

Sexual victimization and anxiety and mood disorders: a case–control study based on the Danish registry system

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Aims. This study aimed to examine the relationship between rape and the subsequent psychiatric diagnosis of any anxiety or mood disorder.

Method. Data from the Danish Civil Registration System and the Danish Psychiatric Central Register were used to identify a sample of female victims who had visited a centre for rape victims during an index year and their subsequent psychiatric records were compared with a matched control group.

Results. While controlling for demographic variables and previous psychiatric disorders, the effect of sexual victimization increased the likelihood of a subsequent diagnosis of an anxiety disorder but not a mood disorder.

Conclusion. Sexual victimization significantly increases the likelihood of experiencing an anxiety disorder, and therefore victims require post-assault information and support.

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There is variation in the estimated prevalence of rape in both the United States and European countries. Estimates of 7–14% for sexual assault of women have been reported in large population-based surveys in the United States (Sorenson *et al.* 1987; Basile *et al.* 2007) and from 4.9% to 34% in the European countries (Regan & Kelly, 2003). However, there have been consistent findings about the negative consequences of rape. Research has provided evidence that sexual victimization is associated with a broad range of problems such as alcohol abuse (Hankin *et al.* 1999), disordered eating (Ackard & Neumark-Sztainer, 2002), symptoms of psychosis (Shevlin *et al.* 2007; Elklit & Shevlin, 2011), the abuse of prescription and recreational drugs (Kilpatrick *et al.* 1997; Sturza & Campbell, 2005), residential mobility (Elklit & Shevlin, 2009), relationship dissolutions (Burgess & Holmstrom, 1974; Norris & Feldman-Summers, 1981; Becker, 1982), and primary care utilization (Elklit & Shevlin, 2010).

Psychological research has examined a range of disorders associated with rape (Resick, 1993). Most research has focused on anxiety disorders, specifically post-traumatic stress disorder (PTSD). An early prospective study reported that 47% of rape victims met

the full criteria for PTSD after 3 months (Rothbaum *et al.* 1992). Two large nationally representative surveys have reported lifetime prevalence estimates of PTSD in victims of rape between 31% and 36% (Kilpatrick *et al.* 1992; Amstadter *et al.* 2008). Other anxiety disorders such as obsessive–compulsive disorder (Burnam *et al.* 1988), general anxiety disorder (Kessler, 1995), and phobias (Loncar, 2006) have also been shown to be significantly associated with rape.

Rape has also been implicated in the development of mood disorders, in particular depression. For example, Kimerling *et al.* (2010) reported that adult sexual trauma significantly increased the risk of depressive disorders; victims were almost three times more likely to experience depression as non-victims. A review of the research evidence (Resick, 1993) on depression following rape reported prevalence estimates of between 35% and 56% for major depression, or depression in the moderate to severe range, for rape victims. The long-term impact of rape on depression has also been investigated. Childhood sexual abuse and cumulative sexual traumas in childhood and adulthood significantly predicted adult depressive disorders (Chapman, 2004; Gillespie *et al.* 2009). Significant psychiatric co-morbidity has also been identified in victims of rape, in particular PTSD and depression (Kessler, 1995; Creamer *et al.* 2001).

There are a number of methodological limitations in previous studies. First, many have relied on self-report

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assessment of sexual trauma and psychological status. Reliance on self-reported trauma histories, rather than objectively collaborated assessments, raise concerns about the validity of such measurements because of the potential for under- or over-reporting (Koss, 1992). Similarly, clinical-based diagnoses of PTSD and depression are considered the gold-standard compared with self-report-based assessments and diagnoses. Second, the cross-sectional nature of many studies means that it is not possible to unequivocally establish the temporal ordering of events. An alternative explanation for these findings is that mental health problems make individuals more vulnerable to sexual victimization. Third, not all studies used a control group and/or statistically controlled for other demographic or risk factors that may influence mental health.

This study aimed to examine the relationship between rape and subsequent psychiatric diagnosis of any anxiety or mood disorder. It was predicted that experience of sexual victimization would increase the likelihood of receiving a diagnosis of any anxiety or mood disorder after controlling for previous diagnoses of any anxiety or mood disorder and other demographic variables. In addition, this study will add to the existing research by (1) using an objective behavioural indicator of sexual victimization rather than self-report, (2) using a formal clinical diagnosis of an anxiety or mood disorder, (3) statistically controlling for any diagnosis' pre-exposure to sexual victimization, and (4) using a matched control group to assess psychiatric differences between those exposed and non-exposed to sexual victimization. In addition, potential risk factors such as relationship status (Pulkki-Råback *et al.* 2012), ethnicity (González, 2010), and children (Ballard *et al.* 1994) were included in the analysis.

Method

Participants

This study was based on the Danish Civil Registration System (CRS) and the Danish Psychiatric Central Register. A detailed description of the structure of CRS was provided by Pedersen *et al.* (2006), and Thygesen *et al.* (2011) provide details of the structure of different Danish health and social registers and how data can be accessed. Access to CRS data was through 'Denmark Statbank', which is the central government agency for statistics. To use CRS data, researchers must apply to Denmark Statbank from an authorized institution. The research proposal needs to be approved by the Danish Register Data Board (Datatilsynet), which is the agency responsible for all studies using registered data, and by the Health Board (Sundhedsstyrelsen), a department of the Danish Ministry of Health, which is the agency responsible for all studies involving public health

data. This study received all necessary approvals and also ethical approval was granted by Aarhus University. On the basis of the research proposal, Denmark Statbank make data available on the relevant variables to the researchers and variables are matched using the individual civil registry number (CPR). The CPR identifies people at the individual level and allows information to be collated across different registries. Identification of individuals is not possible as the 10-digit CPR numbers were scrambled before release. The data are also protected by initial password, and access also requires the correct 'time code' to be entered; this is an alphanumeric code that changes every minute and provided by a digital key.

The cases were 103 female victims who attended the Centre for Rape Victims (CRV) at the University Hospital in Aarhus (Denmark) during the index year (1 January 2003–31 December 2003). The CPR information was used to extract a female-matched control group from the CRS with 20 controls for every case ($n = 2060$) using risk set sampling. The cases and controls were matched for age and municipality (Aarhus). The selection of controls may have resulted in the selection of female victims who had visited the CRV before the index year. To avoid this, an exclusion criterion, having visited the CRV since 1999 (the year the CRVs were established), was used.

The eight Danish CRVs offer services to anyone from the age of 13 who reported any type of sexual assault. The CRV's website offers information for friends and family of rape victims, but the CRV is only available to victims themselves. The CRV offers free access to specially trained nurses, medical treatment, forensic examination, counselling by licensed psychologists, and a highly structured follow-up procedure in one location. CRVs are open 24 hours a day, and referrals or police involvement are not required in order to utilize the services offered. If a victim of rape presents at a police station or contacts the police, they are immediately transported to the CRV where the police questioning and all other examinations and treatments will take place. The CRV will only serve victims within 72 hours of the assault. There is a separate regional centre to support victims of child sexual abuse. Information about the CRVs is available through public and private medical clinics, libraries, educational institutions, and the internet. See Bramsen *et al.* (2009) for a detailed description of Danish CRVs.

Measures

Sexual victimization was operationalized by having visited the CRV at any time during 2003, with no previous recorded visits since 1999. No information on

Table 1. Comparison of characteristics of groups on the basis of diagnosis of anxiety or mood disorder

	Anxiety disorder diagnosis 2003–2007				Mood disorder diagnosis 2003–2007			
	No <i>n</i> = 2078	Yes <i>n</i> = 62	χ^2 (df)	<i>p</i>	No <i>n</i> = 2106	Yes <i>n</i> = 37	χ^2 (df)	<i>p</i>
Living status								
Single [<i>n</i> (%)]	709 (35.4)	30 (52.0)	7.17 (1)	0.01	722 (35.6)	17 (50.0)	3.01 (1)	0.08
Ethnicity								
Immigrant [<i>n</i> (%)]	252 (12.5)	11 (17.1)	1.51 (1)	0.22	260 (12.7)	3 (8.6)	0.53 (1)	0.46
Children								
1 or more children [<i>n</i> (%)]	1283 (61.7)	37 (56.9)	0.62 (1)	0.43	1303 (61.9)	17 (45.9)	3.89 (1)	0.04
Previous disorder								
Diagnosis 1993–2002	31 (1.5)	10 (15.4)	64.82 (1)	0.00	19 (0.9)	6 (16.2)	73.96 (1)	0.00
Sexual victimization								
CRV attendance 2003	87 (4.2)	16 (24.6)	57.49 (1)	0.00	98 (4.7)	5 (13.5)	6.24 (1)	0.01

CRV, Centre for Rape Victims.

the number of visits or details of the rape was available. Other variables were used to describe the demographic characteristics of the sample during the year preceding the index year: (1) relationship status (0-married, registered partnerships, living in consensual union, or cohabiting couples, 1-other), (2) ethnicity (0-non-immigrant, 1-immigrant/2nd generation), and (3) children (0-no children, 1-one or more children).

Every time a person has contact with a psychiatric hospital or department in Denmark, they receive an ICD-10 diagnosis code that is recorded on the Psychiatric Central Register. The diagnosis is made by a psychiatrist. For this study, we combined information on the Psychiatric Central Register and CRS to identify which cases and controls had received a diagnosis of any anxiety, stress-related and somatoform disorders (F40–F48), and mood (affective) disorders (F30–F39). The data from Denmark Statbank used the same scrambled CPR for both the civil and psychiatric registries to allow matching. The occurrence of a diagnosis of each disorder was recorded separately for two time periods. The first time period covered 10 years (1 January 1993–31 December 2002) and the second time period covered 5 years (1 January 2003–31 December 2007). This resulted in two variables that indicated whether a person had received a diagnosis in the 10 years preceding the index year, or during the 5 years after the start of the index year.

Results

The female victims who visited the rape centre were aged from 13 to 87 years (mean = 26 years, *s.d.* = 13.41). The association between diagnoses of anxiety and mood disorders (2003–2007) was low (Kendall's Tau-*b* = .21,

p = .00), indicating that there were largely different participants receiving different diagnosis. χ^2 analyses were performed to compare the characteristics of the diagnosed and non-diagnosed groups (based on both cases and controls), on the basis of data from 2003 and the cases and controls. Owing to a small amount of missing data, the total effective sample sizes of the anxiety and mood disorder analyses were 2135 and 2143, respectively. The results are shown in Table 1.

Two multivariate analyses were performed separately using hierarchical binary logistic regression. The dependent variables were post-index year diagnosis of (1) any anxiety or (2) mood disorder. The variables representing living status, ethnicity, and children were entered in the first block, pre-index diagnosis in the second block, and sexual victimization was entered in the third block. The results are reported in Table 2.

For the model for mood disorders, the first block of the regression model was not significant ($\chi^2 = 5.07$; *df* = 3; *p* = 0.17; Nagelkerke pseudo $R^2 = 0.009$). When the previous diagnosis variable was entered in the second block, this resulted in a significant model ($\chi^2 = 25.85$; *df* = 4; *p* = 0.00; Nagelkerke pseudo $R^2 = 0.077$), which was a significant improvement over the previous model ($\Delta\chi^2 = 20.78$; Δ *df* = 1; *p* = 0.00; $\Delta R^2 = 0.068$). The addition of the third block that included the sexual victimization variable did not improve the model ($\Delta\chi^2 = 0.55$; Δ *df* = 1; *p* = 0.46; $\Delta R^2 = 0.002$), although the overall model remained significant ($\chi^2 = 26.41$; *df* = 5; *p* = 0.00; Nagelkerke pseudo $R^2 = 0.079$). For the model for anxiety disorders, the first block of the regression model was significant ($\chi^2 = 10.54$; *df* = 3; *p* = 0.01; Nagelkerke pseudo $R^2 = 0.032$). When the previous diagnosis variable was entered in the second block, this resulted

Table 2. Estimates from hierarchical binary logistic regression model predicting diagnosis of anxiety or mood disorders

	Anxiety disorder diagnosis 2003–2007					Mood disorder diagnosis 2003–2007				
	B	s.e.	df	Odds ratio (95% CI)	Significance	B	s.e.	df	Odds ratio (95% CI)	Significance
Living status										
Single	0.62	0.32	1	1.87 (0.99–3.50)	0.05	0.16	0.41	1	1.18 (0.52–2.62)	0.69
Ethnicity										
Immigrant	0.63	0.36	1	1.88 (0.93–3.78)	0.08	0.47	0.87	1	0.74 (0.22–2.53)	0.64
Children										
1 or more children	0.38	0.32	1	1.46 (0.77–2.75)	0.24	–1.21	0.97	1	0.68 (0.30–1.52)	0.35
Previous disorder										
Diagnosis 1993–2002	2.36	0.44	1	10.59 (4.49–24.95)	0.00	5.15	0.99	1	16.24 (5.38–48.96)	0.00
Sexual victimization										
CRV attendance 2003	1.83	0.35	1	6.26 (3.14–12.45)	0.00	2.31	0.71	1	1.57 (0.49–5.01)	0.44

CRV, Centre for Rape Victims.

in a significant model ($\chi^2 = 34.35$; $df = 4$; $p = 0.00$: Nagelkerke pseudo $R^2 = 0.093$), which was a significant improvement over the previous model ($\Delta\chi^2 = 23.81$; $\Delta df = 1$; $p = 0.00$: $\Delta R^2 = 0.061$). With the addition of the third block that included the sexual victimization variable, the overall model remained significant ($\chi^2 = 55.78$; $df = 5$; $p = 0.00$: Nagelkerke pseudo $R^2 = 0.142$) and was a significant improvement over-improving the previous model ($\Delta\chi^2 = 21.47$; $\Delta df = 1$; $p = 0.00$: $\Delta R^2 = 0.049$).

Discussion

This study aimed to estimate the effect of sexual victimization on receiving a subsequent diagnosis of an anxiety or mood disorder, on the basis of a sample of Danish female victims and a control group matched for age and area of residence. After controlling for demographic variables and a previous diagnosis, the measure of sexual victimization indicated a significant increased likelihood of a diagnosis of an anxiety, but not a mood disorder.

That sexual victimization predicted a diagnosis of an anxiety disorder is consistent with the extant research literature. As noted in the Introduction, a range of anxiety disorders, in particular PTSD, have been identified as sequelae of sexual trauma. Sexual victimization increased the likelihood of diagnosis of an anxiety disorder by over six times and this is higher than the effects reported for PTSD specifically (Darves-Bornoz *et al.* 2008; Bronner *et al.* 2009). This is expected as it is likely that the anxiety diagnoses captured disorders other than PTSD. This confirms the previous findings that were based on retrospective self-reported accounts of sexual trauma, that used non-clinician-based diagnosis, and that did not control for previous diagnosis.

Reviews of the research literature on psychological interventions for trauma-related experiences have consistently shown significant efficacy (Bradley *et al.* 2005; Taylor & Harvey, 2009). Wider use of such interventions may reduce the necessity for psychiatric care.

High rates of depression have been reported in cases of interpersonal (Kessler, 1995; Boudreaux *et al.* 1998) and the bivariate analysis (Table 1) supported this. However, the association between sexual victimization and a diagnosis of a mood disorder was not significant in this study, when the other background variables and previous diagnoses were controlled for in the multivariate model. One explanation for this is that previous research has identified levels of depression based on self-reported symptoms and these have produced false positive 'diagnoses'. However, given the high levels of co-morbidity of depression with PTSD (Nishith *et al.* 2005; Beck *et al.* 2009), it is also possible that a hierarchical approach to diagnosis has been adopted and the anxiety disorder has been the primary diagnosis, or that PTSD also captures depressive symptomology (Elklit & Shevlin, 2007; Simms *et al.* 2002).

This study had a number of limitations. First, there are a number of other social and genetic risk factors for anxiety and mood disorders that were not controlled for in this study and these may correlate with age. Second, the study did not control for child sexual abuse or neglect, which is known to predict poor subsequent psychological status. Early adversity of children also predicts adult sexual victimization (Siegel & Williams, 2003). The context of reporting to the CRV is not described, but this would be an important aspect of future research. Failing to control for these variables may have increased the observed effect. The design of the study also meant that the

status of cases and controls could not be unequivocally established; there was no independent verification that the cases had actually been subjected to an attempted or completed rape, and not all women who experience sexual victimization will have attended the CRV. This means that the sample may not be representative of all victims of rape. In addition, experiencing symptoms of anxiety may have made some victims more likely to report to the CRV, thereby increasing the observed statistical association. Furthermore, details of the nature of the assaults and the degree of physical force or the type of assailant are unknown. Finally, although the diagnoses were clinician based, there was no indication of how standardized the assessments were.

In conclusion, this study has found that sexual victimization significantly increases the likelihood of a diagnosis of an anxiety but not mood disorder. On this basis, there may be an important role for public health agencies in promoting an increase in the awareness of the mental health consequences of sexual trauma and encouraging the uptake of psychological and psychiatric services. This study used a robust case-control design and controlled for demographic variables and pre-victimization psychiatric history. In addition, objective measures of sexual victimization and psychiatric assessment were used.

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