase in rates of mental disorder. The concurrent data suggested that after adjustment for confounding those exposed to abortion had rates of mental health problems that were 1.37 (95% CI 1.16–1.62) times higher than for those who had not become pregnant (P<0.001). The lagged model produced a slightly lower estimate of 1.32 (95% CI 1.05–1.67, P<0.05).

(b) Pregnancy loss was associated with a modest increase in the rate of problems using the concurrent measures of pregnancy outcome, with those who experienced a pregnancy loss having a rate of mental health problems that was 1.25 (95% CI 1.01–1.53) times the rate for those who were never pregnant (P<0.05). However, under the lagged model, pregnancy loss was not associated with later outcomes, with an adjusted RR of 1.06 (95% CI 0.79–1.43, P>0.70).

(c) For both models, having a live birth, whether with or without an unwanted/adverse reaction, was not associated with significant increases in the overall rate of mental health problems when due allowance was made for confounding variables.

Inspection of the results in Table 2 suggests that the reasons for the higher rates of mental disorder among women exposed to induced abortion were owing to small but consistent tendencies for those exposed to abortion to be at increased risks of a range of adverse mental health outcomes, with these trends being most marked for illicit drug dependence in the concurrent model, and anxiety disorders, alcohol dependence and illicit drug dependence in the lagged model. Odds ratios for specific disorders ranged from 1.19 to 3.56 for the concurrent model and from 1.31 to 2.88 for the lagged model.