Is Seeking Social Support a Protective Factor Weakening the Association Between Perceived Stress and Insomnia in Young Adults' Family Members of Former ICU Patients?

A Survey Study

Mirjam U. Kühne, s2155710

Department of Behavioural and Social Sciences, University of Twente, The Netherlands

BSc Health Psychology and Technology

Dr. J.E. Spook (1st Supervisor)

Dr. M.E. Pieterse (2nd Supervisor)

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Abstract

Background: Family members of former ICU patients often suffer from health issues, summarized under the term post-intensive care syndrome (PICS-F). Consequently, family members experience high levels of perceived stress. Among others, especially younger age family members are at risk of experiencing increased incidence of PICS-F amongst which young adulthood insomnia is one of the most prevalent disorders. However, after a stressful life event, social support seeking behavior has shown to be beneficial in decreasing symptoms of insomnia.

Objective: The study investigated social support seeking behavior weakening the association between perceived stress and insomnia of young adults' family members of former ICU patients.

Method: A convenience sample of 128 students from the University of Twente as well as German and Dutch community members was taken. After exclusion, 57 young adults aged between 18 and 29 (M_{age}=22.7*;* 70.2% female) took part in the cross-sectional survey study. Participant were assessed for subjective insomnia symptoms with the Holland Sleep Disorder Questionnaire (α = 0.91), for levels of perceived stress with the Perceived Stress Scale (α = 0.96) and for seeking social support with the Coping Strategies Inventory (α = 0.85). Multiple linear regression analysis was used to test whether seeking social support moderates the association between perceived stress and insomnia.

Results: On average, for the whole sample (WS), the criterion value of 3.68 for insomnia was not exceeded (M = 3.13, SD = *.96*). For WS perceived stress was positively associated with insomnia (β = .61, p = .00). However, seeking social support was not found to be a significant moderator in the association between perceived stress and insomnia (β = .61, p = .36). For participants who scored above the criterion value for insomnia (CS), perceived stress was not associated with insomnia (β = .92, p = .12). Further, seeking social support was not a protective factor weakening the association between perceived stress and insomnia (β = -.42, p = .46).

Conclusion: Young adults' family members of former ICU patients experience high levels of stress leading to symptoms of insomnia. However, on average, young relatives did not show symptoms of insomnia. For those young adults who suffered from insomnia, stress was no precipitating factor. Further, seeking social support was not a protective factor in the association between perceived stress and insomnia. Future research is needed to test for beneficial coping strategies weakening the association between perceived stress and insomnia.

Is Seeking Social Support a Protective Factor Weakening the Association Between Perceived Stress and Insomnia in Young Adults' Family Members of Former ICU Patients? A Survey Study

One single hospitalization to the intensive care unit (ICU) provides at least two people in need of care: the patients and the patients' family members. As more commonly known, patients who survive ICU hospitalization suffer from cognitive, psychosocial, and/or physical impairments years after ICU discharge. These symptoms are summarized under the term post-intensive care syndrome, in short PICS (Harvey, & Davidson, 2016; Inoue et al., 2019). However, not only the health of ICU survivors but also the health of family members of these former patients can be affected, which is referred to as PICS-Family (PICS-F). Research has shown that former ICU patients' family members encounter psychosocial problems most frequently including symptoms of anxiety (73%), post-traumatic stress disorder (PTSD; 56%), complicated grief (CG; 52%), and/or depression (35%) (Zante et al., 2020).

Research and recommendations for treatment are almost exclusively based on the "first contact person", oftentimes the partner of former ICU patients (Van Sleeuwen et al., 2020; Zante et al., 2020). Besides the risk factors of female gender and lower educational level, younger age of relatives of patients discharged from the ICU are also at a higher risk of suffering from symptoms of PICS-F (Alfheim et al., 2019; Anderson, et al., 2008; Davidson et al., 2012; Inoue et al., 2019; Petrinec, & Martin, 2018). Research has indicated that younger age is a risk factor, but as the average young age refers to 47 years, it is key to understand the risk for even younger groups who are in a different phase of their lives and who now fall outside the scope for treatment (Anderson et al., 2008).

Research and recommendation for treatment not only lack to approach young adults, but it is also almost exclusively based on the mental health issues of family members, not taking into consideration possible physical health-related issues (Inoue et al., 2019). However, according to Huber et al. (2011) from a positive health perspective, sleep as a part of body functions is important for health and health behaviours which might affect mental health should be more emphasized. Additionally, literature has provided strong evidence that impaired sleep/wake patterns and poor sleep quality may be important factors leading to PICS-F (Choi et al., 2016). However, current research has almost exclusively focused on sleep quality of relatives during

ICU admission, the so-called acute phase. According to the findings of Day et al. (2013) during the acute phase over 65% of the family members experience difficulties sleeping, and 43.5% reported a poor or very poor sleep quality. However, research has lacked the evaluation on family members' sleep after discharge of the patient from the ICU to determine if the symptoms improved (Day et al., 2013).

Sleep and Health

During the critical developmental period between the ages of 18- and 29 years, also termed as "emerging adulthood", sleep is one of the most important determinants of health. This period is marked by increased independence, academic responsibility as well as social demands, which influence behaviour, including sleep (Bernert et al., 2007; Tarokh et al., 2016). For young adults, general recommendations for sleep duration are between 7 and 9 hours. However, young adults often fail to reach the recommended sleep durations (Perry, et al., 2013; Sivertsen et al., 2019). Poor sleep and a disrupted sleep patterns can lead to difficulties in coping with other possible life stressors, resulting in a negative downward spiral of cause and effect in which sleep deficit or sleep problems interact and accelerate one another. Not surprisingly, young adults experience sleeping disorders frequently. Here, insomnia is one of the most common ones with a prevalence rate of 9-23% (de Bruin et al., 2015, 2018; Hysing et al., 2013). Insomnia is defined as a persistent dissatisfaction with sleep quality and quantity, followed by considerable daytime impairment, occurring three or more days per week for at least three months (de Bruin et al., 2015, 2018).

These findings support that sleep displays a crucial resource for young adults in restoring physical and mental health. Within the context of PICS-F, few studies have investigated in insomnia as a significant factor leading to PICS-F (Choi et al., 2016; Davidson & Harvey, 2016; Inoue, 2019). However, research on the influence of insomnia has focussed on the acute phase. The long-term consequences of insomnia especially for young relatives of former ICU patients remain unknown (Day et al., 2013; Tarokh et al., 2016).

Stress and Insomnia

One well-explored predictor of insomnia is stress (Hu et al., 2020; Astill et al., 2013). Stress can be defined as a source of negative condition that causes emotional, psychological, or

physical changes in people of all ages from a variety of cultures (Chrousos, 2009). A stressful life event may be considered both a precipitating as well as a predisposing cause of insomnia. Moreover, strong empirical support has shown immediate sleep changes after disturbing life events (Bernert et al., 2007; Van Reeth et al., 2000). When confronted with stressful life events, individuals use a variety of coping strategies to decrease the perceived stress. Research on coping has been dominated by theoretical models that focus on coping strategies of an individual in a particularly stressful encounter. The Transactional Model of Stress and Coping, developed by Lazarus and Folkman, has been specifically instrumental in shaping coping and stress research (Biggs et al., 2017; Folkman et al., 1986).

Transactional Model of Stress and Coping

The Transactional Model of Stress and Coping emphasizes the role of cognition and individual appraisal. When faced with a stressful situation, an individual evaluates the significance of a stressor as well as potential harms or threats first (i.e. primary appraisal). Subsequently, when the stressor is perceived as significant, an individual assesses his or her ability to manage and overcome the threatening situation (i.e. secondary appraisal) (Folkman et al., 1986; Glanz et al., 2008). Herby, individuals make use of a broad spectrum of coping strategies to manage problems and regulate emotions to modify the impact of stress. The actual strategies which are used to mediate the primary and secondary appraisal are called coping efforts. The coping efforts of an individual impacts the outcome of, for example, the psychological and physical well-being of an individual (Folkman et al., 1986; Glanz et al., 2008). In this research the outcome is insomnia.

Stress described within the Transactional Model of Stress and Coping compromises psychological and physical reactions to different events which threaten the ability to cope. Referring to psychological effects, stress could cause anxiety, depression, or sleep disorders, such as excessive daytime sleepiness or insomnia (Chrousos, 2009; Dieleman et al., 2016; Hu et al., 2020). On the one side, this understanding of stress implies that an individual's stress response through their coping efforts may also become insufficient and can ultimately result in health damage. One possible health damage might be expressed through symptoms of insomnia (Van Reeth et al., 2000). However, on the other side, from a positive health perspective, when people can successfully adapt and cope with stressful life events, their health improves, the

experienced distress and fatigue decreases, and their energy increases (Huber et al., 2011). According to Lazarus and Folkman's Transactional Model of Stress and Coping, seeking social support can be considered as a coping resource (Folkman, & Lazarus, 1985).

Seeking Social Support in Relation to Stress and Insomnia

Multiple researcher have studied the coping strategy of seeking social support. When experiencing a stressful life event individuals often seek out to close others for support, advice, or comfort (Vélez et al., 2016). According to Folkman and Lazarus (1988) individuals seeking social support experience less stress, because fewer situations exceed or threaten their resources. Even when confronted with a stressful life event, individuals who seek close friends or family to rely upon are more likely to effectively cope with the stressor and consequently improve their health outcome (Folkman, & Lazarus, 1985). However, some researchers have focused on problem-focused seeking social support, which includes efforts like seeking information or advice, whereas other researcher emphasize emotion-focused support seeking. This includes efforts like turning to others to provide understanding or using others to listen to feelings (Vélez, et al., 2016). However, within the context of young adults' family members of former ICU patients it is unclear whether seeking social support is beneficial in decreasing the outcome insomnia. Family and parent events as well as accident and illness events are considered as unpredictable and uncontrollable (Augustine et al., 2011). Therefore, through the uncontrollable experience family members encounter in the ICU and the dependency on critical care physicians, the levels of perceived stress might differ from other stressful life situations and might be present long time after the ICU admission of a relative.

Both sleep and the coping strategy of seeking social support seem to be essential components of health. Moreover, several studies have explored the association between social support and sleep quality (Kent de Grey et al., 2018). In fact, research has shown that seeking social support predict better sleep quality. An explanation is provided from an evolutionary perspective, as social support ensures a safe environment, in which close companions protect sleepers from possible external threats, such as enemies (Kent de Grey et al., 2018).

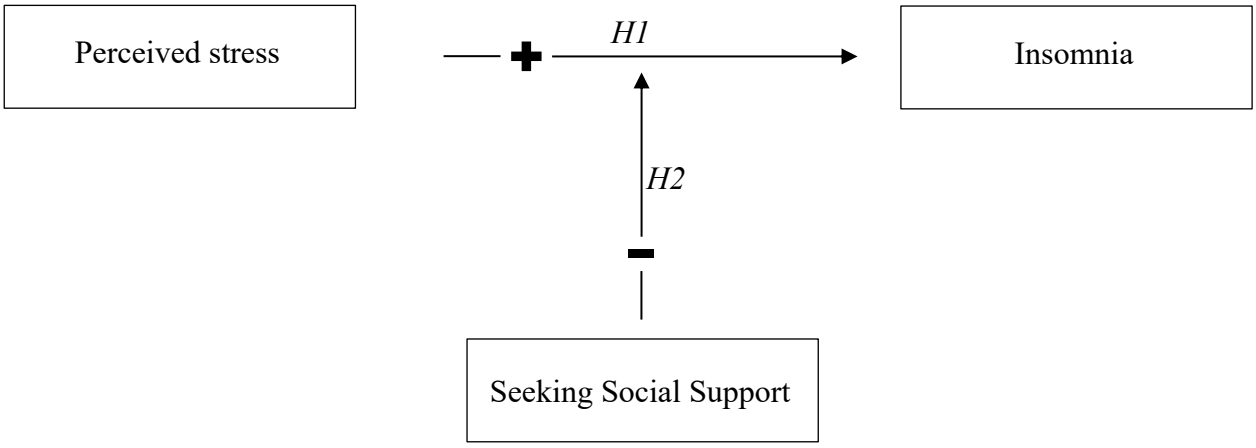
Present Study

The present study aims to investigate if seeking social support weakens the association between perceived stress and insomnia in young adults' family members of former ICU patients. The proposed model is visualized in Figure 1. Based on previous research findings, the two corresponding hypotheses are:

H_1: Higher perceived stress predicts higher symptoms of insomnia in young adults' family members of former ICU patients up to 18 months after discharge.
H_2: Seeking social support weakens the positive association between perceived stress and insomnia of young adults' family members of former ICU patients up to 18 months after discharge.

Figure 1

The Positive Association Between Perceived Stress and Insomnia, Weakened by Seeking Social Support



Methods

Design

This study was part of a larger study investigating the mental and physical well-being of young adults' family members of former ICU patients. Together with five other bachelor students of the University of Twente (UT), participants were recruited using the SONA system of the UT to gather quantitative data through an online questionnaire in Qualtrics. Data collection occurred over a period of one and a half months between April and May 2021. The

study was approved by The Ethics Committee of the Faculty of Behavioral, Management and Social Sciences of the UT (ethical number 210239). This research employed a cross-sectional survey design. Perceived stress was assessed as an independent variable while insomnia was used as the dependent variable with seeking social support as the moderator.

Participants

A convenience sample of 128 students from the University of Twente in addition to German and Dutch citizens was taken. Different inclusion criteria were set: participants aged between 18-29 years who had a relative admitted to the ICU in the past 18 months were asked to participate in the study. As a further inclusion criterion, the ICU stay had to be longer than 48 hours. Based on these inclusion criteria, 71 participants were excluded from the data analysis. This resulted in a final sample of 57 participants. The average participant was female aged 23 with a German citizenship. Demographics information of the total sample can be found in Table 1.

Next, referring to further characteristics of the sample, on average 6 months have passed since the discharge of the former ICU patient, the length of the ICU stay was on average 3 days. Moreover, most participants indicated to have her/his grandparent discharged from the ICU. The characteristics of the sample can be found in Table 2.

Table 1

Demographic Characteristics of Participants

	Full sample	
	n	*%*
Gender		
Female	40	70.2
Male	14	24.6
Other	3	5.2
Nationality		
Dutch	3	5.3
German	46	80.7
Other	8	14.0

Note. $N = 57$. Participants were on average 22.7 years old ($SD = 2.78$).

Table 2

Characteristics of Participants

	Full sample			
	n	*%*	*Mean*	*SD*
Time since discharge (in months)			6.19	26.59
Relationship with the relative				
Patient is the child	2	3.5		
Patient is the parent	15	26.3		
Patient is the grandparent	20	35.1		
Patient is the sibling	4	7.0		
Patient is the aunt/uncle	7	12.3		
Patient is the cousin	6	10.5		
Other	3	5.3		
Length of the ICU stay (in days)				
<2	6	10.5		
2-7	13	22.8		
8-14	17	29.8		
15-31	12	21.1		
>31	9	15.8		
Number of stays in the ICU			2.02	4.04
Need for care				
Yes, provided by family	18	31.6		
Yes, provided by formal caregiver	4	7.0		
No, the relative died	21	38.8		
No	14	24.6		

Note. $N = 57$.

Materials

Apart from the measures that are explained in detail below, the overall project named: *Survey on Health: A comparison between young adults' with relatives as former ICU patients* administered the Hospital Anxiety and Depression Scale (HADS), Mental Health Continuum (MHC), Multidimensional Scale for Perceived Social Support (PSS), Social Support received by the ICU staff (SSICU), SF-8, Social Self-Efficacy Scale (SSE), Dutch Eating Behaviour Questionnaire (DEBQ) and the International Physical Activity Questionnaire (IPAQ). However, the outcomes of these questionnaires were not relevant for the data analysis of the current research.

Measures

Next to demographics and general information, respondents completed three scales: First, the Perceived Stress Scale (PSS), second, the subscale insomnia of the Holland Sleep Disorder Questionnaire (HSDQ) and, third, the subscale seeking social support of the survey instrument Coping Strategies Inventory (CSI) (see Appendix A).

Perceived stress scale (PSS)

The PSS is a ten-item self-administered questionnaire evaluating the degree to which an individual has appraised life as uncontrollable, unpredictable, or overloading (Cohen et al., 1983; Nielsen et al., 2016). Respondents were asked about their feelings and thoughts in the past month and indicated their answer on a 5- point Likert-scale (0 = *Never*; 4 = *Very often*). A sample question was: *"In the last month, how often have you felt that you were unable to control the important things in your life?"*. Cronbach's alpha indicated good construct validity ranging between .75 and .91. Cronbach's alpha values of the current study were excellent (α=.96). Generally, the higher the sum score the higher the degree of perceived stress, no cut-off scores were predefined (Cohen et al., 1983; Nielsen et al., 2016).

Insomnia

Insomnia symptoms were measured with the insomnia sub-scale of the Holland Sleep Disorder Questionnaire (Kerkhof et al., 2013). The sub-scale consists of eight self-administered items rated on a 5-point Likert scale ranging from 1 = *totally not applicable* to 5= *totally applicable*. The time frame of the scale referred to the past 3 months. Items involved were for example: *"I experience fatigue during the day"* and *"I am awake for a long time during the night"*. As the survey was conducted in English the Dutch questionnaire was translated into English. Generally, higher scores indicate more severe insomnia symptoms, and lower scores indicate milder insomnia symptoms, with a cut-off score of 3.68. In a sample that included adolescents from the general and the clinical population, Cronbach's alpha was 0.88 (Van Maanen et al., 2014). For the current thesis, Cronbach's alpha values were strong (α=.91).

Seeking Social Support

The coping strategy of seeking social support was measured with the social support subscale of the Coping Strategies Inventory (CSI). Participants were instructed to think back to a stressful situation before responding to nine items in a 5-items Likert format (1 = *Not at all*; 5 = *Very much*). A sample question involved was: *"I talked with someone about how I was feeling."*

Cronbach's alpha for the subscale had a value of .89 (Tobin et al., 1984). In the current study Cronbach's alpha values were reliable (α=.85).

Procedure

Recruitment and Informed Consent

After voluntary recruitment through the Sona system, respondents were directed with an anonymous link to Qualtrics where they were informed about the research. They were briefed on the general procedure and setup of the study. Subsequently, participants had to provide informed consent (see Appendix B). Thereby, they indicated that they thoroughly read the description of the study, were aware of the possibility to withdraw from the study at any time, and that they agreed with the terms as described.

Demographics and General Information

First, participants had to indicate their gender, age and nationality and were asked whether they have a relative who was admitted to the ICU in the past 18 months. If the answer was "no", participants were directly forwarded to the end of the survey. If the answer was "yes", more items regarding the timeframe of the discharge, the relationship with the former ICU patients as well as the current care situation were asked. After that, as part of the cross-sectional survey design, they were provided with a questionnaire containing the measures that are described above. After the completion of the survey, participants finished the study.

Debriefing

After completing the survey, participants were thanked for taking part and were debriefed on the purpose of the research. Moreover, respondents were given the opportunity to contact the researchers to gain more insight into the study. Finally, participating students from the University of Twente were awarded with Sona credits for their participation, which are required to pass the studies.

Data Analysis

Dataset Preparation

To analyze the data, the raw dataset was retrieved from Qualtrics and was imported into the statistical software SPSS 25.0. To prepare the data for analysis, cases who did not meet the inclusion criteria were excluded. Next, to handle missing data, the procedural method of pairwise

deletion was applied. Furthermore, to gain an overview of the data, values and labels were added as a third step of data preparation.

Exploratory Analyses

First, a dropout analysis was conducted using an independent sample *t*-test to determine if dropouts of participants appeared random or were related to other factors. For further understanding of the data, frequency tables for floor and ceiling effects, as well as boxplots were conducted to check for possible outliers. Further, a reliability analysis was conducted to assess the internal consistency of each scale. Next, for descriptive statistics, means and standard deviations for the whole sample (referred to as WS) were computed for the variables perceived stress, insomnia, and seeking social support. As a last step of the exploratory analysis two correlational analyses were performed for the WS. First the Pearson's r test was performed to examine the associations between insomnia, perceived stress and seeking social support. Second, dummy variables were created to test for underlying correlations between possible covariates on the outcome variable insomnia. Here, again, the Pearson's r test was used. For interpretation, Pearson Correlation coefficient range from -1 to +1, with higher values suggesting a greater positive or negative relationship (Akoglu, 2018).

Inferential Statistics

Two steps were included within the inferential statistics. First, the assumptions of normality, no multicollinearity, homogeneity, independence, and linearity were checked to ensure that the data is appropriate and valid. Second, to test the hypothesis, multiple linear regression analysis was performed for the WS. Within the multiple linear regression analysis three causal pathways were assessed that led to the outcome variable insomnia: First, the impact of perceived stress as a predictor, second, the impact of seeking social support as a moderator, and third, the interaction of these two. The moderation hypothesis is supported if the interaction of perceived stress and seeking social support is significant (Baron, & Kenny,1986).

Additional Analysis for Participants who Scored Above the Criterion Value for Insomnia

Descriptive statistics, means and standard deviations for participants of the sample who scored above the criterion value of 3.68 for insomnia (referred to as CS) were computed for the variables perceived stress, insomnia, and seeking social support. To test the hypothesis, multiple linear regression analysis was performed.

Results

Exploratory Analysis

A total of 71 participants dropped out of the study. Of these 71 participants, a total of 24 participants were withdrawn because they did not have a relative discharged from the ICU. Therefore, a total of 47 dropouts were left. A drop out analysis was performed to test for a difference in the levels of perceived stress between dropouts and participants who completed the questionnaire. The results of the independent sample *t*-test indicated that participants who dropped out due to missing criteria ($M = 23.00$, $SD = 4.47$) did not show higher levels of perceived stress compared to the participants who finished the questionnaire ($M = 21.48$, $SD = 5.87$), $t\ (55) = .73$, $p > .05$. Further, the variables ICU admission, age and length of stay were used to test for possible differences, however, no significant results were found in explaining the dropout rates. An analysis of standard residuals with the final data set consisting of 57 participants was carried out, which showed that the data contained no outliers (*Std. Residual Min* = -2.00, *Std. Residual Max* = 2.17).

For reliability analysis, Cronbach's alpha was calculated for the subscale of seeking social support, consisting of nine items, insomnia, assessing 8 items and the PSC including 10 items. The internal consistency of the questionnaire seeking social support was reliable, with Cronbach's alpha for positive affect = .85. Further, Cronbach's alpha values were strong for insomnia α =.91 and excellent for PSC α = .96.

On average, participants showed high levels of perceived stress ($M = 21.72$, $SD = 5.67$) and seeking social support was average *(*$M = 30.00$, $SD = 7.81$). The criterion value of 3.68 for insomnia was on average not exceeded ($M = 3.13$, $SD = .96$). The descriptive statistics for the variables for WS can be found in Table 3.

Table 3

Descriptive Statistics for Variables Insomnia, Perceived Stress and Seeking Social Support for the Whole Sample (WS)

Variable	*n*	*M*	*SD*	*Scale range*	*Min*	*Max*	*Criterion value*
Insomnia	52	3.13	.96	1 - 5	1.00	5.00	3.68

Perceived Stress	57	21.72	5.67	0 - 40	7.00	34.00	--
Seeking Social Support	51	30.00	7.81	9 - 45	9.00	45.00	--

For the WS, a Pearson's r test showed a statistically significant positive correlation between perceived stress and insomnia (r (51) = .54; $p < 0.01$). However, a positive significant correlation between seeking social support and insomnia (r (51) = .42*; p* < 0.01) and a non-significant correlation between seeking social support and perceived stress (r (51) = .02*,; p* > 0.01) was found (Table 4).

For the WS, Pearson Correlation was performed to test the strength of an association between the categorical variables gender, nationality, time since discharge, relationship, length of stay, need of care and the dependent variable insomnia. Only the variable "other", referring to the relationship of the participants to the former ICU patient, was found to be significantly associated with insomnia (r (51) = .37*; p* < 0.01; Table 5). However, this significant association was based on a sample size of three participants (Table 2).

Table 4

Correlations for the Continuous Variables: Perceived Stress, Insomnia and Seeking Social Support for the Whole Sample (WS)

Variable	1	2	3
1. Perceived Stress	--		
2. Insomnia	.54**	--	
3. Seeking Social Support	.02	.42**	--

Note. All correlations are significant at the 0.01 level (2-tailed).
**$p < .01$.

Table 5

Correlation Matrix Between Insomnia and Potential Covariates for the Whole Sample (WS)

Covariates	Insomnia
1. Patient is the child	-.04

2. Patients is the parent	-.05
3. Patient is the grandparent	-.25
4. Patient is the sibling	-.01
5. Patient is the aunt/uncle	.16
6. Patient is the cousin	.05
7. Other	. 37**

Note. Pearson Correlation was calculated to examine the association between the variables.
*** p < .01. * p < .05. N* = 57.

Inferential statistics

Assumptions

To check the first assumption of normally distributed residuals, the Shapiro Wilk test was used. The Shapiro Wilk value of $p = .46$ for perceived stress indicated normally distributed residuals. However, a value of $p = .03$ for insomnia was found, indicating non-normally distributed residuals. Further, the assumption of collinearity (perceived stress, *Tolerance* = 1.00, *VIF* = 1.00; seeking social support, *Tolerance* = 1.00, *VIF* = 1.00) as well as the assumption of independent errors (Durbin-Watson value = 1.82) were met. The histogram and the P-P plot of standardized residuals showed normally distributed errors and the scatterplot of standardized residuals revealed that the data met the assumptions of linearity and homogeneity as well.

Hypothesis Testing for the Whole Sample (WS)

After centralizing the independent variable perceived stress and the moderator variable seeking social support to reduce multicollinearity, a multiple linear regression was performed to test the first hypothesis. As a set, perceived stress and seeking social support accounted for significant variation in insomnia (F (3, 47) = 20.46, $p < .05$, $R^2 = .57$, $R^2_{Adjusted} = .54$). The multiple linear regression analysis showed a positive association between perceived stress and insomnia which is in line with the Pearson correlation analysis ($\beta = .61$, $p = .00$). Therefore, the first hypothesis that higher perceived stress predicts higher symptoms of insomnia in young adults' family members of former ICU patients was accepted. However, as no significant interaction of perceived stress*seeking social support on insomnia ($\beta = -.09$, $p = .36$) was found, the second hypothesis that seeking social support moderates the association between perceived stress on insomnia was rejected (Table 6).

Table 6

Results of Multiple Regression with Dependent Variable Insomnia for the Whole Sample (WS)

Variable	*B*	*SE B*	*β*	*t*	*p*
Perceived Stress	.10	.02	.61	6.31	.00**
Seeking Social Support	.05	.01	.43	4.35	.00**
Perceived Stress*Seeking Social Support	-.00	.00	-.09	-.92	.36

** $p < .01$

Additional Analysis for Participants who Scored Above the Criterion Value for Insomnia

Descriptive Statistics for Variables of Participants who Scored above the Criterion Value (CS)

Only 16 participants scored above the criterion value of insomnia (M = 4.10, SD = .42). Descriptive statistics for the variables for the CS can be found in Table 7.

Hypothesis Testing for Participants who Scored Above the Criterion Value for Insomnia (CS)

Further, the association between perceived stress and insomnia and the association between the moderation of perceived stress*seeking social support on insomnia of CS was tested using a multiple linear regression. As a set, perceived stress and seeking social support did not explained a significant amount of variance in insomnia (F (3, 13) = 2.24, $p > .05$, $R^2 = .38$, $R^2_{Adjusted} = .21$). Further, no significant association between perceived stress and insomnia ($\beta = .49$, $p = .11$) and between seeking social support and insomnia ($\beta = .92$, $p = .12$) was found. Moreover, seeking social support did not moderate the association between perceived stress and insomnia ($\beta = -.42$, $p = .46$) (Table 8).

Table 7

Descriptive Statistics for Variables Insomnia, Perceived Stress and Seeking Social Support of Participants who Scored Above the Criterion Value of 3.68 for Insomnia (CS)

Variable	*n*	*M*	*SD*	*Scale range*	*Min*	*Max*
Insomnia	16	4.10	.42	1 - 5	3.75	5.00
Perceived Stress	16	25.31	5.12	0 - 40	14.00	34.00

Seeking Social Support	15	32.93	8.43	9 - 45		9.00	45.00

Table 8

Results of Multiple Regression with Dependent Variable Insomnia for Participants who Scored Above the Criterion Value of Insomnia (CS)

Variable	*B*	*SE B*	β	*t*	*p*
Perceived Stress	.04	.02	.45	1.75	.11
Seeking Social Support	.04	.02	.92	1.71	.12
Perceived Stress*Seeking Social Support	-.00	.00	-.42	-.42	.46

** $p < .01$

Discussion

Summary of Results

The current research aimed to test whether higher perceived stress predicts higher symptoms of insomnia and whether seeking social support constituted a protective factor weakening the association between perceived stress and insomnia of young adults' family members of former ICU patients up to 18 months after discharge. To summarize the findings, for the whole sample (WS), on average young adults did not experience symptoms of insomnia. Further, the results indicated that for WS perceived stress led to higher symptoms of insomnia. Therefore, the first hypothesis was accepted. However, seeking social support was not found to be a protective factor weakening the association between perceived stress and insomnia. Therefore, the second hypothesis was rejected.

For those participants who did experience symptoms of insomnia (CS), stress was no precipitating factor. Therefore, the first hypothesis was rejected. Moreover, seeking social support did not weaken the association between perceived stress and insomnia. Therefore, the second hypothesis was rejected.

Theoretical Implications

The Association Between Perceived Stress and Insomnia for the Whole Sample (WS)

The results obtained in this research revealed evidence for a positive association between perceived stress and insomnia which supports the first hypothesis. These findings are consistent with previous research on stress and insomnia which has shown that stress is a well-explored predictor of insomnia (Hu et al., 2020; Astill et al., 2013). As previous findings have indicated that sleep is a crucial resource for young adults to restore physical and mental health, this research supports the positive health perspective which states that sleep as a part of body functions is important for the health (Tarokh, et al., 2016; Huber et al., 2011). Generally, being exposed to a stressful life event impairs the normal sleep function and can trigger insomnia disorder (Kalmbach et al., 2018). However, environmental contexts and individual differences for premorbid vulnerabilities to insomnia influence the extent to which symptoms of insomnia are displayed. Premorbid vulnerabilities include for example poor coping, greater substance misuse or negative cognitive emotional factors (Kalmbach et al., 2018). Within the context of young adults' family members after discharge of a patient from the ICU the association between perceived stress and insomnia has not been yet researched (Day et al., 2013; Tarokh et al., 2016). Therefore, this research provides an important contribution to the literature as the results showed that also under conditions of uncontrollable stress as it is experienced by young relatives of a former ICU patient stress indeed influenced symptoms of insomnia.

Next, the results showed that the young relatives in the present study scored high on perceived stress. This finding is consistent with previous literature which has also found that individuals show higher levels of perceived stress after a stressful life event (Petrinec, & Daly, 2016). Previous research has almost exclusively focussed on the acute setting and on the high levels of experienced stress of family decision makers and/or the "first contact person" (Petrinec, et al., 2016; Day et al., 2013).

On average, young adults scored below the criterion value of insomnia in this thesis. According to research, young individuals frequently fall short of the standard sleep guideline of 7-9 hours each night and consequently experience insomnia quite frequently (Sivertsen et al., 2019; de Bruin et al., 2015, 2018). Therefore, the finding of young adults scoring below the criterion value of insomnia was unexpected. An explanation for the low score is provided in a study conducted by McArdle et al. (2020), who have researched the prevalence of common sleep disorders in young adults. Their study has shown that not only insomnia but other sleep disorders

like obstructive sleep apnea (OSA), restless legs syndrome (RLS) and abnormal periodic leg movements during sleep (PLM) were common in young adults. Therefore, young adults of former ICU patients could have displayed symptoms of other sleep disorders, which were not detected in the current study as only the sleep disorder insomnia was included.

An alternative interpretation for the low score of insomnia could be explained by the sample population being used to collect the data. The sample population of this study mostly consisted of students. Students show health-conscious behavior and are educated in the importance of sleep as part of a healthy lifestyle impacting their well-being (Majer, 2019). Therefore, insomnia as a sleep disorder might not be present in the sample population.

The Association Between Perceived Stress and Insomnia of Participants Who Show Symptoms of Insomnia (CS)

The results showed that young adults who showed symptoms of insomnia (CS) scored slightly higher on perceived stress compared to young adults who, on average, did not experience symptoms of insomnia. However, perceived stress was not associated with insomnia. Therefore, the first hypothesis for CS was rejected. This finding is in contrast to previous research that has proposed that stress is a common precipitant of insomnia (Bastien et al., 2004). An explanation for the absence of an association between these two is that not only stress is prevalent in family members of former ICU patients but also anxiety and depression. Further, also more severe symptoms of stress, classified as PTSD, were oftentimes reported by family members and might therefore be a predictor for insomnia (Han et al., 2012; Davidson et al., 2012). This shows that by using stress as a predictor in the present study, the model might have missed to detect individuals who suffered from insomnia because of e.g., depressions or PTSD, resulting from the ICU admission of a relative.

The Association Between Seeking Social Support and Insomnia

The results of the WS of young adults indicated a positive association between social support and insomnia, meaning that social support seeking behavior increases symptoms of insomnia. This finding that seeking social support was positively associated with insomnia assumes that symptoms of insomnia are displayed. However, the WS indicated on average no symptoms of insomnia. In contrast, for the CS no positive association between seeking social support and insomnia was found, even though they showed symptoms of insomnia. This is an unexpected finding because, on the one hand, literature has stressed the positive association

between seeking social support and insomnia. To specify this, the coping strategy of seeking social support is part of emotion focused coping (EFC) (Tobin, et al., 1984). According to Sadeh et al. (2004) EFC leads to disruptive and reduced sleep and therefore seeking social support rather increases symptoms of insomnia. This is also in line with a study conducted by Morin et al., (2003) who have found that insomnia patients relied more on EFC strategies which resulted in impaired sleep. On the other hand, literature highlighted the health advantages of social support seeking behavior. In a study with older adults (60 years or older) it has been claimed that seeking social support positively affected sleep in people with insomnia (Troxel et al., 2010). However, as the findings of the current study suggested an absence of the association between seeking social support and insomnia, more research is needed within the context of young adults' family members of former ICU patients.

Seeking Social Support in Relation with Stress and Insomnia

In this research, seeking social support did not moderate the positive association between perceived stress and insomnia. As past research has highlighted the benefits of seeking social support on stress reduction and physical health improvement, the absence of social support seeking behaviour as a protective factor is surprising. Especially when considering the population being tested, namely young adults (18-29), who are generally higher in seeking social support (Jiang et al., 2018). However, several possible explanations can be found in the literature.

First, previous findings have indicated that seeking social support is dependent on an individual's perceived available support (Ognibene, & Collins, 1998). Individuals who perceive more available support from friends and family sought more social support in response to stress. However, not only the individual differences in the availability of social support but also the COVID-19 pandemic could have influenced support seeking behavior. The data collection of this research took part during the COVID-19 pandemic. In this context the World Health Organization (WHO) has published recommendations to implement social distancing measures and quarantine procedures for the general population. These implementations might have resulted in feelings of isolations and perceived lack of social support (Bauer et al., 2020). This serves as another explanation that social support did not weaken the association between perceived stress and sleep, as through the COVID-19 pandemic and its social distancing and

quarantine procedures the social support system could have been occupied and might have been less available. Therefore, young adults sought less social support in response to stress.

Next, within the Transactional Model of Stress and Coping, individuals use a broad spectrum of coping strategies to manage and cope with stressful life events. This implies that the coping strategies differ for each individual (Folkman et al., 1986; Glanz et al., 2008). An example is provided by Ognibene et al. (1998) who have found that secure individuals perceived more available support from friends and family and sought more social support in response to stress. However, fearful individuals were more likely to distance themselves in some context and were less likely to seek social support. The individual differences in using coping strategies provide another possible explanation for the absence of social support seeking behaviour as a moderator.

Lastly, the discharge of a relative displays a situation of uncontrollable stress for young adults. Literature has stressed that under conditions of uncontrollable and extreme stress, an individual's natural reaction is to rather withdraw from activities. The so called "shut off" response leads to preservation of energy, reduced activity and is compatible with extended sleep (Sadeh et al. 2004). Therefore, avoidance coping strategies as a part of disengagement coping might be more effective when an individual is exposed to a situation or an event which is perceived as uncontrollable, as it is the case for young adults' family members of former ICU patients (Sadeh et al. 2004).

Strengths and limitations

Strengths

First, this thesis is the first to research the association of perceived stress on insomnia within the context of young adults' family members of former ICU patients. Through finding a significant association between perceived stress and insomnia of young adults, this research indicated that it is important to not only focus on the psychological issues of young adults but also possible physical health issues, like insomnia.

Second, the high levels of perceived stress found in young adults indicated that not only the "first contact person" and/or the family decision makers suffer from PICS-F. Therefore, this finding adds to previous research and sets the basis for including young adults in future research and recommendations for treatment. Next, as this thesis is part of a larger study, data was

gathered with five other students from the University of Twente. This portrays a strength because more participants were recruited compared to an individual's data collection. Consequentially, the statistical power increased.

Limitations

There are some limitations which potentially affected the validity of this research. A cross sectional study design has been used in this thesis, which assessed the variables simultaneously. Consequently, no causal relationship between these variables could have been established and could, therefore, have affected the validity (Solem, 2015). Next, self-report measures like the subscale insomnia or the PSS are threatened by self-reporting bias. To specify this, the self-reporting bias could have arisen from recall bias (Althubaiti, 2016). Referring to recall bias, when answering the items included in the PSS or in the subscale insomnia of the HSDQ young adults had to evaluate the exposure to these variables retrospectively. As these responses depended on the ability of a participants to recall past events, recall bias could have occurred about these past exposures which might have affected the validity (Althubaiti, 2016). Last, to recruit as many participants as possible with the aim to get significant results, the inclusion criteria, time since discharge, was expanded to 18 months. However, there is growing evidence that traumatic memories are prone to distortion. The more time has passed the more an individual remembers traumatic memories as more stressful than they have actually experienced. This phenomenon is also referred to as "memory amplification" (Strange, & Takarangi, 2015). Therefore, expanding the inclusion criteria time since discharge to 18 months could have falsified the results as too much time could have already passed in order to answer the questionnaires truthfully.

Future Research

Only the coping strategy of seeking social support was used to test for a possible moderation on the association between perceived stress and insomnia in this study. Therefore, as a first suggestion for future research, one could test for a possible moderation between perceived stress and insomnia using other coping strategies, i.e. avoidance coping, as well. Literature has shown considerable differences in individual's coping strategies. More specifically, when individuals are given a choice of strategies the possibility of successfully coping increases (Rokke, & al'Absi, 1992). Additionally, to pick up the positive health perspective, successfully

managing and coping with stressful life events benefits the health and reduces distress (Huber et al., 2011). The Coping Strategy Inventory (CSI) provides a useful and valid tool and can be used for future research to identify coping strategies for particular individuals to help manage stress (Rokke et al., 1992).

Next, the relationship variable "other" has been found to be related to insomnia. However, this association might not be meaningful due to the small sample size of three participants. Nevertheless, a suggestion for future research is to define "other" by including more possible relationships. As friends are central to the lives of young adults, one suggestion would be to include "friends" as a further relationship variable of young adults to the former ICU patient (Barry, & Madsen, 2010). Further, to identify the "other" category, another suggesting is to conduct a qualitative follow-up study using a mixed method approach, yielding a sequential, explanatory design. This will be helpful in understanding this quantitative answer, by means of an open, qualitative question to further identify the meaning of these answers.

Additionally, literature has presented PTSD as an extreme example of the association between stress and insomnia (Han et al., 2012). As data shows high prevalence rates for family members of former ICU patients for PTSD (56%), a third suggestion for future research would be to include PTSD as a covariate to test for a possible stronger association on insomnia (Zante et al., 2020). A further suggestion for future research is to not only include PTSD but the availability of a social support system as an independent variable to test for an association between the availability of social support and social support seeking behaviour. Previous research has found that the more perceived social support available the more individuals seek social support in response (Ognibene et al., 1998). Next, not only insomnia as a sleep disorder insomnia but other sleep disorder like OSA, RLS or PLM were found to be common in young adults (McArdle et al., 2020). Therefore, future research should not only include insomnia but other sleep disorder as well.

Lastly, the self-report measurements used in this research are limited to self-reporting bias of participants. To avoid this limitation and gain more reliable results, one further suggestion is to track e.g. the sleep in order to test for possible symptoms of insomnia. Insomnia can be tracked with means of a wrist actigraphy (Actiwatch® AW4; Cambridge Neurotechnology Ltd., Cambridge, UK) and sleep logs (de Bruin et al., 2015, 2018). Studies conducted by de Bruin et al. (2015, 2018) have shown that by using these two instruments a participant's sleep

efficiency (SE), time spent asleep (TST) and their sleep onset latency (SOL) were calculated and insomnia could be assessed. However, these measures did not fit the time frame of this thesis because they are more time consuming. Consequently, self-report measurements have been used.

Conclusion

The present study showed that young adults' family members of former ICU patients suffer from high levels of stress. However, on average no critical symptoms of insomnia were displayed. For participants who showed symptoms of insomnia stress was not a precipitating factor of insomnia. Seeking social support was not found to be a protective factor for weakening the association between stress and insomnia for both groups. Generally, this research was the first to assess the physical health burden, resulting from the discharge of a former ICU patient, for young relatives aged between 18-29 years. As young relatives show high levels of stress and almost 30% of young adults show symptoms of insomnia, this research contributes to literature as it strengthens the need for future research to focus on possible physical health issues of young relatives of former ICU patients. Moreover, further research is needed to test for coping strategies used by young relatives to effectively provide treatment recommendations and design interventions.

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Appendix

Appendix A

Survey

First, we would kindly ask you to answer a few questions concerning your demographics.

1. What is your gender?

   [ ] male

   [ ] female

   [ ] non-binary/third gender

   [ ] prefer not to say

2. Age
3. Nationality

   [ ] Dutch

   [ ] German

   [ ] other:

4. Do you have a relative that was admitted to the ICU in the past 12 months

   [ ] yes

   [ ] no

5. How many months have passed since the relative was discharged from the ICU?
6. What relationship do you have with the relative?

   The relative is my…

   [ ] Parent

   [ ] Grandparent

   [ ] Sibling

   [ ] Aunt/Uncle

   [ ] Cousin

   [ ] Other

5. How long was the stay of your relative? (in days)

   [ ] <2

   [ ] 2-7

   [ ] 8-14

[ ] 15-31

[ ] >31

6. How many times was the relative admitted to the ICU?
7. Is the relative still in need of receiving care from relatives/formal caregivers?

[ ] yes, I/my family provides the care

[ ] yes, a formal caregiver provides the care

[ ] My relative died in the ICU

[ ] No

Perceived Stress Scale (PSS)

The questions in this scale ask you about your feelings and thoughts during the last month. Indicate how often you felt or thought a certain way.

Please choose the answer that appears most appropriate. If you are unsure about which response to give to a question, the first response you think of is often the best one.

0 = Never 1 = Almost Never 2 = Sometimes 3 = Fairly Often 4 = Very Often

1. In the last month, how often have you been upset because of something that happened unexpectedly?
2. In the last month, how often have you felt that you were unable to control the important things in your life?
3. In the last month, how often have you felt nervous and “stressed”?
4. In the last month, how often have you felt confident about your ability to handle your personal problems?
5. In the last month, how often have you felt that things were going your way?
6. In the last month, how often have you found that you could not cope with all the things that you had to do?
7. In the last month, how often have you been able to control irritations in your life?
8. In the last month, how often have you felt that you were on top of things?
9. In the last month, how often have you been angered because of things that were outside of your control?

10. In the last month, how often have you felt difficulties were piling up so high that you could not overcome them?

Holland Sleep Disorder Questionnaire (HSDQ)

In the following, you are asked to fill out questions about your sleeping behaviour. Please indicate the extent to which the statements apply to you. When answering the questions, keep in mind that it concerns the past 3 months

[ ] Totally not applicable

[ ] Often not applicable

[ ] Sometimes applicable, sometimes not applicable

[ ] Often applicable

[ ] Totally applicable

1. I experience fatigue during the day.
2. My sleep quality is poor and I don't feel well-rested in the morning.
3. I am awake for a long time during the night.
4. I am worried about the consequences of my poor sleep (for example the consequences for my health).
5. I experience difficulties falling asleep at night.
6. Especially after a poor night of sleep, I experience one or more of the following consequences throughout the day: fatigue, sleepiness, bad mood, poor concentration, memory issues, lack of energy.
7. I don't get enough sleep, even though I have sufficient opportunities to have long nights of sleep.
8. Because I don't sleep enough, I am functioning less well throughout the day.

Coping Strategy Inventory (CSI)

Take a few moments and think about an event or situation that has been very stressful for you during the last month. By stressful we mean a situation that was troubling you, either because it made you feel bad or because it took effort to deal with it. It might have been with your family, with school, with your job, or with your friends. As you read through the following items please answer them based on how you handled your event.
Please read each item below and determine the extent to which you used it in handling your chosen event. Please use the provided answer questionnaire in the following manner.
Once again, take a few minutes to think about your chosen event.

a. Not at all
b. A Little
c. Somewhat
d. Much
e. Very much

1. I accepted sympathy and understanding from someone.
2. I found somebody who was a good listener.
3. I talked to someone about how I was feeling.
4. I just spent more time with people I liked.
5. I talked to someone that I was very close to.
6. I let my friends help out.
7. I asked a friend or relative I respect for advice.
8. I spent some time with my friends.
9. I talked to someone who was in a similar situation.

Appendix B

Description of the research and your participation

You are invited to participate in a research study conducted by Anita Suntharalingam, Luca Marie Schlieper, Lena Fitzian, Joana Grahl, Mirjam Kühne, and Leona Rudolph. This study is

part of our bachelor theses that we are writing, under supervision of Jorinde Spook, PhD (Assistant Professor, Health Psychology & Technology at the University of Twente).
Please read the following instructions carefully, as it informs you about the purpose of the study, your task and the way we would like to use your information.

About this research:
As the admission of a patient to the Intensive Care Unit (ICU) also impacts the patients' family members, it is important to gain more thorough understanding of the wellbeing of these relatives. Especially young adults in the age category of 18-29 years old are underrepresented in the current body of research. Therefore, we aim to study different (mental and physical) health-related concepts in relation to an ICU-admission of a relative in the past 18 months (i.e., symptoms of anxiety, depressive feelings, quality of life, sleep disturbance, eating pattern, and stress), completed with questions about social support, flourishing, self-efficacy, and coping strategies. Filling in the questionnaire will take about 30 minutes.

Before we begin, some aspects of the research are explained and how we will handle the data.
There are no known risks associated to this survey research.
There are no known benefits to you that would result from your participation in this research.
We are targeting healthy individuals that are not undergoing any treatment for depression, anxiety or PTSD.
We are interested in your own personal experiences. This means that there are no right or wrong answers: you are the expert on this subject.
Each of the researchers will write a bachelor thesis report concerning their topic of research. These theses will be assessed by our first and second supervisor. Furthermore, we only report anonymous, analyzed data in our theses. The final (anonymous) dataset may be used by future students of the University of Twente to continue studying the topic.
Your participation in this research study is voluntary. You may choose not to participate, and you may withdraw your consent to participate at any time. You will not be penalized in any way should you decide not to participate or to withdraw from this study. You are allowed to withdraw the study at any time without stating any reason.

Study contact details for further information

If you have further questions, feel free to contact the researchers: Anita Suntharalingam (a.suntharalingam@student.utwente.nl), Luca Marie Schlieper (l.m.schlieper@student.utwente.nl), Lena Fitzian (l.fitzian@student.utwente.nl), Joana Grahl (j.grahl@student.utwente.nl), Mirjam Kühne (m.u.kuehne@student.utwente.nl), Leona Rudolph (l.rudolph@student.utwente.nl) or our supervisor: Jorinde Spook (j.e.spook@utwente.nl).

Contact Information for questions about your rights as a research participant

If you have questions about your rights as a research participant, or wish to obtain information, ask questions, or discuss any concerns about this study with someone other than the researcher(s), please contact the Secretary of the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences at the University of Twente by ethicscommittee-bms@utwente.nl (ethical number:210239)