

# Associations Between Abortion, Mental Disorders, and Suicidal Behaviour in a Nationally Representative Sample

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**Objective:** Most previous studies that have investigated the relation between abortion and mental illness have presented mixed findings. We examined the relation between abortion, mental disorders, and suicidality using a US nationally representative sample.

**Methods:** Data came from the National Comorbidity Survey Replication ( $n = 3310$  women, aged 18 years and older). The World Health Organization–Composite International Diagnostic Interview was used to assess mental disorders based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition, criteria and lifetime abortion in women. Multiple logistic regression analyses were employed to examine associations between abortion and lifetime mood, anxiety, substance use, eating, and disruptive behaviour disorders, as well as suicidal ideation and suicide attempts. We calculated the percentage of respondents whose mental disorder came after the first abortion. The role of violence was also explored. Population attributable fractions were calculated for significant associations between abortion and mental disorders.

**Results:** After adjusting for sociodemographics, abortion was associated with an increased likelihood of several mental disorders—mood disorders (adjusted odds ratio [AOR] ranging from 1.75 to 1.91), anxiety disorders (AOR ranging from 1.87 to 1.91), substance use disorders (AOR ranging from 3.14 to 4.99), as well as suicidal ideation and suicide attempts (AOR ranging from 1.97 to 2.18). Adjusting for violence weakened some of these associations. For all disorders examined, less than one-half of women reported that their mental disorder had begun after the first abortion. Population attributable fractions ranged from 5.8% (suicidal ideation) to 24.7% (drug abuse).

**Conclusions:** Our study confirms a strong association between abortion and mental disorders. Possible mechanisms of this relation are discussed.

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### Clinical Implications

- Some women with a history of abortion develop emotional problems, and clinicians should assess for mental disorders, particularly SUDs, in these women.
- Clinicians should screen for a history of abortion in women presenting with mood, anxiety, or SUDs as a potential contributing factor.
- Women presenting for abortion should be screened for a history of violence.

### Limitations

- Mental disorders were assessed by lay interviewers.
- The study was cross-sectional and caution must be exerted when considering the direction of the associations found.
- We could not identify the gestation at which the abortion occurred and whether the pregnancy was wanted or unwanted.

**Key Words:** *abortion, mental disorders, suicidal behaviour, epidemiology*

It remains to be decided whether a relation exists between induced abortion and mental illness. Several, but not all, studies have found an association between a history of abortion and subsequent distress and mental disorders.<sup>1-4</sup> Even with an increase of studies using larger, community-based samples and interview-based assessment of mental disorders (as opposed to screening measures), debate continues over this important research question.

A positive association has been found between having an abortion and subsequent symptoms of anxiety<sup>5-11</sup> and depression.<sup>6-8,10,12,13</sup> Substance use,<sup>8,10,11,14-17</sup> suicidal behaviour,<sup>8,18-21</sup> and prior behavioural difficulties (symptoms of conduct and oppositional defiant disorder) in childhood and adolescence<sup>8,11,14</sup> have also been found to be positively related with having had an abortion. A recent study<sup>22</sup> in a nationally representative US sample collected between 1990 and 1992 supported these findings by identifying a relation between abortion and DSM-III-R mood, anxiety, and substance use disorders. Further, overall outpatient mental health services use<sup>23</sup> and hospital admission rates for psychiatric reasons<sup>24</sup> are higher in women who have undergone abortion, compared with different samples of women who have not had abortions. However, the directionality of the relation between abortion and mental illness remains unclear. Several studies have found preabortion symptomatology to be significantly associated with having an abortion and also with postabortion mental problems.<sup>7,8,10,14</sup> To our knowledge, no study to date has examined the relation between abortion and eating disorders, even though a much higher prevalence of unplanned pregnancies has been found in women with bulimia, compared with women without the disorder.<sup>25</sup> One study that looked at pregnancy outcome in a sample of 82 women with anorexia or bulimia found that 30% of reported pregnancies resulted in induced abortion.<sup>26</sup> However, the study was limited by the lack of a control group.

Other recent studies have found no association, or a negative association, between having an abortion and future symptoms of psychopathology. A recent review by Charles et al<sup>1</sup> noted that the best studies in the area have failed to identify a strong relation between abortion and subsequent poorer mental health. The American Psychological Association Task Force

on Mental Health and Abortion reached a similar conclusion in their recent report, at least among women who have had only one abortion.<sup>27</sup> Both depression symptoms<sup>28-30</sup> and general anxiety<sup>30</sup> have been found to be lower postabortion than before the abortion occurred. Further, these rates were deemed comparable with those in general population samples.<sup>28-30</sup> Null findings between abortion, depression,<sup>12,31</sup> and anxiety<sup>23</sup> have also been described. In line with these findings, Major et al<sup>29</sup> found in their longitudinal study that only a very small percentage of women met DSM-III-R criteria for PTSD 2 years after the abortion. Similarly, Steinberg and Russo<sup>32</sup> found no relation between abortion and PTSD, social anxiety, and generalized anxiety disorder in 2 nationally representative datasets when several covariates were taken into account. One of these important covariates was violence, which was also found to render the relation between abortion and depression nonsignificant in a study by Taft and Watson.<sup>31</sup> Finally, in a large sample of women experiencing an unplanned pregnancy, no association was found between abortion and nonpsychotic mental illness based on diagnoses made with the ICD.<sup>18</sup>

The mixed findings in previous research may have numerous explanations. First, many studies have used small, restricted, or treatment-seeking samples. These studies are therefore limited by selection bias and the findings may not be generalizable to the population at large. Second, variable methodology and study design have been used across studies. For example, several studies have used retrospective cohort studies or cross-sectional designs where recall bias is an issue, or have used different comparison groups of women, which adds to the difficulty of interpreting findings across studies.<sup>14,15,22</sup> Previous research has also used a range of assessment tools assessing only symptoms and probable disorder rather than using a standardized interview.<sup>6,7,13,15,31,33</sup> In the few studies that have examined ICD- or DSM-based mental disorders in representative samples, most have either emphasized specific disorders (that is, depression and anxiety), have grouped them into summary categories, or have assessed disorders according to DSM-III-R criteria.

Our study aims to address numerous methodological limitations of previous research by using a large, recently collected, nationally representative sample. We have 2 specific objectives. First, we will examine the relation between abortion and a wide range of DSM-IV-based lifetime mental disorders and suicidal behaviour after adjusting for sociodemographics and violence exposure. Second, we will examine the temporal relation between age of onset of mental illness and age of first abortion.

## Methods

### Sample

The NCS-R (methodological details<sup>34</sup>) was funded by the National Institute of Mental Health and the National Institute

### Abbreviations used in this article

DSM	Diagnostic and Statistical Manual of Mental Disorders
ICD	International Classification of Diseases
NCS-R	National Comorbidity Survey Replication
PAF	population attributable fraction
PTSD	posttraumatic stress disorder
SUD	substance use disorder
WMH-CIDI	World Mental Health-Composite International Diagnostic Interview

of Drug Abuse, and took place between 2001 and 2003 in 48 states in the US (Alaska and Hawaii were not included). People who were institutionalized were not included in the sampling for this survey. The survey sample consisted of 9282 respondents, aged 18 years or older. A subsample of these people ( $n = 5692$ ), including all respondents who met criteria for a lifetime mental disorder plus a probability subsample of the remaining respondents, took part in Part 2 of the survey. Part 2 assessed additional mental disorders and also included questions relating to abortion. Thus the Part 2 sample ( $n = 3310$  women) was used in our study. The survey was administered by trained lay interviews in the households of respondents, with an overall response rate of 70.9%.

### ***Lifetime Abortion***

Interviewers inquired about abortion from female participants who had had sexual intercourse in their lifetimes with the following questions: "Have you ever had an abortion?" and "How old were you (the first time)?" Respondents who refused to answer or who answered "don't know" were removed from all analyses ( $n = 18$ ). One woman who answered age "0" to age of first abortion was also removed from analyses. There were also 2 cases that answered "yes" to a history of abortion but "don't know" or "refuse" for age of abortion. Responses to the first question were dichotomized as "no," compared with "yes," and responses to the second question were made into a continuous variable.

### ***Mental Disorder Diagnoses***

Version 3.0 of the WMH-CIDI<sup>35</sup> was used to assess DSM-IV mental disorders. Major depression, bipolar I disorder, dysthymia, agoraphobia without panic, generalized anxiety disorder, panic attacks, PTSD, social phobia, specific phobia, oppositional defiant disorder, conduct disorder, attention deficit hyperactive disorder, alcohol abuse, alcohol dependence, drug abuse, and drug dependence were investigated in our study. Summary variables were also created to form any mood, anxiety, disruptive behaviour, substance use, eating disorder, and mental disorder variables. Owing to the relatively small number of cases of individual eating disorders, we examined only a summary variable consisting of anorexia, bulimia, and binge eating disorder. Agreement between the WMH-CIDI and diagnoses made by clinicians using the Structured Clinical Interview for DSM-IV ranged from moderate to good for most mental disorders.<sup>36</sup>

### ***Suicidal Behaviour***

Variables representing lifetime suicidal ideation and suicide attempts were generated using the following 2 statements, which were given in written form to participants during the interview: "You seriously thought about committing suicide" and "You attempted suicide." Interviewers asked respondents "Did [the experience] ever happen to you?" to receive a "yes" or "no" response. People were also asked how old they were the first time that these experiences happened.

### ***Sociodemographic Variables***

Sociodemographic covariates included age, education, marital status, household income, and ethnoracial background and (or) ancestry. In the NCS-R dataset, the marital status variable was coded into married or cohabitating; separated, divorced, or widowed; and never married, and the education variable into 0 to 11 years, 12 years, 13 to 15 years, and 16 years or more. Several studies have been published using these subcategory divisions.<sup>37,38</sup> Age was grouped into 18 to 29 years, 30 to 44 years, 45 to 59 years, and 60 years and older, approximate quartiles. We also collapsed the ethnoracial background or ancestry variable into 5 categories (Asian, Mexican or Other Hispanic, Afro-Caribbean or African American, Non-Latino White, and Others) from the 7 category variable that was available in the NCS-R. Finally, the continuous variable of household income was divided into \$0 to \$24 999, \$25 000 to \$44 999, \$45 000 to \$74 999, and \$75 000 and more.

### ***Violence Exposure***

An any violence variable was created based on 6 traumatic events endorsed or not endorsed by respondents: physical abuse by parents and (or) guardians; physical abuse by partner; physical abuse by anybody else; rape; other sexual assault; and mugged, held up, or threatened with a weapon. These variables were previously used to represent violence in a study examining abortion and anxiety disorders in the NCS.<sup>32</sup>

### ***Statistical Analyses***

To ensure the representativeness of the sample and the generalizability of results, weighting and stratification variables were used for all statistical analyses. Additionally, the SUDAAN program<sup>39</sup> was used to apply a variance estimation technique to all analyses known as Taylor Series Linearization. This technique adjusts for the complex sampling designs of surveys such as the NCS-R.

Multiple logistic regression analyses were used to examine the relations between abortion status and sociodemographic variables. Subsequent statistical analyses were adjusted for all sociodemographics (age, education, household income, marital status, and ethnoracial background and [or] ancestry). Multiple logistic regression analyses were also used to investigate the relations between abortion status and lifetime Axis I mental disorders and suicidal behaviour. Unadjusted odds ratios were calculated to assess whether lifetime exposure to violence was a significant confounding variable in the relation between abortion and mental disorders in the present sample. A more stringent logistic regression model examining associations between abortion and mental disorders was then employed, with exposure to violence entered as a covariate along with sociodemographic variables. Owing to the large number of comparisons made, a Bonferroni corrected  $P$  value was applied to these analyses (25 outcome

**Table 1 Abortion status and sociodemographic variables**

Variable	Have you ever had an abortion? ( <i>n</i> = 3291)		OR (95% CI)
	No, <i>n</i> = 2839 % (95% CI)	Yes, <i>n</i> = 452 % (95% CI)	
	89.5 (88.2–90.7)	10.5 (9.3–11.8)	
Variable	<i>n</i> (%)	<i>n</i> (%)	OR (95% CI)
<b>Age, years</b>			
18 to 29	674 (22.6)	106 (21.9)	1.00
30 to 44	844 (26.6)	193 (43.1)	1.68 (1.24–2.27) <sup>a</sup>
45 to 59	747 (26.0)	121 (26.6)	1.06 (0.74–1.52)
≥60	574 (24.9)	32 (8.5)	0.35 (0.20–0.61) <sup>b</sup>
<b>Education, years</b>			
≤11	397 (15.6)	54 (16.7)	1.00
12	884 (34.0)	122 (29.5)	0.81 (0.49–1.33)
13 to 15	868 (22.2)	155 (29.7)	0.99 (0.61–1.61)
≥16	690 (22.2)	121 (24.0)	1.01 (0.62–1.64)
<b>Marital status</b>			
Married or cohabitating	1523 (51.7)	231 (53.5)	1.00
Separated, divorced, or widowed	755 (27.0)	127 (25.8)	0.92 (0.61–1.40)
Never married	561 (21.4)	94 (20.6)	0.93 (0.63–1.37)
<b>Ethnoracial background</b>			
Asian	29 (1.2)	17 (4.8)	1.00
Mexican or Other Hispanic	262 (10.0)	51 (15.0)	0.38 (0.14–1.05)
Afro-Caribbean or African American	363 (13.0)	90 (16.7)	0.33 (0.12–0.90) <sup>c</sup>
Non-Latino White	2090 (73.4)	277 (60.5)	0.21 (0.08–0.53) <sup>a</sup>
Others	95 (2.5)	17 (3.0)	0.31 (0.11–0.86) <sup>c</sup>
<b>Household income</b>			
≤\$24 999	898 (34.41)	134 (28.2)	1.00
\$25 000 to \$44 999	629 (19.9)	87 (19.5)	1.20 (0.74–1.96)
\$45 000 to \$74 999	665 (22.0)	93 (19.8)	1.11 (0.72–1.70)
≥\$75 000	713 (23.7)	138 (32.5)	1.71 (1.09–2.68) <sup>c</sup>

All *n*s were unweighted and percents were weighted.  
<sup>a</sup> *P* < 0.01; <sup>b</sup> *P* < 0.001; <sup>c</sup> *P* = < 0.05

measures:  $P = 0.05$  divided by 25 outcome measures = 0.002). For each significant association between abortion and individual mental disorders after adjusting for sociodemographic variables and exposure to violence, PAFs were calculated using the following formula:

$$\frac{P(OR - 1)}{P(OR - 1) + 1}$$

where *P* was the weighted prevalence of a lifetime history of abortion in the NCS-R sample and OR was the adjusted odds ratio for abortion and each mental disorder.<sup>40</sup> A PAF is intended to approximate the percentage of a particular

outcome (mental disorders) that would not have occurred if the exposure (abortion) were removed.

Finally, to gain an indication of what proportion of respondents had the onset of their mental disorder(s) after their first abortion, a set of new variables was created by subtracting the age of onset of each mental disorder from the age of first abortion for each disorder that emerged as having a significant relation with abortion. A dichotomous variable was created for each disorder (people whose mental disorder onset came after their abortion onset, compared with remaining people with mental disorder–abortion comorbidity) to determine the percentage frequency of people whose mental disorder had occurred after their first abortion.

**Table 2 Relation between abortion and lifetime mental disorders**

Psychiatric diagnostic category	No abortion, <i>n</i> = 2839		Abortion, <i>n</i> = 452		PAF % (95% CI)
	% (95% CI)		% (95% CI)		
	89.5 (88.2–90.7)		10.5 (9.3–11.8)		
	<i>n</i> (%)	<i>n</i> (%)	AOR-1 (95% CI)	AOR-2 (95% CI)	
Major depression	865 (18.7)	169 (29.3)	1.75 (1.29–2.37) <sup>a</sup>	1.51 (1.14–2.01)	—
Dysthymia	209 (4.7)	50 (8.5)	1.79 (1.21–2.63)	1.42 (0.98–2.04)	—
Bipolar I disorder	46 (0.9)	17 (2.8)	2.80 (1.38–5.70)	1.97 (0.97–4.01)	—
Any mood disorder	958 (20.7)	196 (34.0)	1.91 (1.43–2.54) <sup>a</sup>	1.61 (1.24–2.11) <sup>a</sup>	6.0 (3.0–10.0)
Agoraphobia (without panic)	126 (2.7)	27 (4.2)	1.51 (0.94–2.42)	1.26 (0.82–1.95)	—
Generalized anxiety disorder	426 (9.1)	97 (16.0)	1.91 (1.37–2.65) <sup>a</sup>	1.67 (1.17–2.22)	—
Panic disorder	260 (5.8)	54 (9.5)	1.53 (0.96–2.43)	1.31 (0.87–1.97)	—
Panic attack	1182 (30.8)	221 (41.8)	1.45 (1.08–1.95)	1.25 (0.95–1.65)	—
PTSD	375 (8.9)	88 (16.8)	1.91 (1.25–2.94)	1.46 (0.94–2.26)	—
Social phobia	547 (12.0)	129 (21.3)	1.89 (1.39–2.57) <sup>a</sup>	1.61 (1.23–2.12) <sup>a</sup>	6.0 (2.4–10.5)
Specific phobia	669 (15.0)	122 (21.4)	1.44 (1.10–1.89)	1.27 (0.99–1.64)	—
Any anxiety disorder	1767 (44.5)	335 (61.8)	1.87 (1.33–2.63) <sup>a</sup>	1.58 (1.15–2.17)	—
Oppositional defiant disorder	179 (4.6)	50 (9.0)	1.67 (0.99–2.83)	1.33 (0.79–2.22)	—
Conduct disorder	141 (3.3)	40 (7.1)	1.72 (1.18–2.49)	1.36 (0.94–1.98)	—
Attention-deficit hyperactivity disorder	152 (3.5)	26 (4.4)	0.96 (0.57–1.62)	0.76 (0.47–1.24)	—
Any disruptive behaviour disorder	338 (8.3)	80 (13.9)	1.34 (0.88–2.02)	1.05 (0.70–1.58)	—
Alcohol abuse	259 (6.0)	108 (20.9)	4.23 (3.17–5.64) <sup>a</sup>	3.61 (2.67–4.88) <sup>a</sup>	21.5 (14.9–28.9)
Alcohol dependence	121 (2.6)	46 (8.0)	3.14 (2.28–4.32) <sup>a</sup>	2.42 (1.77–3.31) <sup>a</sup>	13.0 (7.5–19.5)
Drug abuse	155 (3.5)	87 (16.1)	4.99 (3.54–7.02) <sup>a</sup>	4.13 (2.85–6.00) <sup>a</sup>	24.7 (16.3–34.4)
Drug dependence	69 (1.5)	42 (7.5)	4.88 (3.23–7.36) <sup>a</sup>	3.87 (2.50–5.98) <sup>a</sup>	23.2 (13.6–34.3)
Any SUD	298 (6.9)	129 (24.6)	4.46 (3.39–5.85) <sup>a</sup>	3.80 (2.86–5.04) <sup>a</sup>	22.7 (16.3–29.8)
Any eating disorder	101 (2.4)	23 (4.2)	1.70 (0.86–3.36)	1.46 (0.74–2.88)	—
Any mental disorder	2077 (52.1)	387 (73.5)	2.37 (1.53–3.67) <sup>a</sup>	1.98 (1.27–3.08)	—
Suicidal ideation	687 (16.1)	161 (28.4)	1.97 (1.46–2.66) <sup>a</sup>	1.59 (1.20–2.11) <sup>a</sup>	5.8 (2.1–10.4)
Suicide attempt	254 (5.6)	69 (12.1)	2.18 (1.66–2.86) <sup>a</sup>	1.51 (1.15–1.97)	—

All *ns* were unweighted. All percents were weighted.  
AOR-1 = Adjusted for age, marital status, race, education, and household income.  
AOR-2 = Adjusted for age, marital status, race, education, household income, and any violence.  
<sup>a</sup> *P* = 0.002  
— = PAF were not calculated for these mental disorders as they did not reach significance when adjusting for sociodemographic variables and violence exposure.

## Results

Table 1 shows the analysis of abortion status and sociodemographic characteristics. A lifetime history of abortion was reported by 10.5% (95% CI 9.29 to 11.83) of women. Women aged 30 to 44 years were more likely than women aged 18 to 29 years to have a lifetime history of abortion, and women 60 years of age and older were less likely than the reference group to report ever having had an abortion. Further, Afro-Caribbean or African American, Non-Latino White, and women of Other descent were less likely than women of Asian descent to endorse a lifetime history of abortion. Finally,

women with a household income of more than \$75 000 were more likely to report an abortion than those in the \$0 to \$24 999 category.

Results of unadjusted logistic regression analyses examining exposure to violence as a potential confounding variable in the abortion–mental disorder relation showed significant positive associations between abortion status and exposure to violence (OR 2.56, 95% CI 1.73 to 3.80) and between violence and all mental disorder summary categories (OR range 2.87 to 5.88—results not shown but available from the authors).

**Table 3 Percentage of people with age of onset of mental disorder after age of first abortion**

Lifetime psychiatric diagnostic category	Mental disorder after abortion % (95% CI)
Major depression	48.8 (40.1–57.5)
Generalized anxiety disorder	45.3 (34.5–56.7)
Social phobia	9.7 (5.9–16.1)
Alcohol abuse	44.7 (33.9–56.1)
Alcohol dependence	45.9 (30.6–62.1)
Drug abuse	41.9 (29.9–55.0)
Drug dependence	49.5 (31.0–68.1)
Suicidal ideation	29.9 (21.7–39.6)
Suicide attempt	23.1 (13.6–36.2)

Table 2 displays the results of the relations between abortion and mental disorders and suicidality, as well as the PAFs that were calculated for each significant relation. Women reporting a lifetime history of abortion were more likely to have a mood disorder. Suicidal ideation and suicide attempts were also more likely to be reported by women who had had an abortion. Several of these significant relations remained significant even after adjusting for violence. However, in the case of major depression and suicide attempts, the associations were no longer significant. Similarly, associations were demonstrated between some anxiety disorders and abortion. However, with the exception of social phobia, these relations were weakened when adjusting for violence. SUDs were strongly associated with a history of abortion, irrespective of violence exposure. No significant relation was found between abortion and the any eating disorder category. PAFs ranged from 5.8% for suicidal ideation to a high 24.7% for drug abuse.

Table 3 displays the percentage frequency of women whose onset of mental disorder and suicidal behaviour came after their age of first abortion. To ascertain the temporality of events, this analysis was performed for the mental disorders that were shown to be independently associated with abortion in our preliminary logistic regression analyses. The percentage of women whose mental disorder followed their abortion was under 50% for all mental disorders and for suicidal ideation and suicide attempts. Less than 10% of people developed social phobia after their abortion. For some disorders, particularly major depression and drug dependence, about one-half of women had an age of onset of mental disorder occurring after their first abortion.

## Discussion

To our knowledge, our study was one of the first to examine associations between abortion and a wide range of individual mental disorders using DSM-IV criteria in a large, nationally representative sample of adult women. In addition, it used the

WMH-CIDI, an internationally recognized standardized interview, to diagnose mental disorders.<sup>35</sup> Previously, much of the literature has relied on women's self-reporting of symptomatology.

The findings of our study should be considered in the context of the following limitations. Mental disorders were assessed by lay interviewers. Nonetheless, agreement was moderate to good between interviewer, and clinician-made diagnoses for most of the mental disorders examined.<sup>36</sup> The data used in our study were from a cross-sectional survey, and therefore caution must be exerted when considering the direction of the associations found. Our age of onset analyses did allow for a proximal assessment of a temporal relation between abortion and mental disorders. These analyses examined only age of first abortion, and we were unable to distinguish whether mental disorder preceded or followed abortion if both events occurred in the same year. Further, recall of age of abortion or onset of mental illness may have been unreliable, particularly if they occurred in the distant past. We were also unable to identify elective abortions for genetic abnormalities, compared with those occurring for other reasons, whether the pregnancy was originally wanted or unwanted, or when in the pregnancy the abortion occurred. Unintended pregnancy itself may be a stressful event that can be a confounding factor in the relation between abortion and mental illness,<sup>29,32,41</sup> and it is important to study mental disorder risk in women who had an abortion, compared with those who had an unplanned pregnancy but carried the baby to term.<sup>27</sup> Unfortunately, the NCS-R could not be used to examine these associations. We were also unable to adjust for some potential confounding variables in our analyses, such as personality variables, because they were not assessed in the survey.<sup>8</sup> Finally, it is possible that abortion may have been underreported,<sup>42,43</sup> owing to the stigma that surrounds it.

A higher likelihood of any lifetime mood disorder was found to exist in women who had experienced an abortion, compared with those who had never had an abortion. It is likely that a woman experiencing a mood disorder would be less inclined to carry through with a pregnancy, instead choosing abortion. Conversely, the circumstances of an unplanned pregnancy and abortion could precipitate a mood disorder in a susceptible person. This relation is likely bidirectional, as the percentage frequency of major depression that followed abortion was about equal to the proportion of cases occurring before or during the same year as the first abortion.

Women who had had an abortion were also more likely to have an anxiety disorder, although the relation was weakened when adjusting for exposure to violence and only social phobia was able to withstand the conservative *P* value that was used. The significant positive relation between social phobia and abortion is contrary to the null findings in the recent study by Steinberg and Russo.<sup>32</sup> However, that study used women who delivered their babies, as opposed to women who had never had an abortion, as their comparison group. It is possible that having an anxiety disorder may contribute to a

decision to have an abortion by undermining self-confidence and the ability to parent successfully. However, the apparent association between mental disorders and abortion may also be driven by confounding factors that influence both phenomena. For example, exposure to violence<sup>22,31,32,44,45</sup> may be one of these factors, as well as poor social or spousal support.<sup>14,46,47</sup>

The strongest associations in our study were between abortion and SUDs. This association was independent of a history of exposure to violence. Again, the proportion of cases of SUDs occurring after the age of first abortion was less than, or about equal to, the proportion of cases occurring before or during the same year as the procedure. SUDs have been found to be associated with sexual behaviours such as having a greater number of partners and infrequent condom use.<sup>48–50</sup> Clearly, these behaviours can place people at an increased risk for an unintended pregnancy, and consequently, for an abortion. In fact, many studies have identified a relation between early and risky sexual behaviours and abortion.<sup>8,11,14,51,52</sup> Conversely, however, some researchers have discussed the possibility that women may self-medicate their pain with alcohol or drugs after an abortion has occurred.<sup>15,16</sup> A bidirectional relation is likely to exist. What should be noted is that the PAFs calculated for all SUDs were substantial, suggesting that a large proportion of the onset of these disorders may be attributable to abortion.

To our knowledge, this is the first study to examine the association between abortion and eating disorders, and the relation was not found to be significant. However, the null finding may be the result of the low prevalence of these disorders in our sample. Future studies should examine this association with a directed sample.

Finally, both suicidal ideation and suicide attempts were positively associated with abortion in our study after adjusting for sociodemographic variables, and the association with suicidal ideation remained significant after adjusting for violence as well. Only about 30% of ideators and 23% of attempters reported their age of suicidal behaviour subsequent to the first abortion. This result is at odds with a previous study showing increased suicidality in women after abortion, compared with women who had delivered their babies.<sup>20</sup> However, Morgan et al.'s<sup>20</sup> study was limited by examining only patients seeking admission for suicide attempts and not a general population sample. Some researchers have postulated that women who have endured, or are enduring, such psychological distress do not feel they are capable to care for a baby when they find themselves pregnant and therefore terminate the pregnancy.<sup>53</sup>

There are several possible mechanisms that may explain the association between abortion and mental illness. First, there could be a direct causal relation where the abortion increases the likelihood of a mental disorder, or a mental disorder increases the likelihood of abortion. Second, there could be an indirect mechanism. For example, mental disorder may be associated with poor social support or impulsivity<sup>54,55</sup> that might lead to an increased likelihood of unplanned pregnancy

and a decision to have an abortion. Finally, there could be shared vulnerability factors (for example, environmental factors and personality pathology) that might be associated both with abortion and with mental illness.<sup>8</sup> Future work needs to explore these and other possible mechanisms.

The implications of these findings and areas for future direction are several. First, clinicians should assess for mental disorders in women requesting an abortion, as the mental disorder often precedes, rather than succeeds, abortion. These findings are consistent with those studies that have found mental health before the abortion to play an important role in the overall relation between abortion and mental health.<sup>8,14,18,29</sup> Future research should further investigate the bidirectional relations found in our study by continuing to use valid assessments of mental disorders and representative samples of women, employing a longitudinal design, and improving the assessment of abortion by corroborating self-reported histories with other reliable sources.

## Conclusion

SUDs appear to be more prevalent in women who report having had at least one abortion. Mood and anxiety disorders, as well as suicidality, are also associated with a history of abortion but the relation is somewhat weaker and less consistent. Further, exposure to violence is a confounding factor in several of the associations between mental disorders and abortion. Our study does not support a unidirectional relation between abortion and mental disorders. Women undergoing abortion are just as likely, if not more likely, to have a pre-existing mental disorder than to develop a new mental disorder subsequent to the abortion.

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**Résumé : Associations entre avortement, troubles mentaux, et comportement suicidaire dans un échantillon nationalement représentatif**

**Objectif :** La plupart des études antérieures qui ont recherché la relation entre l'avortement et la maladie mentale ont présenté des résultats partagés. Nous avons examiné la relation entre l'avortement, les troubles mentaux et la suicidabilité à l'aide d'un échantillon nationalement représentatif des É.-U.

**Méthodes :** Les données provenaient de la National Comorbidity Survey Replication ( $n = 3310$  femmes de 18 ans et plus). L'entrevue diagnostique composite internationale de l'Organisation mondiale de la santé a servi à évaluer les troubles mentaux selon le Manuel diagnostique et statistique des troubles mentaux, 4<sup>e</sup> édition, l'avortement au cours de la vie. Des analyses de régression logistique multiple ont été employées pour examiner les associations entre l'avortement et les troubles de l'humeur, d'anxiété, d'utilisation de substances, l'alimentation, et les troubles de comportement perturbateur, ainsi que l'idéation suicidaire et les tentatives de suicide au cours de la vie. Nous avons calculé le pourcentage de répondantes dont les troubles mentaux sont apparus après le premier avortement. Le rôle de la violence a aussi été exploré. Les fractions attribuables dans la population ont été calculées pour les associations significatives entre l'avortement et les troubles mentaux.

**Résultats :** Après ajustement pour les données sociodémographiques, l'avortement était associé à une probabilité accrue de troubles mentaux graves — troubles de l'humeur (rapport de cotes ajusté [RCA] allant de 1,75 à 1,91), troubles anxieux (RCA allant de 1,87 à 1,91), troubles d'utilisation de substances (RCA allant de 3,14 à 4,99), ainsi qu'idéation suicidaire et tentatives de suicide (RCA allant de 1,97 à 2,18). L'ajustement pour la violence affaiblissait certaines de ces associations. Pour tous les troubles examinés, moins de la moitié des femmes déclaraient que leur trouble mental avait débuté après le premier avortement. Les fractions attribuables dans la population allaient de 5,8 % (idéation suicidaire) à 24,7 % (toxicomanie).

**Conclusions :** Notre étude confirme une forte association entre l'avortement et les troubles mentaux. Les mécanismes possibles de cette association sont discutés.