Forced Sex: A Critical Factor in the Sleep Difficulties of Young Australian Women

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Abstract

The prevalence of forced sex and its contribution to sleep difficulties among young Australian women aged 24- 30 years (n=9061) was examined using data from the 2003 Australian Longitudinal Study of Women's Health. The lifetime prevalence of reported forced sex was 8.7%. Significantly higher levels of recurrent sleep difficulties, prescription sleep medication, clinical depression, anxiety disorder, self harm and substance use, as well as lower socio-economic (SES) indicators, were reported by the forced sex group compared to the no forced sex group. Hierarchical logistic regression revealed the high odds (OR=1.95, CI=1.66-2.26) of recurrent sleep difficulty in such women becomes partially attenuated, but remains statistically significant, after adjusting for key psychological, SES and behavioral variables. Clinical implications for primary care providers and sleep specialists are discussed.

Sleep difficulties are highly prevalent and affect more than 30% of those seeking primary health care (Kushida et al, 2005). They negatively impact on the way a person feels and functions (Dinges et al, 1997) and make a significant contribution to accidents, health care costs and problems at work (Roth, 2005).

Sleep difficulties occur more often in women than in men (Akerstedt, Fredlund, Gillberg & Jansson, 2002). A meta analysis of 29 studies found that compared with men, women face an increased risk of insomnia (1.41:1) (Zhang & Wing, 2006) and this risk appears to increase with age (Byles, Mishra, Harris & Nair, 2003). The gender disparity in the prevalence of sleep problems is also found in common mental disorders (Astbury, 2001).

Previous research has focussed on identifying the factors that explain the gender difference in sleep disorders. To date, research has been conducted into hormonal and physiological differences including the role of oestrogen in sleep changes (Dzaga et al, 2005) the influence of the menstrual cycle, oral contraceptive use, pregnancy, the postpartum and menopause on sleep (Moline, Broch & Zak, 2004). The relationship between the psychological disorders in which women predominate and sleep problems has also been investigated (Piccinelli & Wilkinson, 2000).

Most recently, socioeconomic differences between men and women have been examined as a potential source of the gender disparity in sleep disorders. An analysis of data from the British Psychiatric Morbidity Survey 2000 (Arber, Bote & Meadows, 2009), revealed gender differences in sleep problems were halved once statistical adjustment was made for socio economic differences between men and women. Although this research took the

contribution of depression to sleep problems into account, it did not consider sexual violence as a predictor. Yet survivors of sexual violence appear to be a high risk group for developing sleep difficulties.

Overlooking sexual violence as a potentially significant predictor of such problems may be an important omission in any attempt to develop an explanatory model of the sleep problems of younger women in particular. This is because, first, younger age is an established risk factor for sexual violence and young women are disproportionately exposed to the risk of sexual violence compared with older women and with men (Jewkes, Sen & Garcia- Moreno, 2002). Second, clinical research on help seeking survivors of sexual violence has established that exposure to the trauma associated with sexual violence predicts both sleep problems and high levels of co morbid depression, anxiety, suicidality and PTSD (Krakow et al, 2000; Krakow et al, 2001) and substance abuse (Kilpatrick et al, 2003). Third, alcohol, tobacco and illicit drug use are more common in women who have experienced sexual violence that is co morbid with depression and PTSD (Nishith, Resick & Mueser, 2001). Finally, while depression and substance use disorder are well established as predictors of poor sleep, their linkages with sexual violence and the specific role of such violence as an independent predictor of poor sleep, have not been investigated in a large, community based, representative sample of young women.

Indeed, most of the existing research into the relationship between sexual violence and sleep problems in women is affected by selection bias in that it has relied on small, clinical samples of help seeking victim/survivors and has not controlled for socioeconomic characteristics (Harvey, Jones & Schmidt, 2003). A population based study is needed to determine the extent to which sexual violence is associated with sleep difficulties in a representative sample

of young women, once the contribution of previously established risk factors has been assessed and statistically controlled for in analysis. Established risk factors include depression and anxiety (Krakow et al, 2000), high risk health behaviours (Nishith, Resick & Mueser, 2001; Burke et al, 2008) and low socioeconomic status (Arber et al, 2009). It is also important to examine potential risk factors for poor sleep, such as deliberate self harm, that is specifically associated with sexual violence (Campbell, Keegan, Cybulska & Forster, 2007). Women raped before the age of 16 are three to four times more likely to attempt suicide than those assaulted at older ages (Davidson, Hughes, George & Blazer, 1996). Nevertheless, the relationship between self harm and sleep difficulties has not been investigated previously.

The current study sought to respond to this need by addressing five research questions:

1. What is the lifetime prevalence of forced sex in a nationally representative community sample of young Australian women?
2. Do young women who report forced sex differ from their non abused counterparts with regard to a range of sleep difficulties reported over the past year, the past month and the past week?
3. What is the patterning of self reported sleep problems and forced sex in relation to measures of socio economic status?
4. Are certain psychological and behavioural risk factors reported more by the forced sex group compared to the no forced sex group?
5. To what extent does forced sex make an independent contribution to recurrent sleeping difficulty after adjusting for, and relative to, selected socio-economic, psychological and behavioural factors (where such factors have been shown to have a significant relationship with forced sex from Q3 and Q4 above).

Data and Methods

The Australian Longitudinal Study of Women's Health (ALSWH) has been described in detail elsewhere (Lee et al, 2005). Briefly, the study involves three age cohorts of women, young, middle aged and older, who are being followed longitudinally over at least 20 years. When the study began in 1996, the three cohorts were aged 18-23 years (the 1973-1978 cohort), 45-50 years (the 1946-1951 cohort) and 70-75 years (the 1921-1926 cohort) respectively.

The participants in the ALSWH are broadly representative of the Australian population although women from rural and remote areas were sampled at twice the rate of women in urban areas and immigrant women are underrepresented while tertiary educated women are overrepresented (Lee et al, 2005). Participants respond to mailed surveys on multiple dimensions of their health including physical and emotional health, socio demographic position, health service use, time use, health behaviours, life events including gender based violence, diet, exercise and other variables designed to build a comprehensive view of women's health in its social context. The project has ethics approval from the Human Research Ethics Committees at the Universities of Newcastle and Queensland, Australia.

The current study undertook a cross sectional analysis of data relating to young women born between 1973-1978 who participated in Survey 3 of the ALSWH, conducted in 2003. By Survey 3, 9074 participants remained in the sample, representing a retention rate of 64% of the 14,247 women who participated in Survey 1, 1996. The retention rate between survey 2 and 3 was 94%. The questionnaire, comprised 525 items on diverse aspects of women's health and well being including various kinds of sleep difficulties measured over three

different time frames in Survey 3, namely, in the last 12 months, in the past month and in the last week.

Measures

Sleep difficulty

Last 12 months.

Participants were asked whether they had experienced 'Difficulty sleeping' or 'Severe tiredness' over the last 12 months. 'Severe tiredness' was included in the analyses presented here because of its likely relationship with sleep difficulty. Both variables were rated on a four point scale ranging from 'No' to 'Often'.

Past month

Three questions were asked about sleep and sleep medication in the past month, namely 'Have you been sleeping poorly? , 'Have you had difficulty falling asleep? And 'Have you used prescription medication to help you sleep. These variables were rated as either 'Yes' or 'No'.

Last week

Participants were also asked to rate the statement 'My sleep was restless' for the 'last week' using a 4 point scale from 'Rarely or none of the time' to 'Most or all of the time'

Variables that were rated on a four point scale (difficulty sleeping and severe tiredness over the last 12 months and restless sleep in the last week) were converted to dichotomous variables for the analyses shown in Table 1.

Sexual violence

Forced into unwanted sexual activity

Participants were asked if they had been 'forced into unwanted sexual activity' in 'the last 12 months' and/or 'More than 12 months ago'. Positive responses to these questions were summed to create a new variable 'Ever forced sex' to provide an estimate of the lifetime prevalence of forced sex in this population of younger women.

Psychological variables

Multiple questions on mental health and well being were included in the survey. Given that the questionnaire relied on self report, it was decided to utilise the measures of depression and anxiety that most closely aligned with a likely clinical diagnosis of depression and anxiety disorder. Consequently, variables chosen for the current analysis were derived from the following question: 'In the last 3 years have you been diagnosed or treated for…….Postnatal depression, Depression and Anxiety disorder.' No measure of PTSD was used in Survey 3 of the ALSWH. A third psychological variable that relied on self report was taken from the question 'Have you ever deliberately harmed or hurt yourself?' because of the reported association between sexual violence and deliberate self harm (Campbell et al, 2007).

High risk health behaviours

Three high risk health behaviours relating to illicit drug, tobacco and alcohol use were included in the analysis.

Participants were asked: 'Have you ever used illicit drugs?'

For tobacco use, participants were asked 7 questions on different aspects of smoking. From the responses to these questions the ALSWH then developed a 5 point scale that ranged from 'never smoked' to 'smokes more than 20 cigarettes a day'. Similarly, participants were asked 3 questions on alcohol use. Responses to these questions were used to develop a single 5 category classification of alcohol consumption, based on the recommendations of the

Australian National Health and Medical Research Council and ranged from 'low risk drinker' to 'high risk drinker'.

For the analyses reported here, the two point (yes/no) measure of ever having used illicit drugs was retained. However, the 5 point measure of tobacco use was re coded to form 3 groups, namely, 'never or ex smoker', 'less than 10 cigarettes a day' and 'more than 10 cigarettes a day' and the measure of alcohol consumption was re coded to form 2 groups, namely, 'non / low risk drinker' and 'risky/high risk drinker', defined as drinking 3 or more standard drinks a day.

Socio demographic and socio economic characteristics

Five socio demographic variables reflecting marital status, education, occupation, women's personal income and adequacy of income, were analysed. Most of these variables were also re coded to provide fewer, more meaningful, response categories for the purpose of analysis. Participants were asked 'What is your present marital status?. Six response categories were provided ranging from 'Never married' to Widowed'. In the current analyses, this variable was recoded to include 3 categories, namely, 'never married', 'widowed/separated/divorced' and 'married/de facto'. The question on education asked 'What is the highest qualification you have completed' and included 7 responses ranging from 'No formal qualifications' to 'Higher university degree'. This variable was re coded to provide 3 categories including ' no formal educational qualification or less than year 10 in secondary school',' Year 12 at high school or equivalent'; and 'university degree or higher degree'. Similarly, the 10 responses provided in response to the prompt 'We would like to know your main occupation now' were re coded into four 4 groups: Managerial or Professional; Associate Professional or equivalent; Trade/clerical or service workers; and labouring or related workers. For the measure of

personal income, participants were asked “What is the average gross (before tax) income that you receive each week, including pensions, allowances and financial support from parents?’. Here 11 response categories were re coded into 4 categories with the lowest income group defined as earning between 0 to $A6,239 and the highest group earning between $A52,000-$78,000 or more a year. The final measure of socioeconomic position was on the adequacy of one’s income. Participants were asked ‘How do you manage on the income you have available’. The 4 possible responses ranged from ‘It is impossible’ to ‘It is easy’ and were re coded to form variable that combined responses into two groups, ‘Easy or not too bad’, and ‘Difficult or impossible’.

Statistical analysis

Statistical analyses were performed using SPSS (version 13, SPSS, Inc, Chicago, IL). Statistical tests used 0.05 (2 tailed) significance levels. Table 1 shows the unadjusted odds ratios relating to the proportions of women with reported forced sex compared with their non abused counterparts in relation to a range of sleep difficulties over 3 different time periods. Chi Squared probability values are reported in Table 2 that presents findings on the relationship between socioeconomic variables, forced sex and sleeping difficulty in the past year. Table 3 reveals the relationships between a range of psychological and behavioural predictors of recurrent sleeping difficulty over the past year. Table 4 presents findings from a Hierarchical Logistic Regression analysis to test an explanatory model of sleep difficulties in young women. This used predictors of recurrent sleep difficulty that emerged as significant from the previous analyses. Checks were performed to ensure there was no significant multicollinearity between variables in the models used in the Hierarchical Logistic Regression analysis. All standard errors for the b coefficients were found to be less than 2. The preferred case to variable ratio of 20 to 1 was more than satisfied as the case to variable

ratio in the Hierarchical Logistic Regression analysis was 685 to 1 (8219/12). Adjusted odds ratios are presented in Table 4 to permit the strength and precision of the relationships to be assessed.

Results

Response rate

For Survey 3, 64.3% of eligible women (9074/14,114) completed the mailed survey. The sub set of variables used for the analyses reported here resulted in a sample of 9061 women, although there is some variation in sample size across different analyses.

Sample characteristics

The mean age of participants was 27.14 years (sd=1.45) and an age range from 24 to 30 years. There was no significant age difference between women who reported forced sex (27.13 years, sd=1.45) and those who did not (28.18 years, sd=1.46). The majority, 61.4% (5530/9009) was partnered, either married or de facto, 34.9% (3140/9009) had never married and 3.8% (339/9009) were separated, widowed or divorced. University educated women were overrepresented in the sample and comprised 39.2% (3466/8831) of the total sample while 59.5% (5254/8831) had completed Year 12 or undertaken a trade or certificate level qualification. Only 1.3% (111/8831) reported no formal educational qualification or had not completed secondary schooling. With regard to occupation, 37.1% (3315/8946) were working in managerial or professional positions, 22.4% (2004/8946) in associate professional jobs, 18.0% (1611/8946) in intermediate or elementary level clerical, sales, service or transport jobs and the smallest proportion, 3.3% (295/8946) in labouring or related work while 19.2% (1721/8946) reported they had no paid job. The majority of women (54.8%) earned more than $A26,000 annually but a small number (5.5%) reported that they had no

personal income. The largest proportion of women, 60.3% (5331/8848) lived in urban areas, 35.9% (3178/8848) lived in rural areas and 3.8% (339/8848) lived in remote areas.

Lifetime prevalence of sexual violence

Of the 9043 participants who responded to both questions on forced sex, thus permitting the calculation of an estimate of forced sex 'ever', 9.3% (841/9043) reported at least one experience of forced sex. Due to the over sampling or women living in rural and remote areas, an area weighting variable was used to adjust for this and provide a more accurate prevalence rate for the general population. The application of the weighting variable resulted in a sample of 8282 women and an estimated lifetime prevalence of forced sex of 8.7%. Weighting was only used for the estimate of lifetime prevalence of sexual violence. For all other analyses, the total non weighted sample of women (n=9043) was utilized.

Sexual violence rarely occurred in isolation and 56.8% of those who reported forced sex (478/841) also reported having experienced physical violence defined as having ever been pushed, shoved or hit.

Table 1

Proportion of young women reporting sleep problems over 3 time periods by forced sex (Insert here)

Table 1 shows that women who reported forced sex were significantly more likely to report all forms of sleeping difficulties over all three time periods: in the past 12 months, past month, and past week. Unadjusted odds ratios revealed that relative to women who did not report forced sex, women who reported forced sex were significantly more likely to have

experienced sleeping difficulties (45% vs 30%) and severe tiredness (58% vs 43%) over the past 12 months. In the month before completing the survey, those who reported forced sex were significantly more likely to report sleeping poorly (63% vs 49%), to have difficulty falling asleep (58% vs 42%) and to be using prescription sleep medication. In the previous week, those who reported forced sex ever were also significantly more likely to report their sleep was restless (39% vs 25%). These results indicate that forced sex is associated with an increased vulnerability to a range of sleep problems that span the previous 12 months, up to and including the past week. In all subsequent analyses, difficulty sleeping in the past 12 months, will be used as the indicator of sleep problems because it represents the only measure of recurrent, long term sleep difficulties contained in the ALSWH survey.

Table 2

Socioeconomic characteristics by forced sex and sleep difficulties in the last 12 months amongst young Australian women, Survey 3 of the ALSWH, 2003 (Insert here)

Table 2 shows the patterning of socioeconomic characteristics in two groups, namely the forced sex group and the sleep difficulties group. Overall, 9.3% of the unweighted sample reported forced sex and 31.5% reported sleep difficulties in the past 12 months. In both groups , women who reported forced sex or recurrent sleep difficulties shared similar socioeconomic and demographic profiles and differed significantly in a number of ways from women who reported neither forced sex nor sleep difficulties. Statistically significant differences between women who reported forced sex or sleeping difficulties in the past year and those who did not were found for marital status, educational level, occupation, income and perceived ability to manage on income but not for age or area of residence. Most of the differences indicated that women who reported forced sex or sleep difficulties experienced

greater socioeconomic disadvantage, with the exception of the higher proportion of women in both groups who had completed university or higher degrees. The marked similarity in the pattern of their socioeconomic profile of the two groups (forced sex and sleep difficulties) suggests a high level of overlap between the groups. This relationship is explored further in the analyses that follow.

Table 3

Proportion of young women reporting sleeping difficulty in the past 12 months by psychological and behavioural variables and forced sex

(Insert here)

Table 3 presents unadjusted odds ratios and indicates that higher proportions of women who reported forced sex compared with those who did not also had higher rates of poor psychological health on three measures. Women who reported forced sex were significantly more likely to report having been diagnosed or treated for depression (26% and 11%), anxiety (12% and 5%) in the past three years and to have deliberately hurt or harmed themselves (10% and 2%). An additional psychological measure, post natal depression (PND), yielded no difference between the two groups of women (3% and 3%) but given the small proportion of women who had given birth by the time of the survey, the impact of sexual violence on post natal depression could not be reliably ascertained. Significant differences between the forced sex and no forced sex groups were found on several behavioral variables (Table 3). The abused group was more likely to have used illicit drugs (82% and 60%), to drink alcohol at risky levels (defined as 3 or more standard drinks a day) (37% and 30%) and to be a current smoker (41% and 23%).

Table 4 Insert here

Adjusted odds ratios of recurrent sleep difficulties in the past 12 months (n=8219)

The final research question is now addressed, whether forced sex makes an independent contribution to the dependent variable, sleeping difficulty in the past 12 months, after adjusting for previously established predictors of poor sleep (Table 4, n = 8219). The order of variables entered into the models reflects an a priori judgement of the primary causal ordering between variables. Only variables that were statistically significant in the bivariate analyses shown in Tables 2 and 3 are entered into the hierarchical logistic regression. Forced sex is assumed to exert an independent effect on sleep difficulties (Model 1), to be associated with and mediated by poor psychological health (depression, anxiety disorder and self harm) (Model 2), socioeconomic position (marital status, educational level, occupational level, personal income and perceived ability to manage on one's income) (Model 3) and behavioural risk factors including tobacco, alcohol and illicit drug use (Model 4).

The high odds (OR=1.95) of reported recurrent sleep difficulties amongst women who report forced sex as shown in Model 1 become partially attenuated (OR=1.63) after adjusting for depression, anxiety and self harm (Model 2) and certain socioeconomic variables (OR=1.52) such as being more likely not to have a partner, less likely work in associate professional roles and more likely to find it difficult or impossible to manage on their incomes (Model 3). The addition of substance use in the fully adjusted model (Model 4) further reduces the odds ratio (OR= 1.48) for the forced sex variable. Despite a decrease in the odds ratio, forced sex remains a significant predictor of recurrent sleep difficulties in the past 12 months, in all models including the final fully adjusted model.

The adjusted odds ratios (AOR) associated with psychological and socioeconomic predictors remain almost unchanged from Model 3 to Model 4. For example, the odds for depression decrease from AOR= 2.03 in Model 3 to AOR= 2.01 in Model 4. Women who report depression, anxiety and self harm have significantly increased odds of reporting recurrent sleep difficulties in all models including the fully adjusted model (Model 4). Like forced sex, the AOR's for the three psychological variables decrease once statistical adjustment is made for socioeconomic variables (Model 3) and remain largely unchanged after adjusting for illicit drug use (Model 4). Of the three psychological variables, depression is associated with the highest odds of reporting sleep difficulties in the final model (OR=2.01), followed by self harm (OR=1.65) and anxiety (OR=1.60).

The overall predictive power of the models can be assessed by comparing the change in Log likelihood ratios and the Nagelkerke R^2 (or 'pseudo' R^2). Forced sex has limited predictive power (R^2 =0.013), which increases markedly when depression, self harm and anxiety are added (R^2 =0.054) and socioeconomic variables are added (R^2 = 0.076) but only marginally when substance use variables are included (R^2 =0.077). The largest contributions to increases in explained variance in sleep difficulties occurred when psychological variables were added in Model 2 (from 1.3% to 5.4%) followed by socioeconomic variables in Model 3 (from 5.4% to 7.6%). This suggests that the higher level of recurrent sleep difficulties experienced by women who report forced sex compared with their unaffected peers might be explained by the significant relationship between forced sex and depression, anxiety and self harm and to a lesser extent by the more disadvantaged socio economic circumstances that characterize women who have experienced forced sex.

Discussion

This analysis of an Australian survey of over 9, 000 young Australian women aged between 25 and 30 years has yielded a lifetime prevalence rate of forced sex of 8.7% (adjusted to be nationally representative). This rate is lower than that reported in both the Australian Personal Safety Survey (ABS, 2006) and the United States National Violence Against Women Survey (NVAW) (Tjaden & Thoennes, 1998) that reported rates of 17% and 18% respectively. The likely reason for the lower prevalence rate in the current study is that the 'lifetime' of participants only extended to the age of 30 years, compared with the other two studies that included women 18 years and older, with no upper age limit, thus covering a much broader span of the life course. In the NVAW survey, 45% of all sexual assaults were perpetrated against women who were 18 years of age or older (Tjaden & Thoennes, 1998).

This study is the first to show that young women who report having experienced forced sex are almost 50% more likely to report sleeping difficulty over the previous 12 months and well over twice as likely to be taking prescription sleep medication. The significant link between forced sex and recurrent sleep difficulties remained significant after adjusting for measures of psychological distress, socioeconomic disadvantage and substance use. The results confirm the existence of complex, confounding relationships. The findings allow the development of a hierarchy, whereby psychological risk factors are the most important, reducing the strength of the relationship between forced sex and recurrent sleep difficulties by 32%. The addition of socioeconomic risk factors reduces the odds by a further 11% and when illicit drug use is added in the final model, the odds decrease by another 4%.

In the final, fully adjusted regression model, the four variables with the highest odds ratios (and all highly significant) were depression, deliberate self harm, and forced sex. While

depression and anxiety are well established as independent predictors of difficulty sleeping (Manber and Chambers, 2009; Taylor et al 2005), the strong contribution of deliberate self harm (ever) and sexual violence (ever) to poor sleep in young women has, to our knowledge, not previously been documented in a population based study. The unique contribution of this study lies especially in three outcomes; (i) the documentation of the prevalence rate of forced sex in a national sample of young women, (ii) the demonstrated increase in recurrent sleep problems in these abused women and (iii) the fact that forced sex and deliberate self harm make independent contributions to sleeping difficulties, even when a range of other significant and influential factors are controlled. These outcomes suggest that any explanatory model of sleeping difficulties in women, and especially young women who are more at risk of sexual violence, should not overlook the potential role of a history of forced sex (and/or deliberate self harm). The strong connections between the latter two variables have been previously documented (Campbell et al, 2007).

The strongest socioeconomic risk factor for recurrent sleep difficulties, and one that remained highly significant in the final model, was the subjective measure of how one was managing on one's income. Women who reported it was difficult or impossible to manage on their income were almost 50% more likely to have recurrent sleep problems than those who reported it was relatively easy to manage on their income. This suggests that money worries make an important, independent contribution to recurrent sleep difficulties. The contribution of socioeconomic disadvantage to recurrent sleep difficulties in the current study is significantly lower than that found in the study by Arber et al (2009) where socioeconomic factors halved the odds associated with the relationship between gender and sleep problems. The two studies differ in several, important ways. These include differences in the age ranges of the two samples and the fact that the British study was focussed on explaining the role of

gender differences in sleep problems, while the current study was focussed on the role of forced sex in recurrent sleep difficulties. The British study did not include any measure of forced sex. Both studies did, however, include measures of psychological health. While illicit drug use made a small but significant contribution to recurrent sleep difficulties in the fully adjusted model this was not the case for either tobacco or alcohol use. This outcome contrasts with the findings of previous studies (Kilpatrick, Ruggiero, Acierno, Saunders, Resnick & Best, 2003; Nishith, Resick & Mueser, 2001).

Limitations

The cross sectional nature of the data used in the analyses indicates that it cannot be established that the relationship between forced sex and recurrent sleep difficulties is a causal one. This is further called into question because the measures of depression and anxiety used in the analyses relate to the previous 3 years while the main measure of sleep relates to the previous year. There is no question in the survey relating to sleep difficulties that had lasted longer than 12 months. In addition, only one of the questions on forced sex related to the past 12 months with the other relating to an unspecified period of time prior to the past 12 months. This implies that an unknown number of women who reported they were forced into unwanted sexual activity may have experienced childhood sexual abuse rather than adult sexual assault. It is impossible to know how long before the possible onset of depression, anxiety, self harm and sleep difficulties, the experience of being forced into unwanted sexual activity occurred for women who reported that forced sex occurred longer than a year previously. A well designed prospective, longitudinal study would help disentangle these relationships and elucidate the temporal sequence between them.

A further limitation is that all the data is based on self report and that there is no way of knowing what the relationship is between reported sleep difficulties and clinically meaningful insomnia, meeting established criteria such as those contained in the International Classification of Sleep Disorders (ICSD, 2005). Furthermore, questions designed to elicit any evidence of post traumatic stress disorder would have added to the interpretation of the sexual violence data. Response bias (e.g. 'complainers' or 'strugglers') cannot be ruled out. However, the large sample size and the excellent response rate for a postal survey (64%, with 21% of the non-responders being uncontactable) argue in favor of validity.

Clinical implications

These findings suggest that it would be beneficial for primary health care providers to make a careful assessment of any history of sexual violence when young women seek help for recurrent sleep difficulties. A number of studies show that women do not mind being asked about violence including during pregnancy (Webster, Stratigos & Grimes, 2001) and most regard such questioning as relevant to their health (Taket, Nurse, Smith, Watson, Shakespeare, Lavis et al, 2003; Koziol-McLain, Giddings, Rameka & Fyfe, 2008). However, questioning about sexual and other forms of interpersonal violence demands care and sensitivity.

Women want health professionals to be non judgemental, nondirective, to individually tailor their interventions and appreciate the complexity of the effects of violence on their lives (Feder, Hutson, Ramsay & Taket, 2006). Information gained from sensitive questioning allows meaningful connections to be drawn between diverse, disturbing health conditions and harmful health behaviours that may, previously, have eluded survivors. The strong associations between poor sleep, forced sex and a diversity of psychological, socioeconomic

and behavioural factors shown in this paper further illustrate the need for health care professionals to respond to the full complexity of survivors' health concerns. Early disclosure of a history of sexual abuse is a critical first step in assisting women to understand why their health problems have occurred and to participate in decisions with their health care providers to tailor an intervention that is designed to ameliorate the entire cluster of negative health outcomes in which their sleep problems are enmeshed. It is highly unlikely that the sleep difficulties associated with sexual violence will resolve without specific, trauma focussed treatment. In one study, survivors' sleep problems had lasted for an average of 20 years and had not responded to psychotropic medications or psychotherapy (Krakow, Melendrez, Johnston, Warner et al, 2002).

It is vital that there is good communication between primary health care providers and any sleep specialist that a person may be referred to for assistance. Thus the possible implications of any trauma can be considered and decisions made as a consequence. For example, a group cognitive behavioural program (CBT) for insomnia may be inappropriate for a sexual abuse victim, especially in a group that includes males. Behavioural sleep specialists should, from the first consultation, provide a supportive environment that encourages disclosure of difficult life events and ask about a history of possible trauma. Implementation of a standard CBT program for insomnia in the absence of a good understanding of key relevant issues may not be useful. While such programs have very good success rates they often have difficulty achieving better sleep outcomes for about a third of their clients (Morin, Bootzin, Buysse et al. 2006). Further research is needed to determine whether survivors of sexual violence are overrepresented amongst this group. The therapeutic work of Krakow and colleagues (Krakow et al, 2000; Krakow et al, 2001) demonstrates the value of sleep and trauma specific interventions for survivors of sexual violence.

Summary

About 9% of young women reported that they have been forced into unwanted sexual activity and they faced significantly increased odds of experiencing sleep difficulties compared with peers who have never experienced forced sex. Moreover, the contribution of forced sex to recurrent sleep difficulty in the past 12 months remained significant even after controlling for previously established risk factors for poor sleep.

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Table 1. Proportion of younger women in the ALSWH, Survey 3, reporting sleep problems over 3 time periods by forced sex

	Total	Not forced		Forced sex		Unadjusted OR	95%CI
		%	n	%	n		
Past 12 months							
Recurrent sleep difficulty	9019						
No		69.80%	5713	54.80%	460		
Yes		30.20%	2466	45.20%	380	1.91	1.66-2.21***
Recurrent severe tiredness	9019						
No		51.00%	4153	36.60%	306		
Yes		43.30%	3541	57.00%	479	1.73	1.51-2.01***
Past month							
Sleeping poorly	8972						
No		51.00%	4153	36.60%	306		
Yes		49.00%	3983	63.40%	530	1.80	1.56-2.09***
Difficulty falling asleep	9006						
No		57.60%	4703	41.50%	348		
Yes		42.40%	3464	58.50%	491	1.92	1.66-2.21***
Prescription sleep medication	8834						
No		97.70%	7824	94.60%	784		
Yes		2.30%	181	5.40%	45	2.48	1.77-3.46***
Past week							
Sleep restless	8927						
No		42.60%	3448	29.00%	242		
Yes		57.40%	4644	71.00%	593	1.87	1.62-2.17***

***p<0.001.

Table 2. Socioeconomic characteristics by forced sex and sleeping difficulty in last 12 months amongst young Australian women, Survey 3 of the ALSWH, 2003

Variable	Forced into unwanted sexual activity					Sleeping difficulty in the last 12 months				
	% Not Not forced	N	% Forced	N	Total	% No Sleep difficulty	N	% Sleep Difficulty	N	Total
Total	90.70%	8202	9.30%	841	9043	68.50%	6163	31.5	2838	9001
Marital status ***	90.70%	8171	9.30%	838	9009	68.50%	6163	31.5	2838	9001
1.Never married	34.50%	2819	38.30%	321		33.90%	2087	37.20%	1056	
2..Wid/sep/divorced	3.40%	275	7.60%	64		2.90%	179	5.60%	160	
3. Married/De facto	62.10%	5077	54.10%	453		63.20%	3897	57.20%	1622	
p=			0.000					0.000		
Age	91.40%	7332	8.60%	686	8018	70.20%	5620	29.80%	2391	8011
< 27	56.90%	4175	55.20%	379		58.40%	3282	53.10%	1269	
>27	43.10%	3157	44.80%	307		41.60%	2338	46.90%	1122	
ns										
Highest educational qualification *	90.70%	8010	9.30%	821	8831	68.60%	6054	31.40%	2771	8825
1. None or Year 10	1.20%	94	2.10%	17		1.10%	65	1.70%	45	
2. Year 12 or equivalent	59.80%	4789	56.60%	465		60.80%	3681	56.50%	1567	
3. University degree or higher	39.00%	3127	41.30%	339		38.10%	2308	41.80%	1157	
p=			0.050					0.000		
Occupation ***	90.80%	8111	9.20%	821	8932	68.50%	6112	31.50%	2810	8922
1.Manager/Professional	37.70%	3060	30.60%	251		39.70%	2426	31.30%	880	
2.Associate professional	22.20%	1799	24.20%	200		22.40%	1371	22.30%	627	
3.Trade/clerical/service worker	18.10%	1470	17.10%	140		17.3	1055	19.70%	553	
4.Labour or related or no paid job	22.00%	1782	28.00%	230		20.60%	1260	26.70%	750	
p=				0.000				0.000		
Personal Income ***	90.50%	7618	9.50%	797	8415	68.70%	5777	31.30%	2630	8407
None or < $6239	13.50%	1030	13.30%	106		12.90%	745	14.70%	387	
$6,240-$25,999	26.80%	2045	35.10%	280		25.80%	1488	31.70%	833	
$26,000-$51,999	46.10%	3514	41.50%	331		46.90%	2707	43.20%	1137	
$52,000-$78,000 or more	13.50%	1029	10.00%	80		14.50%	837	10.40%	273	
p=			0.000					0.000		
Manage on Income ***	90.70%	8159	9.30%	840	8999	68.50%	6157	31.50%	2835	8992
Not too bad or easy to manage	59.40%	4849	43.60%	366		62.50%	3847	48.10%	1364	
Difficult or impossible	40.60%	3310	56.40%	474		37.50%	2310	51.90%	1471	
p=			0.000					0.000		
Area of residence	90.70%	8026	9.30%	822	8848	68.50%	6055	31.50%	2783	8838
Urban	60.30%	4836	60.20%	495		60.60%	3669	59.40%	1652	
Rural	35.90%	2878	36.50%	300		35.40%	2146	37	1032	
Remote	3.50%	312	3.30%	27		4.00%	240	3.60%	99	
ns										

p<0.05. **p<0.01. ***p<0.001.

Table 3. Proportion of younger women in the ALSWH, Survey 3, reporting psychological and behavioural risks by forced sex

	Total	Not forced		Forced		Unadjusted	95% CI
		%	n	%	n	OR	
Psychological risks							
Postnatal depression	8899						
No		97.20%	7844	97.00%	807		
Yes		2.80%	223	3.00%	25		
					ns	1.09	0.71-1.68
Depression	8899						
No		88.80%	7161	73.80%	614		
Yes		11.20%	906	26.20%	218		
						2.31	2.00-2.66 ***
Anxiety disorder	8899						
No		94.50%	7624	87.70%	730		
Yes		5.50%	443	12.30%	102		
						1.61	1.31-1.95 ***
Self harm	9043						
No		97.70%	8013	90.10%	758		
Yes		2.30%	189	9.90%	83		
						1.84	1.42-2.40 ***
Behavioural risks							
Illicit drug use ever	9061						
No		40.10%	3188	18.20%	150		
Yes		59.90%	4761	81.80%	672		
						1.15	1.06-1.32 **
Alcohol use	9061						
Low risk or non drinker		69.70%	5696	63.40%	531		
Risky or high risk drinker		30.30%	2472	36.60%	307		
						1.18	1.05-1.32 **
Tobacco use	9061						
Never smoked or ex smoker		77.10%	6227	58.70%	488		
Up to or more than 10 cigarettes		22.90%	1845	41.30%	344		
						1.18	1.06-1.32 **

** p<0.005. *** p<0.001.

Table 4. Adjusted Odds Ratios for predictors of sleeping difficulty in last year (n=8219)

	Model 1 Forced sex			Model 2 Psychological			Model 3 SES			Model 4 Behavioural		
	OR	95%	CI	OR	95%	CI	OR	95%	CI	OR	95%	CI
Forced sex												
No	1.00			1.00			1.00			1.00		
Yes	1.95	1.67	2.26***	1.63	1.39	1.92***	1.52	1.30	1.78***	1.48	1.26	1.74***
Psychological												
Depression												
No				1.00			1.00			1.00		
Yes				2.24	1.94	2.59***	2.03	1.75	2.35***	2.02	1.74	2.34***
Anxiety												
No				1.00			1.00			1.00		
Yes				1.63	1.33	1.99***	1.61	1.31	1.97***	1.61	1.31	1.97***
Self harm												
No				1.00			1.00			1.00		
Yes				1.75	1.33	2.29***	1.65	1.25	2.18***	1.65	1.25	2.18***
Socio- economic												
Marital status												
Married/de facto							1.00			1.00		
Never married							1.34	1.04	1.73*	1.34	1.04	1.72*
Sep/Wid/Div							0.87	0.78	0.97*	0.87	0.78	0.97
Highest Educational Level												
University degree/higher degree							1.00			1.00		
Less than Year 12							1.03	0.67	1.59	1.04	0.67	1.60
Year 12 or equivalent							0.91	0.82	1.01	0.91	0.83	1.02
Gross Personal Income												
A52,000- $78,000 or higher							1.00			1.00		
A$0-6,239							1.17	0.90	1.52	1.18	0.91	1.54
A$6,240-25,999							1.20	0.94	1.53	1.21	0.95	1.54
A$26,000-51,999							1.15	0.97	1.36	1.15	0.94	1.41
Occupation												
Managerial/Professional							1.00			1.00		
Associate Professional							0.82	0.69	0.97*	0.83	0.69	0.99*
Sales, service worker							0.90	0.75	1.07	0.90	0.75	1.07
Labourer or related work							0.96	0.81	1.13	0.06	0.82	1.13
Manage on Income												
Easy/Not too badly							1.00			1.00		
Difficult/impossible							1.48	1.33	1.64***	1.46	1.32	1.63***
Behavioural												
Smoking												
Never/Ex										1.00		
Up to or more than 10 a day										1..00	0.89	1.13
Alcohol												
Low risk or non drinker										1.00		
Risky or high risk drinker										1.08	0.97	1.21
Illicit Drugs												
No										1.00		
Yes										1.14	1.03	1.27*

* p<0.05. ** p<0.01. ***p<0.001.