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Identifying Risk Factors for the Development of Sleep Disturbances in Bereaved Persons: A Cross-sectional Survey

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Abstract

Sleep disturbances are common following bereavement and are associated with several adverse mental and physical health outcomes. However, limited research has examined which sociodemographic and loss-related characteristics are associated with sleep problems in bereaved individuals. Identifying such characteristics may facilitate early monitoring and intervention to prevent the worsening of sleep problems. The present study aimed to shed light on concurrent predictors of sleep quality and insomnia symptom levels in a sample of 293 adults who experienced bereavement within the past ten years. Sociodemographic variables (age, sex, education level) and loss-related variables (relationship to the deceased, cause of death, and expectedness of death) were examined as predictors of sleep quality and insomnia symptom levels using simple and multiple linear regression analyses. Sleep quality was assessed using the Pittsburgh Sleep Quality Index, and insomnia symptom levels were measured with the Insomnia Severity Index. Univariate analyses indicated that lower educational attainment, less expected death, and older age related to poorer sleep quality. Furthermore, univariate analyses showed that lower education and less expected death were related to higher insomnia symptom levels. In multivariate models, education level remained a significant predictor of both sleep quality and insomnia symptoms, and expectedness of death remained a significant predictor of sleep quality. Future studies are needed that use longitudinal designs, objective sleep measures, and simple random sampling to strengthen and extend these findings.

Keywords: sleep disturbances, risk factors, bereavement, univariate analyses, multivariate analyses

Risk Factors for the Development of Sleep Disturbances in Bereaved Persons

Sleep disturbances and disorders are common among bereaved individuals, occurring more frequently than in non-bereaved individuals (Lancel et al., 2020). These disturbances range from difficulties falling or staying asleep to more severe complaints that meet the clinical criteria for insomnia. Understanding the development of sleep problems is important, as disrupted sleep has been associated with a wide range of health problems. In the short-term, sleep problems can cause physical complaints such as headaches and fatigue (Medic et al., 2017). Over time, the sleep disturbances can lead to chronic physical health conditions such as cardiovascular disease, metabolic disorders, and cancer (Medic et al., 2017). Sleep problems can also contribute to the developing, maintaining, and recurrence of mood, anxiety, stress-related, psychotic, and substance use disorders (Freeman et al., 2020; Lancel et al., 2021). Despite the potential clinical relevance of sleep problems in adaptation to bereavement, there has been relatively little research on the specific factors that make bereaved people more vulnerable to sleep problems. This study aims to explore those gaps in knowledge by identifying possible risk factors for the development of sleep disturbances in bereaved individuals. The identified risk factors could be used for the screening and monitoring of at-risk bereaved individuals, which makes treatment of sleeping problems possible as they arise.

A recent systematic review found results pointing to potential risk factors for the development of sleep disturbances in bereaved individuals, including age, sex, type of relationship to the deceased, and type of death (Lancel et al., 2020). With regard to age, evidence suggests that older individuals are more susceptible to sleep disturbances after bereavement. For example, Boelen & Lancee (2013) found a positive association between age and sleep problems in bereaved individuals. Similarly, when comparing sleep disturbances between bereaved and non-bereaved adults (50+), it was found across groups that sleep

problems were more common in older people (Richardson et al., 2003). Thus, sleep disturbances occurred independently of bereavement status, possibly reflecting a general increase in sleep problems with age in the population (Zhong et al., 2019)

Bereavement-specific studies suggest that sex is associated with the development of sleep disturbances as well, as bereaved women experience higher rates of sleep problems following the loss of a loved one than bereaved men (Richardson et al., 2003; van der Klink et al., 2010). This pattern is consistent with findings in the general population, where insomnia is approximately 1.5 times more prevalent in women than men (Suh et al., 2018).

Education level may also play a role in the development of sleep problems after bereavement, as lower educational attainment was found to be associated with lower sleep quality in bereaved individuals (Wu et al., 2021). However, it should be noted that an association between low educational attainment and sleep disturbances is also found in the general population (Cunningham et al., 2015).

The type of relationship to the deceased is another potential risk factor for developing sleep disturbances. Higher rates of insomnia have been observed among individuals who lost a spouse or child compared to those who lost a parent or sibling (Simpson et al., 2014). Mothers who experienced stillbirth reported low sleep quality (Huberty et al., 2018). Additionally, parents who lost their child to stillbirth, neonatal death, or sudden death syndrome frequently reported significant sleep disturbances (Dyregrov & Mattheisen, 1987).

Type of death, specifically the expectedness and cause of death, also appears to increase the risk of sleep disturbances in bereaved people. Natural causes of death may be expected (e.g., cancer) or unexpected (e.g., heart attack), whereas unnatural causes are typically unexpected and include accidents, suicide, or homicide (Hardison et al., 2005). Unexpected spousal loss due to cancer has been associated with higher risk of sleep problems (Hauksdóttir et al., 2010). It is theorized that this increased risk is potentially linked to an underlying

posttraumatic stress disorder, remorse, or feelings of guilt for lost time (Hauksdóttir et al., 2010). Results regarding the risk of developing sleep problems following a death by natural versus unnatural causes are inconsistent. Miles et al., (1985) found no differences in parental sleep disturbances following child death due to an accident or chronic disease, whereas findings of another study reported more sleep problems after natural than unnatural deaths in older bereaved people (Boelen & Lancee, 2013). Conversely, Hardison et al. (2005) found higher insomnia rates following traumatic (unnatural) bereavement compared to non-traumatic (natural) bereavement.

Research on risk factors for sleep disturbances in bereaved individuals is still very limited. Some studies suggest associations between age, sex, and education level and sleep disturbances after bereavement, however, these associations may reflect known relationships between sociodemographic factors and sleep problems in the general population. Relationships to the deceased, such as the loss of a partner or child, appear to increase the risk of sleep disturbances, although comparative research remains scarce. Findings regarding the type of death are mixed, with studies reporting inconsistent results on whether natural or unnatural death is more strongly associated with sleep problems. Given the limited and sometimes contradictory nature of these findings, and the possibility that some observed associations are not specific to bereavement, there is a clear need for further research.

The Current Study

Building on existing literature, the present study aims to shed light on the association of putative sociodemographic (age, sex, education level), and loss-related risk factors (relationship to the deceased, type of death) with sleep disturbances in bereaved individuals. The central research question for this study is: *What potential risk factors can be identified for the development of sleep disturbances after bereavement?* Based on the literature, we hypothesize that older bereaved individuals will experience more sleep problems than

younger bereaved individuals (H1), and that bereaved women will report more sleep disturbances than bereaved men (H2). Given evidence linking education to general sleep health, we further hypothesize that bereaved individuals with lower educational attainment will report more sleep problems than those with higher education levels (H3). We also expect that those who have lost a child or partner will report more sleep problems than those bereaved of other loved ones (H4). Additionally, we hypothesize that bereavement following an unexpected death will be associated with more sleep problems than bereavement following an expected death (H5), and that bereavement following an unnatural death will be associated with more sleep problems than bereavement following a natural death (H6). Finally, the present study will exploratively examine whether each of these factors show an independent association with sleep disturbances when controlling for the other variables.

Method

Procedure

The data was collected as part of a longitudinal survey investigating the relationship between insomnia and grief. This study was approved by the Ethical Committee Psychology of the University of Groningen (PSY-2223-S-0159). Participants were recruited using Google Ads, Facebook groups for grieving people and Dutch organizations for bereaved people. After recruitment, participants were directed to online questionnaires on Qualtrics. Participants were presented with information about e.g., the study's purpose, voluntariness of participation, and how their personal data would be handled, and were asked to provide informed consent. Following provision of informed consent, they could start filling in the questionnaires. There was no compensation for participation. Only baseline data and relevant questionnaires to the present investigation were used in the present study.

Participants

A total of 478 adults (18+) who had experienced bereavement in the last 10 years were recruited. Of these people, 185 did not give consent or did not complete the questionnaires relevant to the present study, leaving 293 participants. Table 1 shows the sociodemographic and loss-related characteristics of the sample.

Table 1

Demographic and Loss-related Sample Characteristics (N = 293)

Characteristic	*N*	%	*M*	*SD*
Age			52.1	13.4
Sex				
Female	259	88.4		
Male	34	11.6		
Education level				
Lower education	123	42.0		
Higher education	170	58.0		
Sex of the deceased				
Female	93	31.7		
Male	199	67.9		
Non binary	1	0.3		
Relationship to the deceased				
Partner	140	47.8		
Parent	77	26.3		
Sibling	20	6.8		
Child	22	7.5		
Other	34	11.6		
Cause of death				
Natural death	243	82.9		
Unnatural death	40	13.6		
Other	10	3.4		
Expectedness of death				
Expected	69	23.5		

Unexpected	140	47.8		
Both or neither	84	28.7		
Time since loss in months			31.58	32.5

Note. The education variable has been divided into lower education, which includes people with educational attainment of primary school, lower vocational education, secondary education, SSVET, or higher secondary education, and higher education, which includes people with educational attainment of higher professional education or university. The cause of death variable is divided into natural death, including e.g., disease, and unnatural death, including accidents, suicide, and murder.

Materials

The present study used questions about sociodemographic characteristics (age, sex, education level), and loss-related characteristics (relationship to the deceased, cause of death, and expectedness of death). In addition, two questionnaires were used to measure sleep disturbances.

Sleep Quality

A Dutch translation of the Pittsburgh Sleep Quality Index (PSQI; Buysse et al., 1989) was used to measure self-perceived sleep quality. Sleep quality according to the PSQI is assessed across seven components, namely "subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleep medication, and daytime dysfunction" (Buysse et al., 1989). To assess these components, 19 items are scored on a 4-point scale (e.g., "During the past month, when have you usually gone to bed at night?"). A global score of 0-21 can be obtained, with higher scores indicating poorer sleep quality. The PSQI demonstrated acceptable reliability ($\alpha = 0.75$) in the current study.

Insomnia Symptom Levels

A Dutch-translated version of the Insomnia Severity Index (ISI; Bastien et al., 2001) was included to measure both daytime and nighttime insomnia symptom levels. It consists of 7 items scored on a 5-point scale. An example is: "How satisfied/dissatisfied are you with your current sleep pattern?". The ISI generates scores from 0-28, with higher scores indicating more severe levels of insomnia. In the current study, the ISI demonstrated good reliability ($\alpha = 0.86$).

Analysis

Data was analysed using IBM SPSS Statistics (version 29). Since most independent variables were categorical, they were dummy-coded prior to the analyses. Therefore, the categorical variables were coded into zeros and ones, where the zero is the reference category. For instance, sex was coded into 'male' with value 1, and 'female' with value 0, being the reference category in this case. Furthermore, education level was split into two groups, 'higher education' (higher professional education, university) coded as 1 and 'lower education' (primary school, lower vocational education, secondary education, senior secondary vocation education, higher secondary education) coded as 0. Cause of death was also divided into two groups, namely 'unnatural death' (death caused by accidents, suicide, or murder) coded as 1, and 'natural death' (for example death caused by disease) coded as 0. The expectedness of death[1] was categorized as 'expected', 'unexpected', and a category combining 'neither' and 'both'. For relationship to the deceased, four dummy variables were created (partner, parent, sibling, child), with other as the reference category.

Prior to conducting inferential analyses, the dataset was screened for missing values, outliers, and adherence to simple linear regression and multiple linear regression assumptions (Pallant, 2020). Descriptive statistics were used to identify missing values, which were then excluded. Using boxplots, outliers were identified and homoscedasticity was screened.

[1] Dummy 1: expected = 1, other = 0; Dummy 2: unexpected = 1, other = 0

Homoscedasticity, was further analysed by looking at scatterplots of the standardised residuals. Normality was assessed through histograms, and Normal Probability Plots (P-P). Linearity of the continuous variables was examined by looking at scatterplots. Multicollinearity among predictors was assessed using the variance inflation factor (VIF; Pallant, 2020).

The independent variables in this study consist of the sociodemographic variables (age, sex, and education level) and loss-related variables (relationship to the deceased, type of death, and expectedness of death). The dependent variables were sleep disturbances, which were operationalized as sleep quality and insomnia symptom levels. First, simple and multiple linear regression analyses were performed to assess the individual predicting qualities of the independent variables. Next, two multiple linear regression analyses were performed with the independent variables that were significant predictors in the previous series of analyses, and the dependent variables of sleep quality and insomnia symptom levels.

Results

Preliminary Analyses

The assumptions for simple linear regression and multiple linear regression were checked prior to hypothesis testing. Firstly, outliers of the continuous variables were identified using boxplots. The analyses were run excluding these outliers, which did not result in significant changes in the results for the simple or multiple linear regression analyses. Thus, the outliers were included in the final analyses. Homoscedasticity of the continuous variables was examined with residual scatterplots. The residual plots seemed to have an even spread along the line in the centre of the plot, indicating homoscedasticity (Pallant, 2020). Homoscedasticity of the categorical variables was assessed by checking whether the variances across categories were approximately equal. This was checked with boxplots and descriptives. Normality was assessed by looking at histograms and P-P plots. The distribution on the

histograms appeared approximately normal, and the P-P plots followed the straight diagonal distribution line, indicating normality. For the categorical variables, histograms were checked for normality per category. Linearity of the continuous variables was assessed by checking that the datapoints in the scatterplots roughly followed a straight line. For the categorical variables, linearity could not be checked as it applies to numerical variables. Lastly, multicollinearity was checked for all predictors, and was not violated with all VIF values < 10 (Pallant, 2020). Therefore, there were no violations of assumptions for simple linear regression and multiple linear regression.

Predictors of Sleep Quality and Insomnia Symptom Levels

Simple linear regression analyses were conducted to examine the individual associations between the independent variables age, sex, education level, and cause of death and the dependent variable of sleep quality (Table 2). Age was a significant predictor of sleep quality, explaining 2% of variance ($F(1,291) = 5.48$, $p = .02$). Education level was a significant predictor of sleep quality as well ($F(1,291) = 53.57$, $p < .001$, $R^2 = .16$), accounting for approximately 16% of the variance. Sex ($F(1,291) < 0.01$, $p = .95$) and cause of death ($F(1,291) = 0.42$, $p = .52$) were not significantly associated with sleep quality.

The independent variables relationship to the deceased and expectedness of death consist of multiple dummy variables, therefore multiple linear regression analyses were conducted to assess their associations with sleep quality (Table 2). Relationship to the deceased was not significantly associated with sleep quality ($F(4,288) = 0.67$, $p = .61$). Expectedness of death was significantly associated with sleep quality ($F(2,290) = 4.63$, $p = .01$, $R^2 = .03$), accounting for 3% of variance. Specifically, experiencing an expected death was associated with better sleep quality ($p < .01$), compared to less expected deaths.

The individual associations between the independent variables of age, sex, education level, and cause of death and the dependent variable insomnia symptom levels were also

investigated by simple linear regression analyses (Table 2). Education level significantly predicted insomnia symptom levels ($F(1,291) = 36.68$, $p < .001$, $R^2 = .11$), accounting for 11% of the variance. Age ($F(1,291) = 2.48$, $p = .12$, $R^2 < .01$), sex ($F(1,291) = 0.06$, $p = .82$, $R^2 < .001$) and cause of death ($F(1,291) = 0.00$, $p = .99$, $R^2 < .001$) were not significant predictors of insomnia symptom levels ($p > .05$).

The associations between relationship to the deceased and insomnia symptom levels, and expectedness of death and insomnia symptom levels were assessed with multiple regression analyses. Relationship to the deceased was not significantly associated with insomnia symptom levels in the multivariate model ($F(4,288) = .09$, $p = .99$, $R^2 = .01$). Expectedness of death was significantly associated with insomnia symptom levels ($F(2,290) = 3.35$, $p = .04$, $R^2 = .02$) and explained 2% of variance. Specifically, experiencing an expected death was associated with lower insomnia symptom levels ($\beta = -.17$, $p < .02$) compared to less expected deaths.

Table 2

Linear Regressions per Independent Variable

Variable	Sleep Quality			Insomnia Symptoms		
	β	*p*	R^2	β	*p*	R^2
Age	.14	.02	.02	.09	.12	.01
Sex	<.01	.95	.00	.01	.82	.00
Education level	−.39	< .001	.16	−.34	< .001	.11
Relationship to the Deceased		.61	.01		.99	<.01
Partner	<.01	.96		.05	.60	

Table 2

Linear Regressions per Independent Variable

Variable	Sleep Quality			Insomnia Symptoms		
	β	*p*	R^2	β	*p*	R^2
Parent	-.04	.68		.04	.66	
Sibling	.02	.80		.04	.62	
Child	.08	.27		.03	.69	
Cause of death	.04	.52	<.01	< .01	.99	.00
Expectedness		.01	.03		.04	.02
Expected	-.20	<.01		-.17	.02	
Unexpected	-.07	.30		-.04	.62	

Note. Dummy coding was used for sex (male = 1, female = 0), education level (higher education = 1, lower education = 0), relationship to the deceased (Dummy 1: partner = 1, other = 0; Dummy 2: parent = 1, other = 0; Dummy 3: sibling = 1, other = 0; Dummy 4: child = 1, other = 0), cause of death (unnatural death = 1, natural death = 0), and expectedness (Dummy 1: expected = 1, other = 0; Dummy 2: unexpected = 1, other = 0).

Age, Education Level, and Expectedness of Death as Predictors for Sleep Quality and Insomnia Symptom Levels

The simple linear regression analyses of age and education, and the multiple linear regression of expectedness of death showed these variables to be significant individual predictors of sleep quality. Therefore, these variables were included as predictors in a multiple linear regression with sleep quality as dependent variable (Table 3). The model predicting

sleep quality with the variables age, education level, and expectedness of death was significant ($F(4, 288) = 15.76$, $p < .001$, $R^2 = .18$) and accounted for 18% of variance. In the multivariate model, education level ($\beta = -0.36$, $p < .001$) remained a significant predictor of sleep quality. Expectedness of death was also associated with sleep quality, specifically expected death significantly predicted better sleep quality ($\beta = -0.15$, $p = .03$) compared to other types of expectedness of death. Age ($\beta = 0.11$, $p = .06$) was not a significant predictor for sleep quality in this multivariate model.

The multivariate model predicting insomnia symptom levels included the variables age, education level, and expectedness of death as predictors (Table 3). This model was significant ($F(4, 288) = 10.48$, $p < .001$, $R^2 = .13$), explaining 13% of variance. Education level remained a significant predictor of insomnia symptom levels in the multivariate model ($\beta = -.31$, $p < .001$). Age was not a significant predictor in this model ($\beta = .07$, $p = .25$), and neither was expectedness of death, as neither expected death ($\beta = -.11$, $p = .09$) nor unexpected death ($\beta = .01$, $p = .91$) differed significantly from other types of expectedness of death.

Table 3

Multiple Linear Regression Models for Sleep Quality and Insomnia Symptom Levels

Variable	Sleep Quality		Insomnia Symptoms	
	β	*p*	β	*p*
Age	.11	.06	.07	.25
Education level	−.36	< .001	−.31	< .001
Expectedness				
Expected	-.15	.03	-.11	.09

Table 3

Multiple Linear Regression Models for Sleep Quality and Insomnia Symptom Levels

Variable	Sleep Quality		Insomnia Symptoms	
	β	*p*	β	*p*
Unexpected	-.02	.74	.01	.91

Note. Model statistics of the multiple linear regression model with sleep quality as dependent variable: $F(4, 288) = 15.76$, $p < .001$, $R^2 = .18$. Model statistics of the multiple linear regression model with insomnia symptoms as dependent variable: $F(4, 288) = 10.48$, $p < .001$, $R^2 = .13$.

Discussion

The aim of the present study was to identify potential sociodemographic and loss-related risk factors for sleep disturbances in bereaved individuals. By examining both subjective sleep quality and insomnia symptom levels, this study aimed to get a better understanding of sleep problems and their potential associated risk factors in the bereaved population, given its high prevalence and clinical relevance.

The findings suggested that education as individual predictor has a moderate effect on sleep quality in a univariate analysis. Specifically, participants with lower educational attainment experienced poorer sleep quality than those with higher educational attainment. In the multivariate model including age and expectedness of death as predictors, education level remained a significant predictor of sleep quality. This indicates that the other predictors did not fully explain the observed relationship between education and sleep quality. Additionally, education level had a moderate effect on insomnia symptom levels in a univariate analysis. Participants with lower educational attainment experienced higher insomnia symptom levels

than participants with higher educational attainment. In the multivariate model predicting insomnia symptom levels, which included education, age, and expectedness of death, education was again a significant predictor. Thus, in this study bereaved people with lower educational attainment reported poorer sleep quality and higher insomnia symptom levels than bereaved people with higher educational attainment. This finding is consistent with earlier findings about educational attainment in studies of bereaved individuals (Wu et al., 2021). It also aligns with established associations between education level and sleep health in the general population (Cunningham et al., 2015). Educational attainment may play a role in the development of sleep problems, as people with higher education have certain coping skills, and a sense of control that is beneficial in stressful situations (Wu et al., 2021). Less-educated people also experience more stress after bereavement, and may have fewer resources to cope with the stress. For example, they may also have less financial resources to deal with the financial burdens that can come with bereavement (Wu et al., 2021). This makes less educated people more susceptible to sleep problems.

Another relevant finding is that expectedness of death has a small effect on sleep quality. Participants who experienced expected deaths reported better sleep quality compared to people that experienced deaths that were more unexpected. This was the case in a univariate analysis predicting sleep quality, and in a multivariate model including age and education as predictors. Expectedness of death also had a small effect on insomnia symptom levels in a univariate analysis, with expected deaths being related to less insomnia symptom levels compared to more unexpected deaths. In a multivariate model predicting insomnia symptom levels, including age and education as predictors, expectedness of death did not remain a significant predictor. This could suggest that the impact of expectedness of death on insomnia symptom levels may be more indirect or possibly explained by other factors. These findings are in line with earlier research suggesting that experiencing unexpected or traumatic

loss is a risk factor for sleep disturbances (Hardison et al., 2005; Hauksdóttir et al., 2010). One possible explanation for expectedness of death being associated with the development of sleep problems is the level of emotional preparedness that comes with expecting a loss (Hauksdóttir et al., 2010). Low emotional preparedness is a risk factor for shock, emotional numbness, or even a posttraumatic stress disorder after bereavement. Another explanation for less prepared bereaved people reporting more psychological issues such as sleep disturbances could be regrets over lost time with the deceased that keep their minds occupied (Hauksdóttir et al., 2010).

Age had a small effect on sleep quality, as older age was a significant predictor of poorer sleep quality in a univariate analysis. In a multivariate model that included education and expectedness of death, age was not a significant predictor. There was no significant association between age and insomnia symptom levels in univariate and multivariate analyses. Therefore, the findings in this sample suggest that age alone is unlikely to be a strong independent predictor of sleep disturbances following bereavement. This partially aligns with previous research reporting increased sleep disturbances among older bereaved individuals (Boelen & Lancee, 2013; Richardson et al., 2003). Sleep quality declines due to aging in general, as there are several changes in the brain structure with age, such as cortical thinning, white matter degeneration, neurotransmitter dysregulation, and circadian disorganization, which all lead to sleep disruption (Zhong et al., 2019). The onset and speed of this decline is, however, a point of discussion (Richardson et al., 2003). Furthermore, the sample in which Richardson et al. (2003) found a positive association between age and the development of sleep problems in bereaved people consisted of 50+ spousal bereaved people, and elderly people who lose their partner in bed are more prone to sleep problems (Richardson et al., 2003). The current study sample does not have the same age minimum as that of the study by

Richardson et al. (2003), as this study includes ages 18 and older with a mean age of 52 years old. This may explain the different results.

The variable sex was not associated with sleep quality or insomnia symptom levels, despite prior findings indicating higher rates of sleep problems among bereaved women (Richardson et al., 2003; van der Klink et al., 2010). Not finding the same results may be partly attributable to the predominantly female sample in this present study, which may cause power problems for the smaller subgroup of males. This may have limited the possibility to detect sex differences. Similarly, the relationship to the deceased was not associated with sleep disturbances in this study, contrary to studies reporting low sleep quality or high insomnia rates following the loss of a partner or child (Simpson et al., 2014; Huberty et al., 2018; Dyregrov & Matthiesen, 1987). The studies by Huberty et al. (2018) and Dyregrov & Matthiesen (1987) only included bereaved parents in their sample, not comparing that type of relationship to others. This present study also included bereaved partners, siblings, children, and other types of relationships. This could partially explain this study not finding an effect of relationship to the deceased on sleep quality or insomnia symptom levels. Another explanation could be that some categories were smaller than others, which could have led to power problems, making it harder to detect differences between groups. Finally, the distinction between natural and unnatural causes of death did not appear to meaningfully influence sleep quality or insomnia symptom levels, which adds to the mixed literature on cause of death and sleep disturbances (Boelen & Lancee, 2013; Hardison et al., 2005) and is consistent with earlier work reporting no clear differences on sleep disturbances based on cause of death (Miles et al., 1985). These mixed results may be due to both the experience of a natural death and the experience of an unnatural deaths being distressing to people for different reasons. Experiencing an unnatural death is often thought of as shocking and possibly traumatic. However, natural death can be straining for a long period before the loss,

as it can cost a lot of energy and cause much stress (Miles et al., 1985). Therefore, both people that experienced a natural death and people that experienced an unnatural death may become stressed due to different reasons, possibly explaining that there was no effect on sleep outcomes found in this study.

Clinical Relevance

There are several models that attempt to explain the underlying mechanisms for the development of insomnia, on which different therapies are based (Perlis et al., 2011). One of these models is the 3P model. The model describes how predisposing factors, which are the more stable biopsychosocial factors, and precipitating factors, which are stressful events that can trigger sleep problems, increase the risk of acute insomnia. The perpetuating factors, which are the behaviours of a person that maintain the sleep disturbances, can cause the insomnia to become chronic (Perlis et al., 2011). This present study added to the knowledge about the predisposing risk factors, and identified educational attainment and expectedness of death to be related to sleep disturbances. As the loss of a loved one can be a stressful event and a precipitating factor of insomnia, this research in the bereaved population is even more relevant. Therefore, clinicians working with bereaved individuals may benefit from monitoring sleep quality and insomnia symptom levels, particularly in individuals with the predisposing risk factors of lower educational attainment, or the experience of unexpected death. Early identification of sleep problems and sleep-focused psychoeducation or interventions may prevent worsening of sleep disturbances in this population.

Strengths, Limitations & Future Research

A major strength of this study is the relatively large sample of bereaved individuals, contributing to a limited body of research on the association between sociodemographic or loss-related factors and sleep disturbances in this population. Furthermore, the use of two

validated measures of general sleep quality and insomnia symptom levels provided a valid measurement of sleep disturbances, which is rare in the literature on sleep in bereaved individuals (Lancel et al., 2020).

Several limitations should also be acknowledged. First of all, the use of cross-sectional survey data precludes drawing conclusions about causality or the temporal development of sleep disturbances following bereavement. Longitudinal research is needed to determine whether the identified risk factors predict the onset of sleep problems (e.g., insomnia disorder) after bereavement. In addition, the use of self-report questionnaires may introduce several biases (Choi & Pak, 2005). Participants could give conscious or unconscious biased answers, for example they could respond in a more socially desirable manner ("faking good") or report more symptoms than they actually experience ("faking bad"). There is also a chance of primacy bias, so choosing one of the first response options, or recency bias, when someone remembers recent events more clearly than events further in the past. Furthermore, participants could show recall bias, when they do not remember events accurately. There were also many different questionnaires in the study, which could lead to response fatigue resulting in inaccurate answers, for instance (Choi & Pak, 2005). Future studies could benefit from incorporating more direct and objective sleep measures. An example of such measures would be actigraphy, which measures sleep rhythms by recording movement (Ancoli-Israel et al., 2003). Finally, the overrepresentation of certain groups, for instance females, in the sample may limit the generalizability of the findings. In future research, using simple random sampling would give every person in the researched population equal chances of being included in the study (Kalton, 2021), and therefore make the sample more representable.

Conclusion

In conclusion, this study shows that sleep disturbances following bereavement are associated with specific sociodemographic and loss-related characteristics. Lower educational attainment and a less expected death emerged as the most consistent factors related to poorer sleep outcomes, while age showed only a limited association. Contrary to some previous research, sex, relationship to the deceased, and cause of death were not associated with sleep quality or insomnia symptom levels in this sample, suggesting that these factors may be less related to sleep disturbances following bereavement. The central implication of this study is that bereaved individuals with lower educational attainment or who experienced an unexpected loss may be particularly vulnerable to sleep disturbances. Attention to sleep problems after bereavement in these groups may be important for preventing the persistence or worsening of sleep problems. These conclusions should be interpreted in light of several limitations, including the cross-sectional design, reliance on self-report measures, and limited representativeness of the sample. Future research using longitudinal designs, objective sleep measures, and more representative sampling is needed to further clarify the development of sleep disturbances following bereavement.

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