Does Avoidance Coping Strengthen the Association between Perceived Stress and Emotional Eating in Former ICU Patients' Young Adult Family Members? A Survey Study

Bachelor Thesis

Leona Rudolph
Department of Psychology, Health & Technology, University of Twente
Health Psychology and Technology
Dr. J.E. Spook (1st Supervisor)
Dr. M.E. Pieterse (2nd Supervisor)
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Contents

Abstract

Background The admission of a relative to the intensive care unit impacts the well-being of young adult family members, also in the time after the discharge. The perceived stress that is caused by the admission can induce emotional eating. Emotional eating has been shown to be higher in avoidance coping users.

Objective The present study investigated whether avoidance coping strengthens the association between perceived stress and emotional eating in young adult family members of former ICU patients up to 18 months after discharge.

Methods By convenience sampling, 54 young adults in the age of 18-29 (M_{age}=22.7; 72.2% female, 24.1% male, 3.8% other) were included in this cross-sectional survey study. The survey included the measures Perceived Stress Scale (α=.79), Coping Strategy Inventory (α=.76) and Dutch Eating Behavior Questionnaire (α=.96). To assess the association between perceived stress and emotional eating, moderated by avoidance coping, a multiple linear regression was applied.

Results Perceived stress was positively associated with emotional eating (β=.37, p=.01). Avoidance coping was found to weaken this association between perceived stress and emotional eating (β=-.29, p=.04).

Conclusion The present findings add to the research field of the experienced burdens of former ICU patients' family members, as a health psychological perspective was provided. It emphasizes the importance of paying more attention to the impact of stress on eating behaviours, especially in young adults. The surprising finding, that the use of avoidance coping strategies protected from engaging in emotional eating shows the importance of further investigation which role coping strategies play when young family members are confronted with unchangeable situations. With this insight, effective interventions and prevention programs can be developed that specifically target young adult family members of former ICU patients.

The critical illness of a relative and the admission to an intensive care unit (ICU) can change the life of the patient and the family from one moment to the next without any warning. Traditional research and interventions predominantly focused only on the needs of the ICU patients (Harvey & Davidson, 2016). However, studies revealed that family members are as well at risk of displaying severe negative physical and psychological responses to the critical illness of relatives. The term *post intensive care syndrome-family* (PICS-f) was introduced to describe these negative outcomes for family members of former ICU patients (Davidson, Jones, & Bienvenu, 2012). A review study by van Beusekom, de Keizer, Dongelmans, and van der Schaaf (2016) showed that across many reviews on burdens of ICU family members, definitions, focuses and outcomes vary. But what stands out is that depression (23-44%), post-traumatic stress disorder (PTSD) (32-80%) and anxiety (15-24%) were the most prevalent mental health burdens of family members, 6-12 months after discharge of the patient. Yet, this research lacks the inclusion of young adults between 18-29 years, as studies only included a mean age of 47 as young age (Anderson, Arnold, Angus, & Bryce, 2008). Also, less research concentrated on a health psychological perspective. Existing studies, which focused only on the acute care phase, indicated that changed eating behaviours are associated with having a relative admitted to the ICU (Choi, Donahoe, & Hoffman, 2016; Choi et al.,2013). It is known that eating behaviour in response to stress depend also on the way how people deal with the stressor (i.e., coping strategies). For example, individuals who avoid thinking about or dealing with the origin of the stress are more likely to eat in response to emotional states (Park & Iacocca, 2014).

Choi et al. (2013) advocated for an increase of research on the health risk behaviours of ICU patients' family members, as 62% reported in their study e.g., a decreased food-intake. Yet, their research and, likewise, the other eating behaviour related studies focused only on acute care situations and not after the discharge of a relative and none included young adults. For example, a study by Van Horn and Tesh (2000) showed that 30% of ICU family members reported a change in their dietary pattern, such as decreased appetite (50%) and increased intake of unhealthy food, in the acute care phase. The intake of junk food replaced well-balanced meals, including a non-sufficient amount of vegetables. The study of Van Horn and Tesh (2000) was in line with findings of an older study by Halm et al. (1993), in which one participant stated: "For lunch I just ate cookies from my aunt." (p.423). Further, the respondents noticed frequently the leaving out of meals. In interviews of Engström and Söderberg (2004) spouses reported: "If no one told me to go and eat … I didn't think about eating for myself, I was never hungry" (p.303). One major determinant of these changed eating behaviours across settings is perceived stress (Tomiyama, 2019; Yau & Potenza, 2013). Stress, according to the Transactional

Approach of Folkman and Lazarus (1984), is “a particular relationship between the person and the environment that is appraised by the person as taxing or exceeding his or her resources and endangering his or her well-being” (p.19).

Emotional Eating

The consumption of food in response to perceived stress and negative emotion is referred to as *emotional eating*. Studies linked emotional eating especially to overeating and to the tendency to consume more comfort food. Comfort food includes palatable snacks that are energy dense but have a low nutrient score (Macht, 2008; Spoor, Beeker, Van Strien, & van Heck, 2007; Tan & Chow, 2014). Whereas reactions to acute stressors inhibit eating and decrease appetite, chronic stress is associated with higher food intake (Adam & Epel, 2007; Torres & Nowson, 2007). Similarly, individuals exposed to chronic stressors reported a greater consumption of palatable and unhealthy food (Groesz et al., 2012). Adam and Epel (2007) explain this with increased cortisol levels in response to persisting stress and the consumption of food to get relief or reward. Family members of former ICU patients experience this phase of chronic stress, as they are no longer confronted with the acute care situation but rather long-term consequences. This means, especially their chronic stress might predict higher engagement in emotion-induced eating (Klatzkin, Baldassaro, & Hayden, 2018).

Moss, Conner, and O’Connor (2020) found that in young adults, especially negative emotion (e.g., sadness, nervousness, scaredness) elicit eating. They concluded that literature lacks research on young adults’ eating behaviours in response to emotion. Nevertheless, they stressed that young adults’ behaviours seem to be in line with adults’ responses, i.e. that they increase the intake of snacks and palatable food when experiencing negative emotion. Another study with young adults found also the perceived severity of stress as determining the likelihood of emotional eating (Tan & Chow, 2014). In a study by Tomiyama, Dallman and Epel (2011), not only emotional eating was associated with high chronic stress, but also a higher tendency for abdominal fat. This shows that uncontrolled eating and weight gain are determined as outcomes of high scores in prolonged perceived stress, resulting from the ICU discharge of a relative.

The Transactional Model of Stress and Coping in Relation to Emotional Eating

In order to inquire an understanding, why individual differences in eating behaviour in responses to stress exist, *The Transaction Model of Stress and Coping* can serve as a framework. Folkman and Lazarus (1984) describe in their model how one reacts to a stressful event, taking

into account the interplay between individual internal factors, the environmental context and personal recourses. As shown in Figure 1, the external predecessor to a persons' reaction is referred to as a stressor, in this case, the ICU admission of a relative. Whether or not this stressor is relevant and threatening to an individual is evaluated by using the so-called *primary appraisal*. When perceiving an event as harmful, a person will analyse the available recourses that can help to deal with the experienced demands. This process is named *secondary appraisal*. Depending upon the cognitive appraisal, a specific coping style will be selected with the expectancy to limit the threat for the self. The response, affected by the cognitive appraisal and coping behaviour, is defined as adaptational outcome (Folkman & Lazarus, 1984). Specifically, Folkman and Lazarus (1984) determine "three basic kinds of outcome are functioning in work and social living, morale or live satisfaction, and somatic health" (p.181). Emotional eating is such an outcome, because studies repeatedly found higher energy intake as a response to negative emotional stress (Nguyen-Rodriguez, Unger, & Spruijt-Metz, 2009).

Especially the choice of a certain coping style, depending on the cognitive appraisal of an event, affects how an individual reacts to a stressor. For example, whether or not one would engage in emotional eating in response to perceived stress, resulting from the ICU admission of a relative. Coping can be defined as the mental and behavioural attempts to deal with a stressor that was appraised as demanding for the self (Folkman & Lazarus, 1988). Folkman and Lazarus (1984, 1980) defined two ways of coping, namely problem-focused and emotion-focused. Endler and Parker (1990) added the strategy *avoidance coping*. They distinguish between avoidance behaviours that are associated with social support, referring to as social diversion and avoidance behaviours that centre at executing replacement tasks, so-called distraction. In the case of this study, the latter dimension is relevant, as engaging in emotional eating was shown to be associated with greater involvement in avoidance distraction (Henderson & Huon, 2002; Spoor et al., 2007). Other studies found similar correlations between avoidance coping and the outcome of engaging in maladaptive eating (MacNeil, Esposito-Smythers, Mehlenbeck, & Weismoore, 2012; Park & Iacocca, 2014; Rodino, Gignac, & Sanders, 2018). In addition, the young family members of former ICU patients are confronted with an event that they cannot influence or control. The unchangeable threat they experience makes it more likely that they try to avoid dealing with the stressor (Franks & Roesch, 2006).

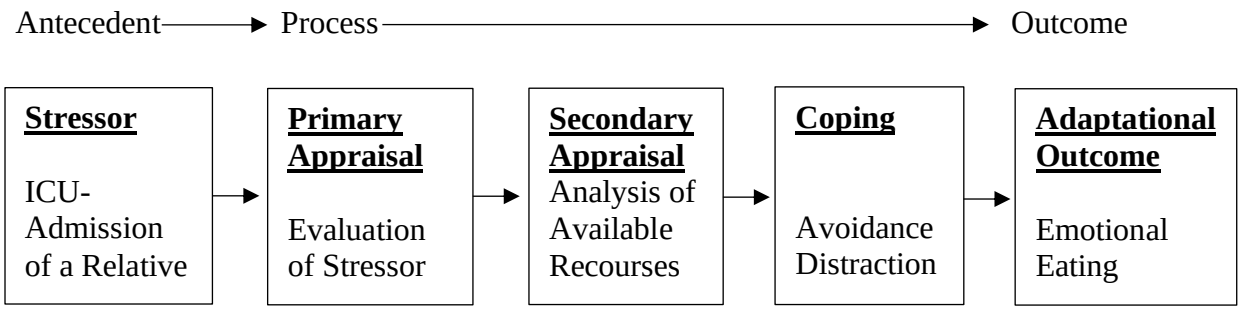

Figure 1. Transactional model of stress and coping in relation to emotional eating

Aim of Research

Although studies found younger age as a risk factor for experiencing greater symptoms of anxiety and depression in response to an ICU admission of a relative, no research on health behaviours of family members of former ICU patients included young adults (Anderson et al., 2008). This gap in research comes along with the case that the few existing studies which measured eating patterns of ICU patients' family members only focused on the acute care situation and not afterwards (Engström & Söderberg 2004; Halm et al., 1993; Van Horn & Tesh, 2000). Research generally found that chronic and uncontrollable stressors, as it is assumed to be present in family members post the ICU stay of their relatives, predict an increase in emotional eating. This emotional eating can be explained with the coping style of an individual and was especially displayed in avoidance coping users, as shown in Figure 2. Based on these previous research findings, it is hypothesized that:

H_1: Perceived stress is positively associated with emotional eating behaviour in young adult family members of former ICU patients whose discharge was up to 18 months ago.

H_2: Avoidance coping strengthens the association between perceived stress and emotional eating behaviour in young adult family members of former ICU patients whose discharge was up to 18 months ago.

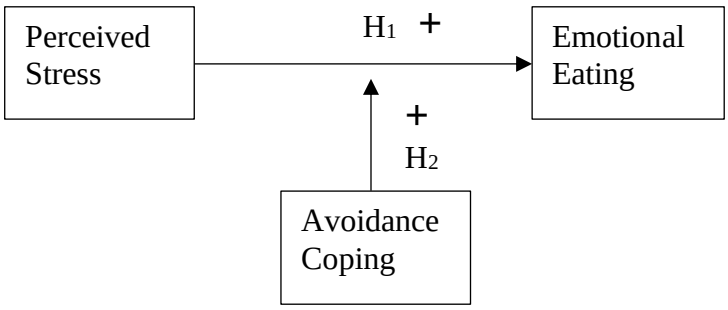

Figure 2. The Positive Association between Perceived Stress and Emotional Eating, Moderated by Avoidance Coping

Method

Study Design

A between-subject cross-sectional design was applied to measure the interaction between perceived stress, emotional eating and avoidance coping. The research was approved by the Ethics Committee BMS of the University of Twente (ethical number 210239).

Participants

Using a convenience sample, data were collected in April-Mai 2021. All participants were volunteers. In total, 54 participants were included in the study. 72.2% were female, 24.1% were male, 1.9% were non-binary and 1.9% preferred not to say. The participants mean age was 22.7 years (*SD*=2.67). As an inclusion criterion it was set that only individuals at the age of 18-29 were considered as participants. Further, only individuals who have had a relative admitted to the ICU in the past 18 months with a stay longer than 48h were included. Table 1 shows all relevant sociodemographic characteristics of the sample.

Table 1

Sociodemographic Characteristics of Participants

Characteristic	*n*	*%*	*M*	*SD*
Total sample	54	100		
Nationality				
Dutch	1	1.9		
German	45	83.3		
Other	8	14.8		
Time since discharge [a]				
<1	7	13.0		
2-3	12	22.2		
4-6	5	9.3		
7-12	24	44.4		
13-18	2	3.7		
Relationship				
Own child	1	1.9		
Parent	15	27.8		
Grandparent	20	37.0		
Sibling	4	7.4		
Aunt/Uncle	6	11.1		
Cousin	6	11.1		
Other	2	3.7		
Length of stay				
<2	5	9.3		
2-7	13	24.1		
8-14	16	29.6		
15-31	12	22.2		
>31	8	14.8		
Need for care				
Yes, family provides care	16	29.6		
Yes, former caregiver provides care	4	7.4		
Relative died	20	37.0		
No	14	25.9		
Number of admissions			2.06	4.14

[a] in month

Material

As being part of the larger project *Survey on Health: A comparison between young adults with relatives as former ICU patients*, data was collected together with five other students of the University of Twente. Using SONA and Survey Cycle to spread the survey, Qualtrics was used to gather the data. In the present study, the measures Perceived Stress Scale (PSS), Dutch Eating Behavior Questionnaire (DEBQ) and Coping Strategy Inventory (CSI) were included to test the variables perceived stress, emotional eating and avoidance coping.

Measures

Stress.

The 10-item Perceived Stress Scale was used to measure the level of stress, experienced by the family members. Items were answered on a 5-point Likert scale from 0 (*Never)* to 4 (*Very Often).* Participants rated, for example, "In the last month, how often have you felt nervous and "stressed"?". To calculate the level of perceived stress for each individual, with having a higher score indicating higher stress, the sum score of all items was taken (Cohen, Kamarck, & Mermelstein, 1994). Psychometric properties of the scale have been widely tested across settings, showing adequate internal consistency reliability, with Cronbach's α =.74-.91 (Lee, 2012). Cronbach's α in the present study was acceptable, with α=.79.

Emotional eating.

To identify the level of emotional eating, the 13-item Emotional Eating subscale of the Dutch Eating Behavior Questionnaire was used. Participants rated the items on a 5-point Likert scale ranging from 1 (*Never*) to 5 (*Very Often*). As an example, they were asked "Do you have a desire to eat when you are feeling lonely?". Higher scores reflect greater intake of food in response to emotional, and scores were obtained by taking the average score. The reliability of the Emotional Eating subscale was shown to be satisfactory, with Cronbach's α =.94 (Van Strien, Frijters, Bergers, & Defares, 1986). In the present study, Cronbach' α was found to be excellent, with α=96.

Avoidance coping.

The participants' likelihood of using avoidance coping behaviours and thoughts in stressful situations was measured with the Problem Avoidance subscale of the Coping Strategy Inventory. The 9-item subscale was assessed on a 5-point Likert scale ranging from 1 (*Not at all)* to 5 (*Very much).* Prior to rating the items, participants were asked to think back to an event that they perceived as stressful. Items such as "I avoided thinking or doing anything about the situation." were then answered, based on their chosen event. Scores were calculated by adding each response of the items together (Tobin, Holroyd, & Reynolds, 1984). The Problem Avoidance subscale showed acceptable internal reliability, with Cronbach's α=.70 (Cook & Heppner, 1997). A similar acceptable Cronbach's α was found in the present study, with α=.76.

Procedure

Participants were recruited via SONA, Survey Circle and in the social environment of the researchers. Included individuals were asked to fill out the survey via the online portal Qualtrics, accessed via a link (see Appendix A). Prior to the start of the survey, a consent form with information on confidentiality and the possibility of withdrawal was given (see Appendix B). Participants had to agree with the described terms in order to continue. Next to questions regarding their demographics, questions concerning the family member that had been admitted to the ICU were asked. For instance, they were asked how long ago the ICU admission of their relative was and which personal relationship they have. Subsequently, participants were instructed to complete the three discussed measures regarding perceived stress, emotional eating and avoidance coping (see Section *Measures*). At the end of the survey, a debriefing about the purpose of the study was given, alongside the option to contact the researcher for additional information.

Data Analysis

Exploratory analysis.

Analysis was carried out, using SPSS version 25.0. To prepare the dataset for further analysis, missing data as well as all data which did not met the inclusion criteria were excluded. Next, for the variables perceived stress, avoidance coping and emotional eating, the sum score of the corresponding items was computed. Through exploratory analysis, statistical outliers were detected and excluded. By an independent samples *t*-test, it was tested whether participants who did not finish the survey scored higher in the level of stress. Then, the mean and standard deviation for the continuous variables age and number of admissions, as well as the frequencies for all other sociodemographic variables were computed. Furthermore, the scale reliability was assessed by a reliability analysis with Cronbach's α. For stress, avoidance coping and emotional eating, the descriptive statistics were computed. Next, the correlation between these variables was assessed by a correlation matrix. To detect underlying correlations between the nominal variables relationship, length of stay, need for care, time since discharge and the variables emotional eating and stress, dummy variables were created and a correlation matrix with Pearson Correlation was used as well. For Pearson Correlation, coefficients range from -1 to +1, with scores closer to 1 indicating a stronger positive or negative association (Schober, Boer, & Schwarte, 2018).

Main analysis.

Prior to the main analysis, it was checked whether the assumption of linearity, independence, homoscedasticity, normal distribution and non-multicollinearity were met, in order to ensure valid and reliable results. To control for multicollinearity, scores of the independent variable and the moderation term were centralized. For the purpose of testing the hypotheses, a multiple linear regression was used. Specifically, the direct association between perceived stress and emotional eating was tested. Further, it was assessed whether the association between perceived stress and emotional eating changes as a function of avoidance coping (Baron & Kenny, 1986). To indicate the validity of fit for the model, R^2 shows how much percent of variance in the depended variable is explained by the independent variable, with higher percentage showing a greater fit of the model (Cohen, 1988). A significant association between the independent variables, the moderator variable and the outcome variable is found if $p<.05$. Positive β values indicate a positive association, whereas negative values indicate a negative association (Tranmer & Elliot, 2008).

Results

Exploration of data

After the exclusion of statistical outliers, of participants who did not meet the inclusion criteria and missing data pairwise, a total number of N=54 from a total sample of N=124 was included for the analysis. An independent samples t-test showed no difference in the level of stress between participants who finished the survey and who dropped out, $t(52)=-.66$, $p=.51$. The reliability testing of the used measures revealed good reliability for the PSS, with Cronbach's α=.79. The DEBQ indicated excellent reliability, with Cronbach's α=.96. For the CSI, acceptable reliability was found, with Cronbach's α=.76. Table 2 shows the descriptive statistics for all three measures. Presented are the values before centralizing the score to ensure an easier interpretation of the values.

Table 2

Means and Standard Deviations of the Measures Stress, Emotional Eating and Avoidance Coping

Measure	*n*	*M*	*SD*	*Min*[a]	*Max*[a]
Stress	54	21.85	5.71	7.00 (0)	34.00 (40)
Emotional Eating	49	2.58	1.07	1.00 (1)	5.00 (5)
Avoidance Coping	48	21.91	7.16	9.00 (9)	40.00 (45)

[a] Values between brackets indicate the minimum/maximum score that could be obtained

As shown in Table 3, a correlation analysis with Pearson Correlation indicated stress as being low significantly correlated with avoidance coping, $r(52)=.29$, $p=.04$. Also, between stress and emotional eating, a low significant correlation was found, $r(47)=.30$, $p=.04$. For all other continuous variables, no correlation was found. Possible covariates with underlying correlation between the independent variable stress, the outcome variable emotional eating and the nominal variables time since discharge, relationship, length of stay and need of care were assessed by another correlation matrix, as shown in Table 4. For the variable relationship, "other" was low significantly correlated with stress, $r(52)=.28$, $p=.04$. Also having an aunt/uncle that was admitted to the ICU was found to be significantly correlated with emotional eating, $r(47)=.36$, $p=.01$. Further, for <1 month since discharge, a low significant negative correlation was found, $r(47)=-.28$, $p=.05$. Also, 4-6 months since discharge indicated a low significant correlation with emotional eating, $r(47)=.29$, $p=.04$.

The first assumption of multiple linear regression was tested with a Shapiro Wilk Test, showing a normal distribution of residuals with $p=.55$. Next, even if a significant correlation was found between the independent variables stress and emotional eating, the variance inflation factor indicated no multicollinearity between both variables ($VIF=1.09$). The assumptions of linearity, independence and homoscedasticity were met and assessed with the use of histograms and scatterplots.

Table 3

Correlations for continuous variables

Variable	1	2	3	4
1. Stress	-			
2. Avoidance Coping	.29*	-		
3. Emotional Eating	.30*	.16	-	
4. Number of admissions	-.01	.19	-.03	-

*$p<.05$

Table 4

Correlations for nominal variables with variable stress and emotional eating

Variable	Stress	Emotional eating
Relationship		
Own Child	-.02	-.05
Parent	.09	-.00
Grandparent	-.20	-.21
Sibling	.13	.03
Aunt/Uncle	-.18	.36*
Cousin	.09	-.15
Other	.28*	-14
Time since discharge [a]		
<1	.21	-.28*
2-3	-.01	-.04
4-6	-.13	.29*
7-12	-.09	-.02
13-18	-.06	-.14
Need for care		
Yes, family provides care	.25	-.00
Yes, former caregiver provides care	-.21	-.21
Relative died	-.01	.07
No	-.12	.04
Length of stay		
<2	-.10	-.04
2-7	.18	-.09
8-14	-.18	.11
15-31	.01	.09
>31	.07	-.11

*$p<.05$

Main Findings

Association between stress and emotional eating.

The association between stress and emotional eating, as well as the moderation of stress*avoidance coping on emotional eating was tested by a multiple linear regression. The level of stress, avoidance coping and stress*avoidance coping did explain a significant amount of variance in the level of emotional eating ($F(3,43)=4.82$, $p=.01$, $R^2=.25$, $R^2_{Adjusted}=.20$). The model indicated a positive association between stress and emotional eating ($\beta=.37$, $p=.01$), but not between avoidance coping and emotional eating ($\beta=.07$, $p=.63$).

Avoidance coping.

The results of the multiple linear regression showed that avoidance coping was a significant moderator in the association between stress and emotional eating. It weakened the association (β=-.29, p=.04), as shown in Table 5.

Table 5

Results of Moderated Multiple Regression with Dependent Variable Emotional Eating

Variable	*B*	*SE B*	β	*t*	*p*
Stress[a]	.07	.03	.37	2.63	.01
Avoidance Coping	.01	.02	.07	.48	.63
Stress*Avoidance Coping[a]	-.01	.00	-.29	-2.17	.04

[a] Centralized scores

Discussion

Summary of Findings

The present study aimed at investigating whether avoidance coping is moderating the association between perceived stress and emotional eating in former ICU patients' young adult family members, whose discharge was up to 18 months ago. In line with the first hypothesis, the findings supported that perceived stress is positively associated with emotional eating in the young adults. In contrast, the second hypothesis could not be accepted because avoidance coping weakened the association between perceived stress and emotional eating, although it was hypothesized that avoidance coping strengthens the association.

Theoretical Implications

The association between stress and emotional eating.

The finding that stress was associated with emotional eating is in line with previous investigations. Being exposed to a stressor can elicit eating in response to the negative emotions that are experienced through the stress, especially in young adults (Tan & Chow, 2014). Epel, Tomiyama, and Dallman (2012) pointed out that prolonged stress, as it is experienced in family members of former ICU patients, impacts the brain areas that work on emotion and impulse control. Consequently, the control over own behaviours and impulses might have been

decreased in response to a critical illness of a relative. Young adults in particular are more prone to lower abilities to regulate eating impulses to emotional eating and stress. Specifically, young adults with the tendency of eating dysregulation and with higher stress levels were more likely to engage in emotional eating (Tan & Chow, 2014). The tendency to eat in response to emotions might be explained by the *masking hypothesis*. According to this theory, individuals use food to cope with the experienced emotions. It seems easier to eat high amounts of food and blame this overeating as the source of the distress, rather than to deal with the actual origin of stress (Polivy & Herman, 1999). Studies could support this theory by detecting the use of food to distract from negative states and stress in young adults (Macht, Haupt, & Ellgring, 2005). However, no studies on family members of former ICU patients investigated on emotional eating of young adults. The present findings underline the importance of further research on this topic.

A different approach is to explain emotional eating not in terms of reducing negative emotion by distracting from the stressor but in terms of increasing mood by the intake of food. Macht and Simons (2010) claim that both, psychological and biological processes play a role. Evidence for so-called *hedonic mechanism* was found by showing that sweet palatable food could improve mood because of the pleasurable consumption (Macht & Müller, 2007). Biological processes begin to produce satisfaction after the intake of food, e.g., by decreasing cortisol levels that are increased through the exposure to stress (Macht & Simsons, 2010). Important here is that emotional eating is not only linked to overeating but especially to the choice of comfort food (Macht, 2008). Various studies showed the predominant choice of this type of food in a state of negative emotion (Dallman, Pecoraro, & la Fleu, 2005; Konttinen, Männistö, Sarlio-Lähteenkorva, Silventoinen, Haukkala, 2005). Some of these studies emphasized also the role of depressive symptoms in emotional eating. Their findings suggested that depression might predict the tendency to eat in response to emotions and that this emotional eating will include a higher intake of unhealthy food (Konttinen et al., 2005; Ouwens, van Strien, & van Leeuwe, 2009). The level of depressive symptoms is high in family members of former ICU patients (van Beusekom et al., 2016). Especially young adults and students, as mainly included in the present sample, are sensitive for stressful events and show higher levels of depression, compared to the general population (Ibrahim, Kelly, Adams, & Glazebrook, 2013). This gives rise to future research, in which it should be controlled for depressive symptoms and which should include young family members of former ICU patients.

Lastly, it has to be stressed that the present study was conducted during the COVID-19 pandemic. Especially in light of the enforced staying at home (i.e., lockdown), distress,

financial uncertainty and the resulting impacts on the mental well-being were experienced by the population (Brooks et al., 2020). Young adults were greatly affected by, e.g., social distancing (Shanahan et al., 2020). Recent studies showed that the intake of food and snacks increased during the lockdown (Buckland et al., 2021). Individuals indicated to eat in response to the pandemic stress and emotions such as emptiness (Cherikh et al., 2020). This conflicts with the findings of the present study, as participants scored only average on emotional eating. A sample bias, because the sample consisted almost solely of students, might explain this inconsistency. It might be, that the students already had an awareness for healthy lifestyle behaviours and, thus, did not eat more in response to the stress. In addition, through the COVID-19 restrictions, visiting patients in hospitals was only to a very limited extent or not at all possible. This increased the stress for families greatly because they felt, e.g., less in control and had fewer communication with hospital staff (Azoulay, Curtis, & Kentish-Barnes, 2021). The influences of the special pandemic situation, especially on young adults, have to be considered when interpreting the present findings.

Avoidance coping.

Surprisingly, with the increased use of avoidance coping strategy, the association between stress and emotional eating weakened, and as such, higher avoidance coping users experienced less emotional eating in response to stress. This unexpected finding might be explained with the context-dependent effectiveness of coping strategies. One context factor is whether the stressor can be changed or not. In situations that are outside of the own control avoidance coping can be effective, even though it is traditionally seen as a maladaptive strategy (Roth & Cohen, 1986). Lazarus and Folkman (1984) empathized in their Transactional Model of Stress and Coping already the analysis of the own available recourses to deal with a stressor (i.e., secondary appraisal). Goh, Sawang, and Oei (2010) included in their revised version of Lazarus' and Folkman's (1984) model, that appraising a stressor as threatening to the self and as not controllable with the own recourses can itself already induce stress. On the basis of Lazarus findings, Roth and Cohen (1986) concluded that anxiety and depression can be reduced by using avoidance coping when being confronted with events outside the own control. The ICU admission of a relative and the critical illness accounts for such an uncontrollable event. Although this might explain the findings of the present study, participants of the sample reported only average scores on the avoidance coping strategy scale. Further research is needed to indicate if avoidance coping can be an effective strategy for family members who have to

deal with the unchangeable situation of having a relative admitted to the ICU or with the long-term consequences of the relatives' critical illness.

A contrasting explanation for the findings is based on viewing avoidance coping as a maladaptive strategy to cope with stress over a longer period (Finkelstein-Fox & Park, 2019). The ineffectiveness of avoiding the stressor does not always have to result in overeating, it can also mean that individuals do not eat at all. Especially in acute stress situations, individuals' appetite and food intake are decreased (Adam & Epel, 2007). Within the context of family members of former ICU patients, Choi et all. (2013) already demonstrated that their appetite was decreased during the acute care phase. In the present study, a substantial number of participants indicated that the patients' ICU admission was only 1-3 months ago. Family members in the time shortly after the ICU admission of a relative may still experience acute stress (van Sleeuwen, van de Laar, Geense, van den Boogaard, & Zegers, 2020). Therefore, they might have reported less emotional eating. This explanation would be in line with the negative correlation that was found between <1 month since discharge and emotional eating. Also, a great number of the participants reported that their relative died in the ICU. This caused additional and impactful stress for them, even though no correlation between stress and a relative who died during/after the ICU was found. However, with the used measure for emotional eating and the cross-sectional design, only the desire to eat in emotional states could be tested. Further research is required to test, e.g., the frequency/amount of food intake in response to emotion during and after the ICU admission. This would add knowledge, whether undereating or overeating is specific for the acute or post phase and influenced by factors such as the loss of a relative.

Basis for a third explanation are the recent findings of Waugh, Shing, and Furr (2020). They found that *positive distraction* is linked to better psychological outcomes than avoidance coping when dealing with chronic stressors. Both are forms of disengagement coping. Whereas avoidance coping is the ignoring of the stressor and the negative emotions, positive distraction is the attempt of "redirecting attention from the stressor to activities or thoughts that could induce positive emotions" (Waugh, Shing, & Furr, 2020, para. 5). Taking into account that individuals choose comfort food to elicit pleasurable feelings when being stressed, emotional eating could also be seen as a form of positive distraction. Participants of the present study might have not identified their emotional eating as such because they did not relate it to negative emotions. Instead, they directed their attention to the satisfaction when eating food and were, thus, not aware that they engaged in eating in response to negative emotions.

A fourth explanation questions the appropriateness of testing only avoidance coping as a moderator. Studies found also emotional-oriented coping as being used by emotional eaters (Raspopow, Matheson, Abizaid, & Anisman, 2013; Spoor et al., 2007). In the revised version of the Transactional Model of Stress and Coping, the experience of stress already after evaluating the own recourses (i.e., secondary appraisal) is added. When the activated coping strategies fail to reduce the stress, the psycho-physiological outcomes (e.g., emotional eating) will be momentously higher (Goh et al., 2010). It is from importance to test also other coping strategies such as emotion-oriented coping to investigate which strategies are effective in reducing stress and consequently decrease maladaptive outcomes such as emotional eating.

Further, findings of DeLongis and Holtzman (2005) emphasized that the use of a coping strategy within an individual depend on the social and situational context in which the stressor occurs. In the Coping Strategy Inventory, participants were asked to think back to a stressful event. This might have produced that family members did not specifically thought back to the ICU admission of the relative. Thus, the scale measured the used coping strategy in the event they recalled and not the used strategy in response to the ICU admission. Future research is important to investigate which exact coping strategy is used by family members who experience eating in response to emotional states, resulting from the ICU admission of a relative.

ICU admission characteristics.

Surprisingly, a low positive correlation between having an aunt/uncle who was admitted to the ICU and emotional eating was found. Because of the rather low sample size and the fact that only a few participants indicated having an aunt/uncle admitted to the ICU, it cannot be determined whether this kind of relationship to the former ICU patient does predict emotional eating. For example, a study by Pillai, Aigalikar, Vishwasrao, and Husainy (2010) showed that especially parents of former ICU patients are more affected by the stress than distant relatives. However, it might be that individuals of the sample population had a deeper relationship with their aunt/uncle than it is normally assumed. Labelling the relationship with a person by genetic relatedness, e.g., “aunt/uncle” might be misleading as it does not give information about the emotional connection to the other person (Pahl & Spencer, 2004).

A second unexpected correlation was found between time since discharge and emotional eating. First, <1 month since discharge was negatively correlated with emotional eating. This is in line with explanations why the findings indicated avoidance coping as weakening the association between stress and emotional eating. Second, a low positive correlation between 4-6 months since discharge and emotional eating was found. An explanation for this might be that

at this point in time, the chronic stress starts to produce increased levels of emotional eating. Chronic stress has the unique nature that individuals cannot anticipate an ending of the stressor (Schetter & Dolbier, 2011). It might be, that in the time between 4-6 months the family members became aware that the health status of the relative has no tendency to change. Thus, emotional eating, as an attempt to deal with the stress, might have started. Again, having no control over the situation might have had an influence. Due to the rather low number of participants who reported <1 month and 4-6 months since discharge, it cannot certainly be concluded whether these time frames are correlated with high/low levels of emotional eating. Future research should take into account whether young family members display differences in eating behaviours during acute phases and post acute phases.

Strengths and Limitations

Strengths.

It has to be emphasized that the study, as being part of a larger survey, is one of the first studies targeting younger family members of former ICU patients. Similarly, the research on health-related outcomes of an ICU admission of a relative can itself be seen as a first foundation to future research. The insight that was gathered through this study can help to understand how further research in a similar setting should be set up in order to acquire more knowledge about the association between stress, resulting from an ICU stay of a relative and health outcomes such as eating pattern in young adults. Lastly, combining the research of six students of the University of Twente with different variables of research, facilitated gathering data from more participants than individual data collection could have done. This allowed also to simultaneously measure different concepts.

Limitations.

First, limiting aspects of this research regard the cross-sectional design. Thus, no real causal claims could be done between the variables (Taris, Kessler, & Kelloway, 2021). Second, data collection was not done in cooperation with specific institutions such as hospitals. Thus, the discharge of the relative of a great amount of the participants was already up to 1 year ago. This may have caused a so-called recall bias. Participants might not have recalled experiences and emotion connected to the ICU admission accurately (Raphael, 1987). Third, combining research into one larger survey had not only benefits but also disadvantages. It caused the survey to be an extensive survey with a duration of 30-40 minutes to complete. Studies showed that lengthy surveys are related to higher drop-out rates and items located at the end of surveys are

answered less deliberated (Galesic & Bosnjak, 2009). The scales that were used in the present study were located at the end of the survey. The length of the survey in combination with the general higher tendency of family members of former ICU patients to experience fatigue might have decreased the reliability of the collected data (Choi et al., 2014). Fourth, the self-reported data limit the findings of the study. The self-reporting bias implies that participants might have had a wrong memory recall or might have indicated the socially most desirable answer (Bauhoff, 2011).

Implications for Future Research

For future research, it is from interest to go beyond the desire to eat in response to emotions. Masheb and Grilo (2006) measured in their study, for example, not the desire but the frequency to eat when being emotional. This could be done by applying experience sampling method. For example, Macht, Haupt, and Salewsky (2004) asked participants to fill out a short survey 10 times per day over one week. In this survey, participants were asked to indicate their current emotional state. They also had to indicate whether and which type of food they have eaten in the past 15 minutes. Lastly, they had to report possible reasons why they have eaten. Experience sampling method was shown to be effective in measuring eating behaviours. It can easily be integrated in the life of the target group, as it is performed via a smartphone (Hofmann, Adriaanse, Vohs, & Baumeister, 2014). Especially the frequency of having comfort food snacks could be assessed. Performing it during the acute phase and after the discharge would allow to test how eating pattern change through the exposure to acute and chronic stress. This could give insight whether eating decreases with acute stress and increases with chronic stress.

In addition, also the use of coping strategies should be tested in the acute setting and afterwards. In combination with testing the stress and depression level, this could help to understand how coping effectiveness changes in response to different stressors and settings. The revised Transactional Model of Stress and Coping of Goh et al. (2010) could serve as a framework for this future research as it considers higher psycho-physiological outcomes when coping could not effectively reduce the stress that resulted from the primary and secondary appraisal. This implies to measure not only avoidance coping but also other coping strategies. It should be considered to use a measure for coping that is less prone to variations which stressful event is recalled by the individual. An important account would be to include also a scale that measures positive distraction as an extension to the coping strategies.

Further, it is important to test whether the controllability of the situation has an influence on the used coping strategies and on the eating behaviour of family members. Lastly, future

research should also consider specifying the variable relationship. This would ensure to measure the emotional relationship to the former ICU patient and, thus, to assess whether having a close relationship is associated with emotional eating.

Conclusion

Previous research already investigated the impact of an ICU admission of a relative for the family members, even though it is still mainly focused on the patient. Yet the research paid no attention to young adult family members. Also, it lacks knowledge about health psychological outcomes for the family members. The present findings provide evidence of the positive association between stress and emotional eating. This contributes to the field of research because it includes, as one of the first, young adult family members of former ICU patients. Also, the identification of avoidance coping strategy as protecting from engaging in emotional eating when experiencing stress from an ICU admission of a relative holds promising implications for future research. More knowledge has to be acquired how individual characteristics and contextual factors such as chronic or acute phases impact the experienced psychological burdens for young adults. This will add insight but also awareness in the development of effective interventions that target specifically the family member, to increase their well-being and prevent adverse outcomes for their health.

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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

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?

Dutch Eating Behavior Questionnaire

The following questions concern your eating behaviors in emotional states.

[ ] Never

[ ] Seldom

[ ] Sometimes

[ ] Often

[ ] Very often

1. Do you have the desire to eat when you are irritated?
2. Do you have a desire to eat when you have nothing to do?
3. Do you have a desire to eat when you are depressed or discouraged?
4. Do you have a desire to eat when you are feeling lonely?
5. Do you have a desire to eat when somebody lets you down?
6. Do you have a desire to eat you are cross?
7. Do you have a desire to eat when you are approaching something unpleasant to happen?
8. Do you get the desire to eat when you are anxious, worried or tense?
9. Do you have a desire to eat when things are going against you or when things have gone wrong?
10. Do you have a desire to eat when you are frightened?
11. Do you have a desire to eat when you are disappointed?
12. Do you have a desire to eat when you are emotionally upset?
13. Do you have a desire to eat when you are bored or restless?

Coping Strategy Inventory

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 slept more than usual.
2. I went along as if nothing were happening.
3. I tried to forget the whole thing.
4. I didn't let it get to me; 1 refused to think about it too much.
5. I decided that it was really someone else's problem and not mine.
6. I avoided the person who was causing the trouble.
7. I made light of the situation and refused to get too serious about it.
8. Every time I thought about it I got upset; so I just stopped thinking about it.
9. I avoided thinking or doing anything about the situation.

Appendix B

Consent Form for Participation in a Study
University of Twente

Survey on Health: A comparison between young adults with relatives as former ICU patients

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 12 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, Luca Marie Schlieper, Lena Fitzian, Joana Grahl, Mirjam Kühne , Leona Rudolph 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)