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Fergusson DM, Swain-Campbell NR, Horwood LJ. Does sexual violence contribute to elevated rates of anxiety and depression in females? *Psychological Medicine*, 2002; 32: 991-996.

DOES SEXUAL VIOLENCE CONTRIBUTE TO ELEVATED RATES OF ANXIETY  
AND DEPRESSION IN FEMALES?

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Short Title: Sexual violence and internalising disorders in females

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## Abstract

**Background:** It is well documented that females have higher rates of internalising disorders (anxiety, depression) than males. It is also well known that females have higher exposure to childhood sexual abuse and sexual assault. Recently it has been proposed that the higher levels of internalising disorders in females may be caused by their greater exposure to sexual violence.

**Method:** Data were gathered as part of the Christchurch Health and Development Study. In this study a cohort of 1,265 children born in Christchurch, New Zealand, in 1977 have been studied from birth to age 21 years. The measures collected included: major depression and anxiety, childhood sexual abuse and adolescent sexual assault.

**Results:** Findings confirmed the established conclusion that internalising disorders are over twice as common in females than males (ORs 2.2-2.7). In addition, it was found that females were exposed to higher rates of sexual violence than males (ORs 5.1-8.4). Statistical control for gender related differences in exposure to sexual violence reduced the associations between gender and anxiety and depression. Nonetheless, even after such control, gender was significantly ( $p < .0001$ ) related to both anxiety (OR = 1.8; 95% CI = 1.3-2.4) and depression (OR = 1.9; 95% CI = 1.4-2.3).

**Conclusions:** Greater female exposure to sexual violence may be a factor that contributes to greater female susceptibility to internalising disorders. However, even after adjustment for gender differences in exposure to sexual violence it is clear that a substantial relationship between gender and internalising disorder persists.

It has been well documented that rates of depression and anxiety are higher in females than in males (Kessler et al., 1993; Weissman et al., 1993; American Psychiatric Association, 1994; Pigott, 1999; Seeman, 1999). For example, Weissman et al. (1993) reported data from four large cross-national studies and found rates of depression for females that were between 1.8 and 3.5 times that of males. However, the reasons for these gender differences in internalising disorders are not known (Oakley-Browne, 1995).

One hypothesis that has been proposed recently is that higher rates of internalising disorder in females may be explained by greater exposure of females to sex-based violence (Mullen et al., 1988; Weiss et al., 1999; Wise et al., 2001). Specifically, it has been argued that women have higher exposure to sex-based violence including childhood sexual abuse and rape (Finkelhor et al., 1990; Fergusson and Mullen, 1999). In turn, it has been well documented that exposures to these forms of violence are associated with increased rates of internalising disorders (Beitchman et al., 1992; Polusny and Follette, 1995; Silverman et al., 1996; Fergusson et al., 1996a; Fergusson and Mullen, 1999). This line of reasoning raises the possibility that gender related differences in exposure to sex-based violence may explain gender differences in internalising disorders.

In this study, we used data gathered over the course of a 21-year longitudinal study to examine these issues. The specific aims of the research were to:

1. Document the association between gender and risks of internalising disorders (depression, anxiety).
2. Document linkages between gender and exposure to sex-based violence in childhood and adolescence.

3. To model the joint relationships between gender, exposure to sex based violence and internalising disorders to examine the extent to which exposure to sex based violence explained the higher rate of internalising disorders in young women.

## Methods

### Participants

The data described in this report were gathered during the course of the Christchurch Health and Development Study (CHDS). The CHDS is a longitudinal study of an unselected birth cohort of 1,265 children born in the Christchurch (New Zealand) urban region in mid-1977. This cohort has been studied at birth, 4 months, 1 year, annual intervals to age 16 years, and again at ages 18 and 21 years. Data have been collected using a variety of sources, including parent interviews, teacher assessments, child interviews, standardized psychometric tests, medical and official records. An overview of study design has been given previously (Fergusson and Horwood, 2001). The present analysis is based on 1053 individuals who were assessed at either 18 or 21 years. This sample represents 83% of the initial cohort. However, not all members were assessed on both occasions. Variations in sample size are shown in Tables 1 and 2. The variables analyzed in this report were measured in the following ways.

## Measures

### *Gender*

Gender was recorded for all the participants at birth. At that time there were 635 males (50.2%) and 630 females (49.8%). Sample sizes vary at the 18 and 21-year interviews and females made up 50.7% and 50.9% of the sample respectively at these ages.

### *Internalizing disorders: depression and anxiety*

At ages 18 and 21 years, sample members were interviewed about their mental health using a questionnaire based on the Composite International Diagnostic Interview (CIDI) (WHO, 1993). Trained lay interviewers conducted all interviews. On the basis of these data, DSM-IV (1994) symptom criteria were used to construct a series of diagnoses of psychiatric disorders for each sample member.

Symptoms of *major depression* were assessed using CIDI items. At age 18, participants were asked to report on symptoms occurring during the periods from 16-17 years and 17-18 years, at age 21 for the periods 18-20 and 20-21 years. At all time periods participants were asked to report on the extent of impairment caused by their symptoms.

*Anxiety disorder* symptoms were assessed using the CIDI at ages 18 and 21 years. Participants were asked to report whether or not they had experienced a range of anxiety disorder symptoms since the last assessment. Anxiety disorders assessed included: generalized anxiety; panic disorders; agoraphobia; social phobia; and specific phobia. Using this information, time dependent measures of anxiety and depression at ages 16-18 and 18-21 years were constructed. Respondents were classified as having anxiety or

depression during each interval if they met DSM-IV diagnostic criteria for these disorders during the interval.

### *Sexual violence*

Three measures of sexual violence were used in the analysis: childhood sexual abuse (<16 years); and, sexual assault (16-18 years; 18-21 years). These measures are described below.

#### *Childhood sexual abuse (<16 years)*

At age 18 sample members were questioned about their experience of childhood sexual abuse prior to age 16. Respondents who reported having been sexually abused by a parent or another person were then asked further questions relating to the nature and extent of the abuse (Fergusson et al, 1996b). On the basis of this information respondents were classified into four groups reflecting the severity of abuse exposure: 1) no sexual abuse; 2) non-contact sexual abuse; 3) contact sexual abuse not involving attempted or completed intercourse; and 4) sexual abuse involving attempted or completed oral, anal or vaginal intercourse. The same questions were repeated at the 21-year interview.

These data have been analyzed in a previous study using latent class methods (Fergusson et al., 2000). This analysis suggested that the best measure of childhood sexual abuse was based on a combination of reports at 18 and 21 years. Participants who reported childhood sexual abuse at either 18 or 21 were classified as having been exposed to childhood sexual abuse. Using these criteria 14% of the respondents reported exposure to sexual abuse: 3% reported non contact abuse; 5% reported contact abuse without

penetration and 6% reported contact abuse involving actual or attempted sexual penetration.

*Sexual assault (16-21 years)*

Exposure to sexual assault at ages 16-18 and 18-21 years was assessed within the context of a life events scale administered at ages 18 and 21 years. Specifically at each age sample members were asked: “Since the last assessment have you been sexually assaulted?” Participants who endorsed this question were classified as having been exposed to sexual assault for the periods 16-18 or 18-21 years.

*Statistical methods*

1. The bivariate associations between gender and internalizing disorders were assessed using the odds ratio (OR) and 95% confidence interval (Table 1). The significance of each association was tested using the chi-squared test of independence.

2. The bivariate associations between gender and exposure to sexual violence were assessed using the odds ratio and 95% confidence interval (Table 2). The significance of each association was tested using the chi-squared test for independence.

3. The association between gender and internalizing disorders taking into account the intervening effects of exposure to sexual violence was assessed by fitting the model:

$$\text{Logit}(Y_{it}) = B_0 + B_1X_1 + B_2Z_1 + B_3Z_{2t} + B_4A$$

where  $\text{Logit}(Y_{it})$  was the log odds of anxiety (or depression) at time  $t$  ( $t = 16-18; 18-21$ ) for participant  $i$ ;  $X_1$  was gender;  $Z_1$  was the measure of childhood sexual abuse;  $Z_2$  was a cumulative measure of sexual assault by time  $t$ ; and,  $A$  was age. This model was fitted using a generalized estimating equation (GEE) approach (Liang and Zeger, 1986),

assuming the correlation matrix of model disturbances over time was unstructured. Model fitting was conducted using STATA 6.0 (Statacorp, 1999). From this model, estimates of the adjusted odds ratios between gender and internalizing disorders were calculated. These estimates are given by  $e^{B_1}$  where e is the base of natural logarithms.

4. Treatment of missing data. To take account of missing data due to sample attrition, the methods described by Carlin et al. (1999) were used. These methods involved a two-stage analysis process. In the first stage of the analysis, a sample selection model was constructed using data gathered at birth to predict participation. The model fitted was:

$$\text{Logit}(O_{it})=B_0+\sum B_j X_{ij}$$

where  $\text{Logit}(O_{it})$  was the log odds that the  $i$ th participant would have been observed at time  $t$ , and  $X_{ij}$  was a set of variables describing the participant at the initial (birth) interview. There were detectable tendencies ( $p<.05$ ) for the obtained sample to under-represent participants from socially disadvantaged families characterized by low maternal education, low socio-economic status and single parenthood. On the basis of the fitted regression model, the sample was post-stratified into a series of groups and the probability of study participation was estimated for each group. The observations for each individual were then weighted by the inverse of this probability in all analyses.

## Results

### *A. Gender and internalising disorders*

Table 1 shows the associations between gender and rates of major depression and anxiety disorders at during the periods 16-18 years and 18-21 years. It can be seen that for both outcomes, females had significantly higher rates of disorder than males ( $p < .01$ ). The odds ratios and 95% confidence intervals describe the association between gender and internalising disorders. These show that females had odds of internalising disorders that were between 2.2 and 2.7 times those of males.

### *B. Gender and exposure to sexual violence*

Table 2 shows the associations between gender and a) measures of exposure to sexual violence including childhood sexual abuse, and b) measures of sexual assault at 16-18 and 18-21 years (see Methods). The strength of association between gender and each measure of sexual violence is given by the odds ratio and corresponding 95% confidence interval. Results show that females had odds of exposure to sexual violence that were between 5.1 and 8.4 times those of males.

### *C. Association between gender and internalising disorders adjusted for exposure to childhood sexual abuse and sexual violence.*

The preceding results raise the possibility that the associations between anxiety, depression, and gender are mediated by exposure to childhood sexual abuse or sexual assault in adolescence. To examine this issue, the data were analysed using a generalised estimating equation (GEE) model in which log odds of depression and anxiety were modelled as linear functions of: gender, childhood sexual abuse, sexual assault and age (see Methods). The results of this analysis showed:

1. Significant predictors of anxiety were: gender ( $B = .58$ ;  $p < .0001$ ); childhood sexual abuse ( $B = 1.0$ ;  $p < .0001$ ); sexual assault ( $B = 1.25$ ;  $p < .0001$ ).

2. Significant predictors of depression were: gender ( $B = .62$ ;  $p < .0001$ ); childhood sexual abuse ( $B = 1.25$ ;  $p < .0001$ ); sexual assault ( $B = 1.14$ ;  $p < .0001$ ).

From these fitted models, it was possible to estimate the association (OR) between gender, and anxiety and depression adjusted for the effects of exposure to sexual violence. These estimates are reported in Table 3 which compares the unadjusted values of the relationships between gender and depression/anxiety with the adjusted estimates. The table also reports a test of the significance of the differences between the unadjusted and adjusted values. The Table shows:

1. For both anxiety and depression, exposure to sexual violence did not explain the associations with gender. Even after adjustment for sexual violence, significant associations remained between gender and internalising disorders ( $p < .0001$ ).

2. Nonetheless, control for exposure to sexual violence did explain a small component of the elevated rate of anxiety and depression in young women. For depression the odds ratios reduced from 2.4 to 1.8. A test of equality of odds ratios showed this difference to be statistically significant ( $p = .03$ ). Similarly, the odds ratios between gender and anxiety disorders reduced from 2.5 to 1.9. A test of the equality of odds ratios showed this difference to be marginally significant ( $p = .08$ ). Both sets of results imply that rates of internalising disorder in females were elevated, partially, as a result of their higher exposure to sexual violence.

## Discussion

In this paper we have examined the hypothesis that elevated rates of internalising disorder in females were explained by their greater exposure to sexual violence. This hypothesis has been articulated in a growing number of articles (Mullen et al., 1988; Weiss et al., 1999; Wise et al., 2001) but as yet had not been subjected to direct testing.

The findings confirm the well-established conclusion that rates of internalising disorder were over twice as common in females as in males (e.g. Weissman et al., 1993). In addition, females were found to be at substantially increased risk of being exposed to sexual violence, with females having odds of exposure that were from 5 to 8 times higher than males.

Multivariate modelling led to two general conclusions about the linkages between gender, exposure to sexual violence, and internalising disorders:

1. Most of the higher rate of internalising disorders found in females was not explained by their higher exposure to sexual violence. After control for this exposure females had rates of internalising disorder that were approximately twice those of males.
2. Nonetheless, a small component of the elevated rates of internalising disorders found in females was explained by their greater exposure to sexual violence. These results suggest that while exposure to sexual violence does not explain male/female differences in internalising disorders, this exposure may exacerbate pre-existing gender differences in susceptibility to internalising disorders.

The present study has a number of methodological advantages. These include a) the use of a representative birth cohort that has been studied from childhood to adulthood; b) collection of reports of childhood sexual abuse on two occasions; c) the use of

multivariate methods to examine the association between gender and internalising disorders. However, there are some potential limitations to the study. These centre around the assessments of exposure to sexual violence. First, while measures of childhood sexual abuse were based on repeated reports to multiple questions, the measurement of sexual assault was based on responses to single items. It is possible that this may have led to an under ascertainment of the prevalence of sexual assault. Another possible threat to validity may arise from gender specific differences in the reporting of exposure to sexual violence. In particular, some research has suggested that males may be more prone to under-reporting experiences of child sexual abuse than females (Widom and Morris, 1997). This, in turn, would exaggerate gender differences in exposure to sexual violence, leading to a possible over-control of the association between gender and internalising disorders. Notwithstanding this, the present study clearly suggests that greater female exposure to sexual violence may be a factor which contributes to greater female susceptibility to internalising disorders. However, it is clear that even after control for exposure to sexual violence, a substantial relationship between gender and internalising disorder remains.

## ACKNOWLEDGEMENTS

This research was funded by grants from the Health Research Council of New Zealand, the National Child Health Research Foundation, the Canterbury Medical Research Foundation and the New Zealand Lottery Grants Board.

## References

American Psychiatric Association (1994). Diagnostic and statistical manual of mental disorders (4<sup>th</sup> ed). American Psychiatric Association: Washington.

Beitchman, J.H., Zucker, K.J., Hood, J.E., daCosta, G.A., Akman, D., and Cassavia, E. (1992). A review of the long-term effects of child sexual abuse. Child Abuse & Neglect, 16:101-118.

Carlin, J.B., Wolfe, R., Coffey, C., and Patton, G.C. (1999). Tutorial in biostatistics. Analysis of binary outcomes in longitudinal studies using weighted estimating equations and discrete-time survival methods: prevalence and incidence of smoking in an adolescent cohort. Statistics in Medicine, 18:2655-2679.

Fergusson, D.M., and Horwood, L.J. (2001). The Christchurch Health and Development Study: Review of findings on child and adolescent mental health. Australian and New Zealand Journal of Psychiatry, 35: 285-296.

Fergusson, D.M., Horwood, L.J., and Lynskey, M.T. (1996a). Childhood sexual abuse and psychiatric disorders in young adulthood: Part II: Psychiatric outcomes of sexual abuse. Journal of the American Academy of Child and Adolescent Psychiatry, 35:1365-74

Fergusson, D.M., Lynskey, M.T., and Horwood, L.J. (1996b). Childhood sexual abuse and psychiatric disorders in young adulthood: Part I: The prevalence of sexual abuse and the factors associated with sexual abuse. Journal of the American Academy of Child and Adolescent Psychiatry, 35: 1355-1364.

Fergusson, D.M., Horwood L.J., and Woodward, L.J. (2000). The stability of child abuse reports: a longitudinal study of the reporting behaviour of young adults.

Psychological Medicine, 30:529-544.

Fergusson, D.M., and Mullen, P.E. (1999). Childhood sexual abuse - an evidence based perspective. Sage: Thousand Oaks, USA.

Finkelhor, D., Hotaling, G., Lewis, I.A. and Smith, C. (1990). Sexual abuse in a national survey of adult men and women: Prevalence, characteristics and risk factors. Child Abuse & Neglect, 14:19-28.

Kessler, R.C., McGonagle, K.A., Swartz, M., Blazer, D.G., and Nelson, C.B. (1993). Sex and depression in the National Comorbidity Survey I: Lifetime prevalence, chronicity and recurrence. Journal of Affective Disorders, 29: 85-96.

Liang, K.-Y. and Zeger, S.L. (1986). Longitudinal data analysis using generalized linear models. Biometrika, 73: 13-22.

Mullen, P.E., Romans-Clarkson, S.E., Walton, V.A., and Herbison, G.P. (1988). Impact of sexual and physical abuse on women's mental health. The Lancet, April 16:841-845.

Oakley-Browne, M.A. (1995). Depression and anxiety. Pgs 187-198. In Joyce, P.R., Romans, S.E., Ellis, P.M., and Silverstone, T.S. (eds) Affective disorders. Department of Psychological Medicine: Christchurch, New Zealand.

Pigott, T.A. (1999). Gender differences in the epidemiology and treatment of anxiety disorders. Journal of Clinical Psychiatry, 60 suppl 18: 4-15.

Poulsny, M.A., and Follette, V.M. (1995). Long-term correlates of child sexual abuse: theory and review of the empirical literature. Applied Preventative Psychology, 4: 144-66.

Seeman, M.V. (1999). Psychopathology in women and men: focus on female hormones. American Journal of Psychiatry, 154: 1641-47.

Silverman, A.B., Reinherz, H.Z., and Giaconia, R.M. (1996). The long-term sequelae of child and adolescent abuse: a longitudinal community study. Child Abuse and Neglect, 20: 709-723.

Statacorp (1999). Stata statistical software: release 6.0. College Station, Stata Corporation: Texas.

Weiss, E.L., Longhurst, J.G., and Mazure, C.M. (1999). Childhood sexual abuse as a risk factor for depression in women: psychosocial and neurobiological correlates. American Journal of Psychiatry, 156:816-828.

Weissman, M.M., Bland, R., Joyce, P.R., Newman, S., Wells, J.E. and Wittchen, H-U (1993). Sex differences in rates of depression: cross national perspectives. Journal of Affective Disorders, 29:77-84.

Widom, C.S., and Morris, S. (1997). Accuracy of adult recollections of child victimisation: Part 2. Child sexual abuse. Psychological Assessment, 9:412-421.

Wise, L.A., Zierler, S., Krieger, N., and Harlow, B.L. (2001). Adult onset of major depressive disorder in relation to early life violent victimisation: a case-control study. The Lancet, 358:881-87.

World Health Organisation (1993). Composite International Diagnostic Interview (CIDI). World Health Organisation: Geneva.

Table 1. Associations between gender and anxiety and depression (16-18; 18-21).

Age	Disorder	Male	Female	OR	95% CI	p
16-18 years (N = 1024)	% Anxiety	11.9	22.6	2.2	1.6-2.9	<.0001
	% Depression	7.8	18.3	2.6	1.8-3.8	<.0001
18-21 years (N = 1011)	% Anxiety	13.7	30.4	2.7	2.1-3.7	<.0001
	% Depression	16.6	30.8	2.2	1.7-2.9	<.0001

Table 2. Associations between gender and a) childhood sexual abuse (<16), and b) sexual assault (16-21).

	N	Male	Female	OR	95% CI	p
% Childhood sexual abuse (<16 years)	1053	5.5	22.6	5.1	3.4-7.5	<.0001
% Sexual assault (16-18 years)	1024	1.0	6.0	6.4	2.7-15.3	<.0001
% Sexual assault (18-21 years)	1011	0.4	3.2	8.4	2.2-32.8	<.001

Table 3. Associations between gender and a) anxiety disorder, and b) depression before and after adjustment for childhood sexual abuse (<16), sexual assault (16-21).

	Unadjusted Estimates		Adjusted Estimates		p <sup>1</sup>
	OR	95% CI	OR	95% CI	
Anxiety	2.3	1.7-3.1	1.8	1.3-2.4	.08
Depression	2.5	1.9-3.1	1.9	1.4-2.3	.03

<sup>1</sup> Test of equality of unadjusted and adjusted ORs.