

Depression and termination of pregnancy (induced abortion) in a national cohort of young Australian women: the confounding effect of women's experience of violence

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Abstract

Background

Termination of pregnancy is a common and safe medical procedure in countries where it is legal. One in four Australian women terminates a pregnancy, most often when young. There is inconclusive evidence about whether pregnancy termination affects women's rates of depression. There is evidence of a strong association between partner violence and depression.

Objective

To examine the associations with depression of women's experience of violence, pregnancy termination and socio-demographic characteristics, among a population-based sample of young Australian women.

Methods

The data from the Younger cohort of the Australian Longitudinal Study on Women's Health comprised 14,776 women aged 18-23 in Survey I (1996) of whom 9683 aged 22-27 also responded to Survey 2 (2000). With linked data, we distinguished terminations reported before 1996 among teenage women and women in their early twenties from those reported later.

We used univariable and multivariable logistic regression to examine the association of depression (CES-D10) with sociodemographic variables, pregnancy termination and violence. We explored the inter-relations between termination, violence and depression, with and without adjustment for sociodemographic status in mutually adjusted models. Finally we stratified the adjusted models by violence category.

Results

30% of young women were probably depressed. Eleven percent reported a termination by 2000. Termination before 1996 and between 1996 and 2000 were both associated with depression in a univariable model (OR 1.37, 95%CI 1.12-1.66; OR 1.52, 95%CI 1.24-1.87). However, after adjustment for violence and sociodemographic variables (OR 1.21, 95%CI 0.98-1.50) this was no longer significant. There was no modifying of the effect when models were stratified by different levels of violence.

In contrast partner violence was significantly associated with depression: in univariable (OR 3.32, 95%CI 2.56-4.30) and multivariable models, both unadjusted for (OR 2.91, 95%CI 2.24-3.79) and adjusted (AOR 2.84, 95%CI 2.18-3.70) for termination and sociodemographic variables.

Conclusions

Violence, especially partner violence, and socio-economic disadvantage are significantly associated with women's depression. Pregnancy termination is not associated with depression when these factors are taken into account. There is no evidence in this paper suggesting that pregnancy termination increases the risk of depression, but that other underlying factors such as violence and socioeconomic disadvantage, do. (350 words)

Background

Termination of pregnancy (also referred to as induced abortion or more commonly just abortion) is one of the most common and safe medical procedures in Australia, as it is in other developed countries worldwide. In Australia, around one in four women terminate pregnancies, most often in their early twenties [1]. Termination is most frequently a woman's response to unwanted pregnancy, due to a range of possible circumstances e.g. poor access to contraception, contraceptive failure, unprotected intercourse or coerced sex occurring in the often complex context of her life situation [2]. The question of whether to terminate a pregnancy often forces women to confront their current and potential life circumstances, including that of their intimate relationships, employment, financial situation and readiness to parent. Our previous analyses of data from this cohort of young Australian women found that young women experiencing partner violence were more socially disadvantaged and more likely to terminate their pregnancies than those better off and violence-free. Younger women (particularly those in their teenage years) were more likely to report a higher proportion of termination of pregnancies occurring before the 1996 survey, compared with those in the 2000 survey, who were aged in their later twenties [3, 4].

Termination of pregnancy remains a controversial issue, with some arguing that it leads to adverse mental health sequelae [5, 6] and others that the evidence suggests the contrary [7, 8]. There are major limitations with the evidence to date [6]: significant under-reporting, lack of clarity about whether the probable depression or termination came first; limited sample sizes or study design, clinical rather than population or community samples; and confounding factors for which no adjustment has been made. Important potential confounding factors contributing to depression, such as partner violence, childhood sexual abuse or socioeconomic disadvantage may not be taken into account. There is now consistent and reliable evidence of the association

between partner violence and depression [9, 10] and between partner violence and termination of pregnancy [3, 11, 12].

The longitudinal population study by Fergusson et al of young New Zealand women between the ages of 15-25 did not include a measure of partner violence either in the family of origin or among the young people themselves [6], but did include some measures of problematic family functioning such as changes of parents, parental history of criminality and experience of childhood sexual abuse. The authors suggested that abortion/termination among teenage women and women in their early twenties may be associated with an increased likelihood of mental health problems.

An early analysis of data from the US national longitudinal survey of young women aged 14-21 in 1979 had concluded that pregnancy termination placed young people at risk of depression [5]. Schmiege and Russo reanalysed these data, arguing that the previous analysis had misclassified subjects (unintended rather than unwanted pregnancies) and excluded women (who subsequently terminated following an index pregnancy) who should have been included. They controlled for the same social and personal factors as the first analysis, but found that among those young women with an unwanted pregnancy, there was no difference in levels of depression between those who terminated the pregnancy, compared with those who continued the unwanted pregnancy to term [8].

We undertook a linked analysis of the 1996 and 2000 surveys of the Younger cohort of the Australian Longitudinal Study of Women's Health (ALSWH) to examine associations of probable depression with termination of pregnancy and women's experiences of violence among a random population sample of young Australian women.

Methods

The data

The ALSWH has been described in detail elsewhere [13]. Briefly, the project involves three age cohorts of women, who were aged 18-23 (the Younger cohort), 45-50 years (the Mid-age cohort) and 70-75 years (the Older cohort) when first surveyed in 1996. They are being followed longitudinally for at least twenty years. Participants respond to mailed surveys covering aspects of physical and emotional health, health service use, demographics, time use, health behaviours, life events, and other variables to develop a comprehensive picture of women's health in its social context. About 36,000 women aged 18-23, selected from the Australian national health insurance database were eligible for the Younger cohort. Data for 14,779 women who responded to Survey 1 in 1996 and linked with data for 9683 who responded to Survey 2 in 2000 were used for this analysis.

The project as a whole has ethics clearance from the Human Research Ethics Committees at the Universities of Newcastle and Queensland, Australia. The Human Research Ethics Committee of La Trobe University (Reference 01/140), Melbourne, Australia, gave approval for the secondary data analysis in this study.

Sample selection involved over-sampling in rural and remote areas; therefore, in the analysis, we incorporated probability weights to reflect the population distribution of Australian women in the age group studied [13]. This weighting resulted in an estimated sample size of 9,692.

Measures

Measure of probable depression: the CES-D 10

The Centre for Epidemiological Studies Depression Scale (CES-D) is a 20-item self-report scale used to identify the persistence and severity of probable depression over the past week among the

general population. It was constructed from well-established existing scales and has been reduced in length by half (10-item CES-D 10) without significant loss in specificity or sensitivity. It is not a diagnostic tool but higher scores indicate probable depression (high levels of depressive symptomatology). The ALSWH incorporates the 10 item CES-D, where ≥ 10 is regarded as an appropriate cutoff and this is used in the current analysis [14].

Socio-demographic factors

We included the following socio-demographic variables of interest in the model: marital status, age, highest education level, occupation, private health insurance cover, country of birth, area and state of residence (as the legal status and accessibility of pregnancy termination services varies by state). Whilst indigenous (Aboriginal and Torres Strait Islander - ATSI) status was included in the analyses, associations are not reported in accordance with ALSWH requirements to ensure results cannot be misinterpreted as the ATSI sample is not representative.

Reproductive events

The survey questionnaires for Surveys 1 and 2 asked women to list how many times they had (a) been pregnant, (b) had a miscarriage, (c) had a pregnancy termination and (d) given birth at term or (e) given birth at less than 37 weeks - preterm. For this paper, the responses to (c) were dichotomized into 'ever' and 'never'; multiple events were rarely reported and the power for detecting significant associations for these was low. We linked the termination data from women's responses in the two surveys, and were thus able to distinguish those who reported their first termination prior to the 1996 survey when they were either teenage or in their early twenties from those who first reported a termination in 2000.

Composite variable for violence

Intimate partner violence, often called domestic violence, is a complex, multi-dimensional set of coercive behaviours, most often measured by acts of physical and sexual violence. However, women who are physically abused by intimate partners are often abused in other ways, for instance psychologically or economically. Three short questions about violence were asked in this survey:

- In the last twelve months, have you been pushed, grabbed, shoved, kicked or hit?
- In the last twelve months, have you been forced to take part in unwanted sexual activity?
- Have you ever been in a violent relationship with a partner/spouse?

These were combined to produce a composite variable with five mutually exclusive categories determined, after preliminary cross-tabulations, to indicate the presence of violence. The categories were also of sufficient size to provide reliable estimates.

1. No violence (NoV)
2. Recent physical or sexual violence (in the last 12 months) but no partner violence – recent non-partner violence (NonPV)
3. Partner violence but no recent violence (EverPV)
4. Partner and recent violence (P&RecV)
5. Missing responses on any of the three questions

Analyses

Using the data for all women from Survey 2 in 2000, we estimated the associations between probable depression and sociodemographic factors (Table 1).

We then estimated associations with probable depression between women first reporting terminations in the 1996 survey when they were aged between 18 and 23 or in the 2000 survey (mutually exclusive) when they were aged between 22 and 27, compared with those never

reporting termination at either age. We modeled this effect adjusting for both violence and socio-demographic factors. We finally examined the relationship between probable depression and termination in models stratified by violence category (Table 2).

The associations were estimated first using univariable and then multivariable logistic regression. In all cases, numbers (n) and percentages reported have been adjusted for the area weighting. All reported odds ratios (ORs) or adjusted odds ratios (AORs), 95% confidence intervals (CIs), and p-value indicators are adjusted for population sample area weighting. All analyses were using survey commands in Stata 8. [15]

Missing data (less than 3% for any variable) were modelled using an indicator variable and have not been reported here.

Results

Young women, probable depression and socio-demographic factors (Table 1)

We found that 30% of these young women aged between 22-27 years scored 10 or above on the CES-D scale indicating probable depression, when they were surveyed in 2000. Women who were married or living in de facto relationships were less likely to experience depression (OR 0.61, 95% CI 0.54-0.70; OR 0.76, 95% CI 0.67-0.87 respectively) than single or divorced/separated women. Women with post-secondary qualifications, especially tertiary degrees, those with private health insurance and those living in rural areas were also less likely to be depressed compared with women with secondary education only, no private health insurance and those living in urban areas respectively. Woman with clerical or trade jobs or those with home duties were more likely to be depressed (OR 1.23, 95% CI 1.07-1.41; OR 1.76, 95% CI 1.45-2.14) than managerial or professional women.

The associations between depression, termination of pregnancy and forms of violence against young women (Table 2 and Figure 1)

At the time of the 1996 survey (when women were aged between 18 and 23) - not shown, only 12% of young women had ever been pregnant (data not shown). Six percent reported a termination (50% of those ever pregnant). At the time of the 2000 survey, 30% of young women aged between 22 and 27 had ever been pregnant. Eleven percent reported terminating their pregnancies, of whom five percent reported a termination for the first time in the 2000 survey. Overall 37% of those who reported being pregnant since 1996 had terminated a pregnancy. In univariable analyses of the relationship between termination and probable depression (Figure 1, graph 1), there is a significant association, both with a termination reported prior to 1996 (OR 1.37, 95%CI 1.12-1.66) or termination between 1996 and 2000 (OR 1.52, 95%CI 1.24-1.87). However, when adjusted for violence, the association is no longer significant for a termination reported before 1996 (AOR 1.15, 95%CI 0.94-1.41), but remains so for those reported later (AOR 1.32, 95% CI 1.07-1.63).

In contrast, the unadjusted odds ratios for probable depression among women reporting any form of violence are highly significant and remain so when adjusted for termination of pregnancy. Odds ratios are highest for women who report partner violence (AOR 3.17, 95% CI 2.44-4.12).

Further adjustment for socio-demographic factors reduces the odds ratios associated with pregnancy termination, whilst those associated with women's experiences of violence remain high and statistically significant. Compared with women experiencing no violence, the odds ratios for probable depression are highest for women who report experiencing partner and recent violence (AOR 2.84, 95%CI 2.18-3.70) followed by those with recent non-partner violence (AOR 2.40, 95%CI 1.95-2.97). Women whose report of partner violence is not accompanied by recent

violence have a reduced but still significant odds ratio for probable depression (AOR 1.70, 95%CI 1.46-1.98).

Finally, the association between depression and termination was estimated within each violence category (stratum), both in a univariable analysis and when adjusted for sociodemographic factors. The odds ratios show consistency between all strata thereby making either effect modification unlikely.

Discussion

We found, similar to France et al [14], that 30% of young women reported probable depression. Poverty and other socio-demographic disadvantage has previously been shown to significantly impact on women's experience of depression [16]. We have previously published data from this cohort of women showing evidence of an association between socio-economic disadvantage and pregnancy terminations [3].

More recently, women's experiences of violence, especially partner violence, have been convincingly demonstrated to have an association with depression [9, 10]. Our previous analyses of these data demonstrated that partner violence has a strong association with pregnancy termination; also found elsewhere, [3, 12]. In addition, we found that when women report abuse by partners, they experience greater likelihood of more frequent pregnancies, miscarriages and adverse pregnancy outcomes and this troubled reproductive history should be considered in relation to maternal depression.

Some authors have argued that pregnancy termination or induced abortion plays an aetiological role in depression [17], therefore our current analysis is timely. This study adds to the

accumulation of evidence that termination has little or no additional effect, when other more powerful influences like those of violence (especially partner violence) and poverty are taken into account [7]. What this study suggests, as others have previously [7, 9, 10], is that women's experience of violence - likely to continue over an extended period of time - along with other adverse reproductive events and circumstances increases their risk of depression, rather than their experience of terminating a pregnancy. Our findings cast doubt on those studies which find an association between termination and depression or suggest a link between termination and suicide, but have failed to consider partner violence as a missing confounder [5, 17, 18].

The study has strength as it is based on a large longitudinal national randomly selected population sample with linked data. This has allowed us to demonstrate that women were not more likely to experience probable depression if they had terminated a pregnancy – whether in their teens or later, provided there was adjustment for experience of violence. We demonstrated that violence is not an effect modifier, as the association between depression and pregnancy termination was not affected by the level of violence experienced. This suggests that the link between mental health and exposure to termination of pregnancy found by Fergusson et al in their longitudinal sample could be the result of failing to take current or previous experience of partner violence into account, as they indeed surmised [6].

The study also has some limitations. Self reports of pregnancy termination may lead to under-ascertainment, although anonymous mailed self-report (as in ALSWH) of such experiences is likely to reduce this tendency. As induced abortion statistics overall in Australia are unreliable due to the differing legal status and reporting requirements between states, it is not possible to verify the proportion reporting termination in our study with reported national proportions [1].

The questions in the ALSWH about a violent relationship with a partner have not been validated and may be open to interpretation. Nevertheless, associations with our composite variable have been consistent with other studies [11, 19-21]

Stratification of the data into violence categories results in inadequate power to detect associations between termination and depression, however, the consistency of effects points to the robustness of these findings and suggests that there is unlikely to be interaction present.

In intimate relationships, women and their partners have many issues to consider when faced with an unwanted or unexpected pregnancy. These include making judgments about financial security, employment prospects, maturity and readiness to parent. If partner violence is present in the relationship, it seems plausible that the cumulative impact of the abuse, perhaps several pregnancies, adverse pregnancy outcomes and poverty will have a greater impact on a women's mental health than any decision to terminate a pregnancy. The strong and consistent finding of a link between partner violence and depression and the relationship between violence and pregnancy termination helps to explain the growing evidence of the lack of association between depression and pregnancy termination.

Conclusions

The evidence in this paper does not support a causal link between termination and depression; rather that any association can be accounted for by experience of partner violence. Termination is most commonly the result of an unplanned and unwanted pregnancy. Prevention of unwanted pregnancies is likely to be reduced by a comprehensive sexual and reproductive health program, but also includes tackling structural determinants such as poverty and the prevention of intimate partner violence. Depression contributes to a considerable burden of disease and disability among women worldwide. To reduce the mental ill health associated with reproductive events, national

sexual and reproductive health strategies should also incorporate initiatives to reduce violence against women.

Competing interests

None

Authors' contributions

Both authors designed the study. Lyndsey Watson undertook the statistical analyses and Angela Taft wrote the first draft of the article. Both authors revised the manuscript.

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**Table 1. Probable depression and associations with sociodemographic factors. Survey 2
Younger cohort of the Australian Longitudinal Study on Women's Health 2000**

Variable	Total ¹	Variable Column%	Depressed (presumed from CESD≥10)			
			%	AOR ²	95% CI	
Total	9,327	100	30			
Marital status						
Single	5,193	56	33	1		
Married	2,114	23	25	0.61	***	0.54 - 0.70
De facto	1,798	19	28	0.76	***	0.67 - 0.87
Wid/sep/divorced	183	2	40	1.13		0.81 - 1.58
Age (at response to Survey 2)						
<24years	2,326	25	32	1.00		
≥24years	7,007	75	30	0.99		0.88 - 1.11
Education level						
None/year10 educ	821	9	38	1.07		0.89 - 1.28
HSC	2,027	23	35	1.00		
App/cert	2,085	23	30	0.83	*	0.72 - 0.96
Degree or higher	4,098	45	26	0.72	***	0.62 - 0.83
Occupation						
Manager/professional	3,960	44	26	1.00		
Para-professional	593	7	26	0.93		0.75 - 1.16
Trade/clerical	2,721	31	32	1.23	**	1.07 - 1.41
Blue-collar	514	6	32	1.17		0.93 - 1.47
No paid job	261	3	33	1.18		0.88 - 1.58
Other ³	773	9	39	1.76	***	1.45 - 2.14
Health insurance						
No private cover	6,228	67	32	1.00		
Has private cover	3,043	33	27	0.85	**	0.76 - 0.95
Country of birth						
Australian born	8,838	95	30	1.00		
European born	107	1	30	0.96		0.58 - 1.57
Asian born	323	4	37	1.32	*	1.00 - 1.74
Area of residence						
Urban	6,682	75	31	1.00		
Rural	1,989	22	28	0.79	***	0.71 - 0.88
Remote	302	3	30	0.92		0.72 - 1.18

1 Total numbers within variables vary due to missing responses, column %'s calculates without including missing category

2 Adjusted odds ratio, mutually adjusted for all other socio-demographic factors in table as well as Aboriginal and Torres Strait identity.

3 Other includes home duties

* p≤0.05, ** p≤0.01, *** p≤0.001

Table 2. Association of violence and termination with presumed depression (CESD \geq 10).

Variable	Total ¹	Col %	% De-pressed	Univariable				Multivariable			
				OR ²		95% CI		OR ²		95% CI	
Unadjusted for socio-demographic variables											
				Separately in model				Together in model			
Termination											
no termn	8018	89	29	1				1			
termn 1st in 1996	533	6	36	1.37	***	1.12	- 1.66	1.15	*	0.94	- 1.41
termn 1st in 2000	497	5	38	1.52	***	1.24	- 1.87	1.32	*	1.07	- 1.63
Violence											
NonV	7418	81	27	1				1	*		
									*		
NPV	442	5	48	2.55	***	2.07	- 3.15	2.52	*	2.04	- 3.11
									*		
ExpV	1024	11	40	1.85	***	1.61	- 2.14	1.80	*	1.55	- 2.08
									*		
P&RecV	282	3	55	3.32	***	2.56	- 4.30	3.17	*	2.44	- 4.12
									*		
Adjusted for socio-demographic variables³											
				Separately in model				Together in model			
Termination											
no termn				1				1			
termn 1st in 1996				1.24	*	1.01	- 1.52	1.09		0.89	- 1.35
termn 1st in 2000				1.36	**	1.11	- 1.68	1.21	^M	0.98	- 1.50
Violence											
NonV				1				1	*		
									*		
NPV				2.43	***	1.96	- 3.00	2.40	*	1.95	- 2.97
									*		
ExpV				1.73	***	1.49	- 2.01	1.70	*	1.46	- 1.98
									*		
P&RecV				2.91	***	2.24	- 3.79	2.84	*	2.18	- 3.70
									*		

Stratifying by violence level

Adjusted for SES variables³

No violence

Termination

no termn

1

1

termn 1st in
1996

1.32 *

1.01 - 1.72

1.28

0.98 - 1.68

termn 1st in
2000

1.28

0.98 - 1.67

1.16

0.89 - 1.51

Any violence

Termination

no termn

1

1

termn 1st in
1996

0.96

0.70 - 1.32

0.90

0.65 - 1.24

termn 1st in
2000

1.39

0.98 - 1.97

1.27

0.88 - 1.82

NPV

Termination

no termn

1

1

termn 1st in
1996

0.85

0.36 - 2.04

0.65

0.25 - 1.67

termn 1st in
2000

1.59

0.76 - 3.34

1.34

0.60 - 2.98

EXPV

Termination

no termn

1

1

termn 1st in
1996

0.96

0.65 - 1.44

0.91

0.61 - 1.36

termn 1st in
2000

1.29

0.80 - 2.06

1.24

0.76 - 2.03

P&RecV

Termination

no termn

1

1

termn 1st in
1996

0.99

0.50 - 1.95

1.04

0.48 - 2.28

termn 1st in
2000

1.28

0.59 - 2.80

1.07

0.48 - 2.40

1 Total numbers within variables vary due to missing responses, column %'s calculates without including missing category

2 * p≤0.05, ** p≤0.01, *** p≤0.001

3 Adjusted for marital status, age, education level, occupation, health insurance status, country of birth, area of residence, state of residence and Aboriginal or Torres Strait identity.

FIGURE 1: Graphs of association of probable depression (CESD \geq 10) with termination of pregnancy (TOP) and violence with and without adjustment for sociodemographic (sdem) variables

