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Sleep disruptions and mental health of primary caregivers of persons with disability due to chronic mental and physical conditions in the Australian population

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Abstract

This study aimed to investigate the association between sleep disruption and the general mental health of caregivers of disabled people in Australia. It was hypothesised that greater sleep disruption would be associated with poorer mental health amongst caregivers. The study utilised data obtained from a national health survey of a stratified random sample, with the current sample consisting of 687 people living in a private dwelling who identified themselves as the primary caregiver of a person with a disability. In addition to information regarding their primary recipient of care and the broader impact of their caregiving role, sleep disruptions were assessed by responses to a direct question during a personal structured interview. General mental health of caregivers was assessed using the SF-12v2 Health Survey to classify their mental health to one of four linear categories, ranging from 'severe mental ill-health' to 'excellent mental health'. Data were analysed using multinomial logistic regression to cater for the multiple classifications of the outcome. After adjusting for potential confounding factors, results suggested a significant association between sleep disruptions and poor mental health among caregivers. Those who were frequently disrupted in their sleep were about 2.5 times more likely to experience severe mental ill-health (OR: 2.42, 95% CI = 1.28, 4.54) when compared to those whose sleep was not disrupted at all. There was no significant association between occasional disruptions and mental ill-health after adjusting for potential confounders. Results suggested that sleep disruptions can be considered as a potential risk factor for severe mental ill-health among caregivers.

Keywords

sleep disruption, caregivers, carers, disability, chronic illness, risk and protective factors

Introduction

The impact of caring for a chronically ill person or a person with a disability on the physical and mental health of the caregivers has long been recognised and studied (Baumgarten, 1989; Pinquart & Sörensen, 2003, 2007; Prachakul & Grant, 2003; Pruchno, 1990; Saunders, 2003; Savage & Bailey, 2004; Vitaliano, Zhang &

Scanlan, 2003). On the whole they were significantly depressed, experienced more stress, and had lower self-efficacy than non-caregivers (Pinquart & Sörensen, 2003).

Results from review studies have suggested that sociodemographics, such as gender, lower socioeconomic levels, relationship between caregivers and patients, lack of social support,

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poorer physical health status and risky health behaviours are associated with mental ill-health of caregivers (Connell, Janevic & Gallant, 2001; Cooper, Balamurali & Livingston, 2007; Haley, 2003; Klassen, Raine, Reineking et al., 2007; Savage & Bailey, 2004; Van der Voopt, Goossens, Van der Bijl et al., 2007). For example, in a systematic review of the literature by Savage and Bailey (2004) on the effect of caregiving to the aged and people with disability and mental illness, it was found that, among other factors, an unsatisfactory relationship with the care recipient was detrimental to the mental health of the caregiver (Savage & Bailey, 2004). In a more recent review study, care burden and poorer physical health were associated with higher anxiety levels among caregivers when compared to non-caregivers (Cooper et al., 2007).

Among many caregiving-related health issues, sleep problems have been reported in many studies (Creese, Bédard, Brazil & Chambers, 2007; Flaskerud, Carter & Lee, 2000; Matsuda, Hasebe, Ikehara et al., 1997; McKibbin, Ancoli-Israel, Dimsdale et al., 2005; Meltzer & Mindell, 2006; Tsukasaki, Kido, Makimoto et al., 2006; Wilcox & King, 1999). These problems include night time or early morning waking, difficulties in sleep onset, poor sleep quality, less slow-wave sleep, insomnia, and most commonly, sleep disruptions (Flaskerud et al., 2000; Matsuda et al., 1997; Tsukasaki et al., 2006; Wilcox & King, 1999).

It has been well documented that sleep disruption is a distinctive symptom of some mental illnesses, such as post traumatic stress disorder (Mellman & Hipolito, 2006). It has further been suggested that sleep loss is an important trigger for mania among patients who suffer from bipolar disorder (Umlauf & Shattell, 2005). Moreover, in the DEPRES II study (Depression Research in European Society II), a large scale population-based pan-European survey of depression in the community, it was found that sleep disruption and inadequate sleep were associated with depression among adults in the general community (Tylee, Gastpar, Lépine & Mendlewicz, 1999).

As a potentially biological mechanism, it has been suggested that the association between frequent sleep disruption and mental ill-health

lies in the characteristic of sleep itself, particularly the phase of sleep known as Rapid Eye Movement sleep (REMS). During REMS the brain activity is quite similar to that at the waking stage and neurons in the brain stem are particularly active. It has been established that REMS is associated with depression in humans, where a deprivation in REMS exhibits an antidepressive effect and most antidepressant medications suppress REMS (Thase, 2006). This relationship between REMS and depression is possibly attributable to a neuroanatomical and neurochemical processes (Germain, Buysse & Wood-Nofzinger, 2004). Sleep disruption might interrupt REMS and shorten its duration during normal sleep. However, as REMS is deprived the human body will compensate with a prolonged REMS which is known as a REMS rebound. Frequent sleep disruptions may effect more frequent REMS rebound in those caregivers who are frequently deprived of sleep. Hence a negative effect may be found on the mental health of these caregivers, thereby contributing to mental ill-health.

Sleep disruptions as a risk factor for mental ill-health among caregivers have been suggested previously by two studies. Specifically, the studies found that the quality of sleep was significantly associated with depression among caregivers of cancer patients (Carter & Chang, 2000) as well as patients with Alzheimer's disease (Willette-Murphy, Todero & Yeaworth, 2006). It was also found that undisturbed sleep predicted good mental health among these caregivers. However, both were small scale studies with patients of older ages, and no risk estimates were provided. No report has been explored thus far on the relationship between sleep disruption and the general mental health of caregivers of disabled people of varying age groups.

The aim of this study is to examine the association between sleep disruptions and the general mental health of caregivers of people with disability due to various types of chronic illness across all ages, utilising data obtained from a population-based health survey. It is hypothesised that greater sleep disruption will be associated with poorer mental health amongst caregivers.

Method

Sampling technique

This study analysed data obtained from the Survey of Disability, Ageing and Carers conducted by the Australian Bureau of Statistics (ABS) in 2003. Data were obtained from the ABS with institutional approval for using the data set for the study. Details of the survey methodologies were reported in the information papers published by the ABS (ABS, 2003a, 2003b). The survey was conducted in the period between June and November 2003 and included both urban and rural areas in all states and territories of Australia except remote and sparsely habited areas. The survey included people who lived in both private and non-private dwellings such as boarding houses, and care-accommodations such as retirement villages, but excluded prisons and correctional facilities. The current study focused on caregivers in private dwellings only.

The survey was conducted using randomised multistage sampling techniques, with the type of dwellings used to select the sample. The operational procedures were complex and required lengthy description (see ABS, 2003a for details). A brief summary of the selection of metropolitan-private-dwelling samples is presented here. For the private dwelling selection, each state and territory was first divided into many statistical regions. Metropolitan regions were then subdivided into local government areas, and non-metropolitan regions were divided into major urban, minor urban, or rural areas. Each region consisted of a number of population census collection districts containing on average 250 dwellings. The sample was then selected using the following procedures to ensure each dwelling within the same region had the same probability of selection. First, a sample of collection districts was selected from each region with a probability proportional to the number of dwellings in each district. Second, each selected district was then divided into blocks of similar size, and one block was then selected from each district, also with the probability proportional to the number of dwellings in the block. Third, a random sample was selected from a list of private dwellings located within each of the selected blocks.

Procedure

Data were collected by trained interviewers via computer-aided personal interviews with respondents. In total, the ABS sample contained 14,019 private dwellings. A sub-sample of 687 people identified themselves specifically as being the primary caregivers of disabled persons residing in private dwellings. In addition to demographic information, those who identified as being a caregiver were also asked to provide information on characteristics of the main recipient of care, other factors related to the caring of a disabled person, and an assessment of the caregiver's general health status including their mental health status. Main recipient characteristics included the chronic condition causing the major disability, number of recipients receiving care from the caregiver, duration of care provided by the primary caregiver, relationship of caregiver to the recipient, hours of care provided per week, and disability status of the recipient.

Other factors related to caring included whether the caregiver needed to leave work due to caring, whether the relationship with their spouse/partner was affected by their caregiving role, whether their financial situation was affected, and whether their need for respite was satisfied. Primary caregivers were also asked whether their sleep was interrupted due to their caring role. Response options were 'frequently', 'occasionally', or 'not disrupted at all'.

Instruments

General mental health status of the primary caregivers was assessed using the SF-12v2TM Health Survey (Ware, Kosinski, Turner-Bowker & Gandek, 2005). This measure asks respondents to rate 12 questions about their health in the last four weeks on a 6-point scale. An example question is 'How often did you feel down during the last four weeks?' Scores ranging from 1 (all of the time) to 6 (none of the time) are assigned to each item. Standardised scores were calculated from responses to the survey and aggregated into two summary scores: the physical health and mental health summaries. These two summary scores were then transformed using a norm-based transformation method to produce the t-score with a mean of 50

and a standard deviation of 10, where high scores indicate good general health status (Ware et al., 2005).

Due to the highly skewed distribution of the t-scores (skewness = -0.976, Shapiro-Wilk $W = 0.92$, $p < .001$) and for the ease of analysis, the transformed mental health summary scores were classified into four categories, namely 'severe mental ill-health', 'mild/moderate mental ill-health', 'good mental health' and 'excellent mental health'. The 25th, 50th, and 75th percentiles of the norm for healthy adults without chronic conditions were used as cut-off points. This normative information is provided by Ware et al. (2005), based on data collected from large scale standardisation studies conducted in the United States and other countries.

Data analysis

Data were analysed using the Stata statistical software program (StataCorp, 2005). Since all variables included in the study were categorical by nature, they were analysed accordingly. Bivariate analyses were conducted to examine unadjusted associations between all variables of interest including sleep disruptions and caregivers' mental health status. Chi-squared tests were applied to examine these bivariate relationships. Due to the multiple categories of the outcome variable of mental health status, data were analysed using multinomial logistic regression modelling using the 'excellent' mental health group as the referent group. Hence, the unadjusted Odds Ratio (OR) and the corresponding 95% confidence intervals (95% CI) for each category of mental health status were calculated using multinomial logistic regression procedures.

The adjusted OR were also calculated with adjustment to potential confounding factors identified in the bivariate analyses in this sample as well as those identified in the literature. These factors, such as relationship between caregivers and care recipients and physical ill-health were then included in the multinomial logistic regression analysis. For the inclusion of any variable in the regression model, the criteria of a bivariate association with $p \leq .20$ or any known risk factor for mental ill-health was used. Presentations for all p values were two tailed.

Results

Sample characteristics

The demographic characteristics of the 687 people who identified themselves specifically as being the primary caregivers of disabled persons residing in private dwellings are shown in Table 1. The majority were female (68.3%), married (72.3%) and lived in their own home (67.3%). Thirteen percent were younger than 35 years of age, 47.9% were between 35 and 59 years, and 38.6% were 60 years or older. The majority were Australian born (72.8%), about 10% were born in other English-speaking countries and 16.3% were born in other non-English-speaking countries. Among those who were overseas born, a small proportion migrated to Australia within the last 10 years ($n = 10$, 1.5%). The majority of respondents resided in major cities (61%), had an education level of secondary school or below (60.6%), had a low income level that placed them in the bottom 40th percentile of the cash income for the total sample, and were unemployed or no longer in the work force (68.4%). Approximately one third of respondents reported their physical health to be fair or poor, a third reported good physical health, and a third reported very good or excellent health.

Table 2 shows the characteristics of the main recipients of care, as reported by respondents. The majority had disabilities due to a chronic physical condition (80%), with the remaining having a mental or behavioural disorder. More than half (57.9%) of the recipients of care were classified as having profound disability, and 34.2% were severely disabled. Most caregivers provided care only to one recipient (79.6%), with one third providing care for more than 10 years, 27.2% between 5 and 9 years, and 37.4% for less than 5 years. Nearly half provided care for more than 40 hours per week, a fifth between 20 and 39 hours, and a third for less than 20 hours per week.

Factors related to the caring role

Table 3 show factors relating to the caring of the main recipient. In terms of the exposure variable, namely sleep disruption due to the caring role, 167 (26.1%) reported that they were frequently disrupted, 170 (26.5%) were occasionally disrupted, and 304 (47.4%) were not disrupted at all. Slightly more than one fifth (21.7%) of care-

Table 1. Caregivers' characteristics for whole sample ($N = 687$) and by mental health status (column percentages are shown in parentheses)

Caregivers' characteristics	Whole sample $N = 687$	Mental health status				Chi square
		Severely poor	Mildly/ Moderately poor	Good	Excellent	
Age						
<35 years	93 (13.5)	40 (15.4)	13 (8.7)	16 (16.0)	24 (13.6)	$\chi^2_{(6)} = 13.71,$ $p = .033$
35-59 yrs	329 (47.9)	140 (53.6)	72 (48.3)	43 (43.0)	74 (41.8)	
60 or above	265 (38.6)	81 (31.0)	64 (43.0)	41 (41.0)	79 (44.6)	
Sex						
Female	469 (68.3)	188 (72.0)	98 (65.8)	71 (71.0)	112 (63.3)	$\chi^2_{(3)} = 4.51,$ $p = .211$
Male	218 (31.7)	73 (28.0)	51 (34.2)	29 (29.0)	65 (36.7)	
Marital status						
Divorced/separated/de facto	190 (27.7)	83 (31.8)	38 (25.5)	22 (22.0)	47 (26.6)	$\chi^2_{(3)} = 4.29,$ $p = .232$
Married	497 (72.3)	178 (68.2)	111 (74.5)	78 (78.0)	130 (73.4)	
Education levels						
Secondary or below	417 (60.7)	168 (64.4)	80 (53.7)	64 (64.0)	105 (59.3)	$\chi^2_{(6)} = 6.61,$ $p = .359$
Post secondary	179 (26.1)	64 (24.5)	44 (29.5)	26 (26.0)	45 (25.4)	
University or above	91 (13.3)	29 (11.1)	25 (16.8)	10 (10.0)	27 (15.3)	
Country of birth						
Australia	500 (72.8)	193 (73.9)	107 (71.8)	75 (75.0)	125 (70.6)	$\chi^2_{(6)} = 7.41,$ $p = .285$
Other English speaking	75 (10.9)	26 (10.0)	20 (13.4)	14 (14.0)	15 (8.5)	
Other non-English speaking	112 (16.3)	42 (16.1)	22 (14.8)	11 (11.0)	37 (20.9)	
Area of residence						
Major cities	419 (61.0)	168 (64.3)	92 (61.7)	50 (50.0)	109 (61.5)	$\chi^2_{(6)} = 10.29,$ $p = .113$
Inner regions	162 (23.6)	56 (21.5)	37 (24.8)	25 (25.0)	44 (24.9)	
Other areas	106 (15.4)	37 (14.2)	20 (13.4)	25 (25.0)	24 (13.6)	
Accommodation type						
Own home	462 (67.3)	170 (65.1)	104 (69.8)	66 (66.0)	122 (68.9)	$\chi^2_{(3)} = 1.27,$ $p = .737$
Renting and others	225 (32.8)	91 (34.9)	45 (30.2)	34 (34.0)	55 (36.1)	
Household income level						
Low	463 (75.5)	177 (76.3)	92 (70.2)	76 (81.7)	118 (75.2)	$\chi^2_{(3)} = 4.01,$ $p = .261$
Middle/high	150 (24.5)	55 (23.7)	39 (29.8)	17 (18.3)	39 (24.8)	
Employment						
Unemployed/not working	470 (68.4)	184 (70.5)	100 (67.1)	66 (66.0)	120 (67.8)	$\chi^2_{(3)} = 0.94,$ $p = .815$
Employed	217 (31.6)	77 (29.5)	49 (32.9)	34 (34.0)	57 (32.2)	
Physical health						
Fair/poor	194 (28.7)	127 (48.7)	31 (20.8)	17 (17.0)	19 (10.7)	$\chi^2_{(6)} = 106.83,$ $p < .001$
Good	239 (34.8)	86 (32.9)	52 (34.9)	37 (37.0)	64 (36.2)	
Excellent/very good	254 (37.0)	48 (18.4)	66 (44.3)	46 (46.0)	94 (53.1)	

givers had to leave their work to provide care. A similar proportion (20.4%) reported that their relationship with their spouse or partner was adversely affected due to their caring role. Nearly half indicated that their financial situation was worsened as a result of caring for a disabled person, and 17.8% had unsatisfied needs of respite. For the general mental health status of these caregivers, using the above-mentioned cut-off, 261 (37.9%) were classified as having 'severe' mental ill-health, 149 (21.7%) 'mild/moderate' mental ill-health, 14.6% ($n = 100$) 'good' mental health, and 25.8% ($n = 177$) 'excellent' mental health.

The bivariate associations between sleep disruptions, caregivers' demographics, characteristics of the main recipient, factors related to the caring role, and general mental health status of caregivers were examined. Results are also shown in Tables 1, 2 and 3. As indicated, sleep disruptions, relationship with spouse/partner, financial situation, unsatisfied need of respite, and physical ill-health were associated with the general mental health status of caregivers. The unadjusted associations among all these variables were highly significant ($p < .001$). Age of caregivers and the chronic condition causing major disability were also

Table 2. Characteristics of recipients of care for whole sample ($N = 687$) and by mental health status (column percentages are shown in parentheses)

Characteristics of recipient	Whole sample $N = 687$	Mental health status				Chi square
		Severely poor	Mildly/ Moderately poor	Good	Excellent	
Chronic condition causing major disability						
Mental & behavioural disorders	137 (19.9)	58 (22.2)	30 (20.1)	26 (26.0)	23 (13.0)	$\chi^2_{(3)} = 8.50,$ $p = .037$
Physical illness	550 (80.1)	203 (77.8)	119 (79.9)	74 (74.0)	154 (87.0)	
Number of recipients apart from the main						
None	547 (79.6)	196 (75.1)	123 (82.5)	83 (83.0)	145 (81.9)	$\chi^2_{(3)} = 5.36,$ $p = .147$
1 or more	140 (20.4)	65 (24.9)	26 (17.5)	17 (17.0)	32 (18.1)	
Duration of care provided						
<5 yrs	252 (37.4)	98 (38.3)	56 (38.1)	36 (36.7)	62 (36.0)	$\chi^2_{(6)} = 3.46,$ $p = .749$
5-9 yrs	183 (27.2)	77 (30.1)	36 (24.5)	27 (27.6)	43 (25.0)	
10 yrs or more	238 (35.4)	81 (31.6)	55 (37.4)	35 (35.7)	67 (39.0)	
Relationship of caregiver to recipient						
Spouse/partner	106 (15.4)	44 (16.9)	19 (12.8)	9 (9.0)	34 (19.2)	$\chi^2_{(9)} = 26.65,$ $p = .002$
Parents	177 (25.8)	81 (31.0)	42 (28.2)	30 (30.0)	24 (13.6)	
Children	369 (53.7)	128 (49.0)	81 (54.4)	55 (55.0)	105 (59.3)	
Other	35 (5.1)	8 (3.1)	7 (4.6)	6 (6.0)	14 (7.9)	
Hours of caring per week						
<20 hours	194 (30.4)	59 (24.3)	47 (34.3)	27 (29.1)	61 (37.0)	$\chi^2_{(6)} = 10.60,$ $p = .101$
20-39 hours	131 (20.5)	50 (20.6)	29 (21.2)	23 (24.7)	29 (17.5)	
40 or more	313 (49.1)	134 (55.1)	61 (44.5)	43 (46.2)	75 (45.5)	
Status of disability						
Mild/moderate	54 (7.9)	18 (6.8)	10 (6.7)	10 (10.0)	16 (9.1)	$\chi^2_{(6)} = 5.89,$ $p = .435$
Severe	235 (34.2)	80 (30.7)	50 (33.6)	37 (37.0)	68 (38.4)	
Profound	398 (57.9)	163 (62.5)	89 (59.7)	53 (53.0)	93 (52.5)	

Table 3. Factors related to the caring of the main recipient for whole sample ($N = 687$) and by mental health status (column percentages are shown in parentheses)

Factors related to the caring of main recipient	Whole sample $N = 687$	Mental health status				Chi square
		Severely poor	Mildly/ Moderately poor	Good	Excellent	
Sleep disruption						
Frequently	167 (26.1)	93 (38.3)	26 (18.8)	22 (22.9)	26 (15.9)	$\chi^2_{(6)} = 38.83,$ $p < .001$
Occasionally	170 (26.5)	67 (27.6)	37 (26.8)	23 (24.0)	43 (26.2)	
Not disrupted	304 (47.4)	83 (34.1)	75 (54.4)	51 (53.1)	95 (57.9)	
Leave work						
Yes	149 (21.7)	57 (21.8)	32 (21.5)	21 (21.0)	39 (22.0)	$\chi^2_{(3)} = 0.04,$ $p = .997$
No/not in work force	538 (78.3)	204 (78.2)	117 (78.5)	79 (79.0)	138 (78.0)	
Relationship with spouse/partner affected						
Yes	131 (20.4)	75 (31.1)	24 (17.4)	13 (13.5)	19 (11.5)	$\chi^2_{(3)} = 28.76,$ $p < .001$
No/not applicable	510 (79.6)	166 (68.9)	114 (82.6)	83 (86.5)	147 (88.5)	
Financial situation worsened						
Yes	307 (49.0)	153 (64.6)	69 (50.4)	38 (41.8)	47 (29.2)	$\chi^2_{(3)} = 50.24,$ $p < .001$
No	319 (51.0)	84 (35.4)	68 (49.6)	53 (58.2)	114 (70.8)	
Need of respite not satisfied						
Yes	122 (17.8)	77 (29.5)	20 (13.4)	12 (12.0)	13 (7.3)	$\chi^2_{(3)} = 41.98,$ $p < .001$
No	565 (82.2)	184 (70.5)	129 (86.6)	88 (88.0)	164 (92.7)	

Table 4. Adjusted Odds Ratios and 95% Confidence Intervals of mental health status for different levels of sleep disruption

Sleep disruption	Mental health status		
	Severely poor	Mildly / moderately poor	Good
Frequently			
Unadjusted	4.01 (2.47-6.92)	1.27 (0.68-2.36)	1.58 (0.81-3.06)
Adjusted	2.42 (1.28-4.54)	0.99 (0.50-1.91)	1.44 (0.71-2.94)
Occasionally			
Unadjusted	1.78 (1.10-2.89)	1.09 (0.64-1.86)	1.00 (0.54-1.83)
Adjusted	1.64 (0.94-2.87)	0.90 (0.51-1.57)	0.90 (0.50-1.70)
No disruption	1.00	1.00	1.00

associated with caregivers' mental health at a 5% significance level but not at 1%. Hence, these variables were included in the multinomial logistic regression analyses to be adjusted for their effect on the relationship between sleep disruption and caregivers' general mental health. Additionally, other variables such as sex, area of residence, number of recipients under care, and weekly hours of care were also included. The unadjusted ORs for mental health status of different levels of sleep disruption were calculated and are summarised in Table 4. As shown, the odds for severe mental ill-health were significantly increased for those caregivers whose sleep had been frequently and occasionally disrupted when compared with those whose sleep was not disrupted at all. There were no significant associations between sleep disruption and other levels of mental health status.

Multinomial logistic regression analyses were performed on the data with potential confounding factors identified in the bivariate analyses included. Models including interaction terms between these variables and sleep disruption were also fitted. The results indicated that none of these interaction terms were significant, suggesting that these variables were potential confounding factors and not effect-modifiers. The adjusted results obtained from the final multinomial logistic regression model are also presented in Table 4. After adjusting for potential confounding factors including age, sex, disability status, relationship with the recipient, financial situation, relationship with spouse/partner, need of respite, and physical health, the association with frequent sleep disruptions and severely poor mental health remained significant. There was a nearly 2.5 times increase in the odds of severe mental ill-

health (OR: 2.42, 95% CI = 1.28-4.54) for those caregivers whose sleep was frequently disrupted due to the caring role when compared with those whose sleep was not disrupted at all. Contrary to the unadjusted results, the association between occasional sleep disruption and poor mental health became insignificant after adjusting for potential confounding factors.

Discussion

Results confirm the burden associated with the caregiving role, with more than half of the respondents in this study reporting some level of sleep disturbance and two thirds reporting mental ill-health. Findings support the hypothesis that sleep disturbance is associated with mental ill-health. Caregivers whose sleep is frequently disrupted were about 2.5 times more likely to suffer from poor mental health, as compared to those whose sleep is not disrupted. Since none of the interaction terms between independent variables and sleep disruption were significant, sleep disruption can be considered as an independent risk factor for poor mental health in caregivers. These results are consistent with the association between sleep and mental health status in caregivers examined in two previous studies (Carter & Chang, 2000; Willette-Murphy et al., 2006); however, as these studies did not report specific risk estimates in their findings, it is difficult to compare across samples.

There may be many possible explanations for the association between sleep disruption and mental ill-health, such as the disruption to REMS described in the introduction. Other explanations are also possible. For example, the mood of caregivers may be adversely affected by frustration at any disruption created by responding to the night time needs of the person for whom they are providing care. Lack of

energy due to insufficient sleep would only serve to magnify the burden of care, thereby affecting their mental health. Numerous studies have reported (as reviewed recently by Banks & Dinges, 2007) that sleep deprivation can cause many behavioural and neurobiological deficits including lapses of attention, slowed working memory, reduced cognitive throughput, depressed mood, and perseveration of thought.

Sleep disruption is a potentially modifiable risk factor, and the results obtained from this study may have direct implications for the provision of support to caregivers. For example, it would be useful to include instruction in sleep hygiene strategies in psychoeducational materials for caregivers in order to improve their ability to maximise the duration and quality of their sleep. It has been demonstrated that providing relevant information on caregiving can improve mental health outcomes among caregivers (Whitlatch, 2008).

These results may also be used to advocate for additional resources for caregivers at a more systemic level. Respite is usually provided as a short-term measure, and/or for a short period of time, usually during the day. The results of this study suggest long-term caregivers require more support during the evening so that they can have a reprieve from their duties, at least temporarily, to cover their sleep debt.

A main strength of the present study is that it used data collected from a population-based national survey, in which participants were randomly selected from the total target population using a validated and statistically proven methodology. It has examined the association between sleep and mental health of caregivers providing care for a wider age range of recipients than has previously been considered by other studies.

The study also has a number of limitations. Firstly, there may be report bias in the variables examined due to the fact that data were collected via self-report. This may have limited somewhat the validity of results, particularly for respondents who identified both frequently disrupted sleep and severely mental ill-health, as both factors have been found to impair recall of events. Self-report may have also increased the emotive response of study participants, thereby reducing the objectivity with which they

responded to the items. A key limitation of the current study is the fact that it does not provide the opportunity to make causal inferences from the variables under review (Rothman & Greenland, 1998). It may be that those caregivers reporting mental ill-health were more likely to report sleep disturbance. Such a finding would not be implausible given mental disorders such as major depression and post traumatic stress disorder in particular may be characterised by sleep disturbance (Meilman & Hipolito, 2006). A longitudinal design would thus be required to clarify the nature of the relationship between sleep disruption and mental health status.

Despite these limitations, the current study adds weight to the growing literature on the burden associated with the caregiving role. It highlights the all-encompassing nature of providing care in the home, and highlights the need for responsive and holistic care for those supporting a family member living with a disability.

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