Exploring stressors which impact the university students' mental wellbeing during the Covid-19 pandemic

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Abstract

Introduction: Because of the COVID-19 pandemic and its resulting changes for our daily life, university students encounter challenges which impact their mental wellbeing tremendously. Therefore, the goal of this study was to explore stressor which influence the mental wellbeing among university students. **Methods:** A non-experimental correlational design was performed. **Participants:** In total 224 participants took part in the study. **Instruments:** The survey consisted of three different questionnaires, the Perceived Stress Scale (PSS-10), the Positive and Negative Affect Schedule (PANAS), and the Fear of Coronavirus Scale (FCS). Further, additional questions regarding demographics and individual variables were included. **Procedure:** The survey was created via Qualtrics and shared afterwards via the University of Twente´s SONA system, as well as via social media and instant messenger. Subsequently, the collected data was transferred to SPSS. **Analysis:** Pearson correlations were conducted whether a relation could be established between coronavirus related stressors and perceived stress, as well as NA. Further, a simple regression analysis was run to investigate the causal relationship between perceived stress and the fear of coronavirus. **Results:** The results of the correlation analysis revealed a significant relation between PSS and fear of an infection with the coronavirus, as well as the fear of isolation. Further, a significant relation was established between NA and the fear of not being able to determine one's own life. In addition, the analysis revealed a significant association between PSS and NA. Lastly, perceived stress was determined as a significant predictor for the fear of coronavirus. **Conclusion:** The current study provided evidence for COVID-19 related stressors which worsen university student's mental wellbeing, namely the fear of an infection with the virus, the fear of not being able to determine one´s own life, and the fear of isolation. In addition, a predictor for the fear of the coronavirus was established.

Keywords: COVID-19 pandemic, university students, mental wellbeing, perceived stress, positive affect, negative affect

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1. Introduction

1.1. Background

In December 2019, several cases with an unknown aetiology of pneumonia appeared in Wuhan, Hubei Province (Ge et. al, 2020). A few weeks later, on January 7th, this novel coronavirus was detected in one patient by the Chinese Centre for Disease Control and Prevention (CDC), whereupon the World Health Organization (WHO) named it 2019CoV (Chen et. al, 2020). As the virus spread to many other countries, the WHO Emergency Committee announced a global health emergency of international concern (Velavan & Meyer, 2020). On February 11th, the virus was renamed by the International Committee on Taxonomy of Viruses, as severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2). Consequently, WHO declared the epidemic disease which is caused by SARS-CoV-2 as coronavirus disease 2019 or short COVID-19 (Ge et. al, 2020). Over one and a half years after its first occurrence, the global statistics report more than 137 million confirmed cases of COVID-19 and more than 2,9 million reported deaths (World Health Organization, 2021).

The numbers of COVID-19 cases are increasing rapidly, notably, because SARS-CoV-2 can be spread through several means. Essentially, it can be directly transmitted through droplet and human-to-human transmission (e.g., sneezes, coughs, talking or singing). Likewise, it can also be transmitted indirectly, for instance through airborne contagion or touching of contaminated objects (Lotfi, Hamblin, & Rezaei, 2020). The majority of patients who got infected with the coronavirus experience mild symptoms like dry cough, fever, and shortness of breath. Nevertheless, some individuals suffer from severe symptoms which can manifest itself in acute respiratory distress syndrome (ARDS) which eventually leads even to respiratory failure, or organ damage and can cause the death of the patient (Hosseini et al, 2020). Furthermore, researchers in the UK determined that the overall death rate from Covid-19 is approximately 0.66%, increasing to 7.8% in people aged over 80 years (Mahase, 2020).

Because of this highly contagious disease, most countries around the world followed the same procedure to reduce the spread of the coronavirus and therefore, attempting to decrease its impact. Most of the measurements concerned restricting people's social life, more precisely governmental requests of physical distancing, closing businesses which were classified as non-essential, as well as restricting travel possibilities and implementing mandatory quarantines for people who had to travel nonetheless (Gostin & Wiley, 2020). The dimensions of these preventive measurements are earnestly affecting the daily-, as well as work

life, while the detrimental consequences for our economy are still to be seen, since it is too early to report the entire socioeconomic impact of this disease (Ayittey, Ayittey, Chiwero, Kamasah, & Dzuvor, 2020). In addition, it also raises questions about how it affects the population's general mental health.

1.2. Implications on Mental Health

Since this pandemic is disrupting and restricting nearly every aspect of the life we knew before, it is not astonishing that its impingement is linked to negative mental health outcomes in cultures worldwide (Boden et al., 2021). Several studies already disclosed mental health problems among the general population which emerged from the COVID-19 pandemic. A review of the epidemiology of mental health problems gives an indication of the wide range of health-related issues. These not only concern depression, anxiety disorders and stress, but also report feelings of anger, panic and even impulsivity (Hossain et al. 2020). For instance, a study by Lei et al. (2020) which used the self-rating anxiety scale (SAS) and the self-rating depression scale (SDS) to examine the mental health of 1593 participants from south-eastern China, indicated that the prevalence of anxiety was 8.3% while the prevalence of depression was 14.6%. Henceforth, a systematic review and meta-analysis of the prevalence of stress, anxiety, and depression among the general population by Salari et al. (2020) reported an average prevalence of stress in five studies of 29.6%. Further, they found an average prevalence of anxiety in 17 studies of 21.9%, as well as an average prevalence of depression in 14 studies of 33.7%. While having a closer look at the perceived stress of the general public it becomes apparent that the existing research reports higher scores in perceived stress. One example is a Colombian online study which examined the association between perceived stress and the COVID-19 pandemic. Their results indicated that 15% of the participants scored for high perceived stress and were able to associate those findings with the presented inconsistent strategies of health authorities regarding the containment of the COVID-19 virus (Pedrozo-Pupo, Pedrozo-Cortés, & Campo-Arias, 2020). However, these studies only partially display the considerable psychological distress people are currently experiencing.

1.3. Implications on Student's Mental Health

Besides those already alarming developments in the general population, researchers also continually emphasize that the COVID-19 pandemic and its affiliated effects negatively influence students' mental health (Zhai, & Du, 2020). Especially as the government

implemented further measurements against the coronavirus. These encourage people to work from home if possible, which especially had consequences for the educational institutions. Since March 2020 universities and colleges have had to close most of their facilities and are still not able to offer on campus education yet (Sahu, 2020). According to the United Nations Educational, Scientific and Cultural Organization (UNESCO), more than 990 million students in over 130 countries are affected by the pandemic, due to the closure of educational institutions (UNESCO, 2021).

The immediate transition from on-site classes to a purely online teaching environment has serious consequences for the affected students. On the one hand, it has an impact on the education itself, as a study on 1500 undergraduate students at Arizona State University (ASU) displayed. The survey tried to identify the repercussions of Covid-19 on student experiences and expectations. According to Aucejo, French, Araya and Zafar (2020) 13% of the participants indicated that they are delaying their graduation, 12% have the intention to change their majors and even 11% are withdrawing from their classes. Furthermore, the study also demonstrated that the pandemic has an impact on the current labour market. Approximately 40% of the students stated that they lost their job, internship or even job offer and 29% of the participants expected to have less income by the age of 35 (Aucejo, French, Araya, & Zafar, 2020).

One the other hand, next to the concerns about their education and future labour market, several studies on university students already displayed that mental health issues among young adults unquestionably increased. According to Zhai and Du (2020) college students reported to experience feelings of distress due to the disruption of the semester and anxiety caused by the closure of the facilities. Furthermore, some students are also experiencing loneliness and isolation contributed by staying home and being separated from family and friends (Zhai, & Du, 2020). This is in line with a cross-sectional survey study among 2031 college students from the United States which displayed that 48.14% showed a moderate to severe level of depression, as well as 38.48% showed a mild to severe level of anxiety. Additionally, it was discovered that 18.04% of the participants indicated that they had suicidal thoughts two weeks prior to the survey (Wang et al., 2020).

Moreover, an interview survey with students from the United States showed similar results and confirmed that 71% of the participants reported that they perceived increased stress and anxiety, as well as 44% indicated to experience depressive symptoms due to the COVID-19 pandemic (Son, Hegde, Smith, Wang, & Sasangohar, 2020). Furthermore, the results of the

study gave an indication about which COVID-19 related stressors concern students the most. The majority of participants illustrated that due to the pandemic they developed a fear or worry about their own health and the health of their close friends and family members. In addition, they reported difficulties with concentration and disruption of their sleep patterns. Next to that, the students also expressed that their level of social isolation increased significantly, due to the online classes and governmental restriction of social contact (Son et al., 2020).

In consideration of these findings, it becomes apparent that the reactions to the COVID-19 pandemic emphasize itself in depression, anxiety, and stress symptoms (Son et al., 2020; Wang et al., 2020; Zhai, & Du, 2020). Whereby, it should be noted that these findings clarify that the prevalence of anxiety, depression, and perceived stress are already higher than it was estimated for the general population.

These outcomes are concerning, as in general, perceiving a greater level of overall stress can not only contribute to a greater level of future stress, but it can also impact the emotions and increase the Negative Affect (NA) (Blaxton, Bergman, & Wang, 2020). Regarding the emotional responses which accompany the COVID-19 pandemic, Fernández-Abascal and Martín-Díaz (2021) already conducted a study on the Positive and Negative Affect prior and during the pandemic in Spain. Their findings disclosed that the Positive Affect (PA) gradually decreased during the pre-confinement week and the weeks of the confinement period. Even though no significant differences regarding the NA could be observed, it should be noted that high scores of PA can be related to higher levels of energy and concentration, while a lower score of PA can be associated with sadness and lethargy (Watson, Clark, & Tellegen, 1988). As the study was conducted during the first weeks of the pandemic, it should be further investigated whether the emotional responses regarding the COVID-19 pandemic and its accompanying restrictions remained stable, especially since the perceived stress levels among university students increased (Zhai, & Du, 2020).

Subsequently, the existing research on how the COVID-19 pandemic impacts university students clearly indicates that it has a negative influence on the education itself, as well as the overall mental wellbeing of students and their emotional responses. Since most studies were conducted in the beginning of the outbreak it is critical to further investigate the impact the pandemic has had more than one and a half years after its first occurrence. Especially, because it has only been partially investigated which stressors lead to a deterioration of university students' mental wellbeing during the Covid-19 pandemic.

1.3. Objectives

Generally, the aim of this research concerns to get a better insight into the impact of the COVID-19 pandemic on university students' mental wellbeing. Therefore, the first objective of this study concerns to explore the current emotional state of university students. In addition, the study explores if corona related stressors impact the PA and NA and accordingly influence the emotional state of university students. Further, it will also be examined if the NA has an impact on the perceived stress. As a third objective, the current stress level of university students will be determined and investigated further. Especially in relation to whether certain corona-related stressors aggravate feelings of stress and thus worsen their mental health. As a last objective, the causality between perceived stress and the fear of the coronavirus will be examined.

1.4. Hypotheses

H_1: There are higher scores of NA in university students compared to PA as a result of the covid-19 pandemic.

H2: There is a positive relationship between the fear of not being able to determine one's own life and higher scores of NA among university students.

H3: There is a positive relationship between NA and perceived stress among university students.

H4: There is a positive relationship between the fear of an infection of the novel coronavirus and perceived stress among university students.

H5: There is a positive relationship between the fear of social isolation due to the novel coronavirus and perceived stress among university students.

H6: Perceived stress is a significant predictor of fear of coronavirus among university students.

2. Method

2.1. Design

A non-experimental correlational design was performed by conducting an online survey amongst university students and students of Applied Sciences. The independent variable in this

study was "perceived stress", while the dependent variable concerned "fear of coronavirus". As a recruitment technique, convenience sampling was used. On the one hand, the students were addressed through the University of Twente´s own SONA system, as the link to the questionnaire was distributed there. On the other hand, the link to the questionnaire was also shared through social media (e.g., Instagram) and instant messenger (e.g., WhatsApp).

2.2. Participants

The survey was conducted with a sample size of 362 participants. The participation of students in this study was based on their written consent. The window for data collection was open from April 9, 2021 to May 10, 2021. Ethical approval for the study was granted by the Ethics Committee of the University of Twente with the request number 210233. The inclusion criteria for the online survey concerned participants who are currently studying at a University or a University of Applied Sciences and who are older than 18 years old. In addition, responses which displayed missing data, due to participants who did not fulfil the survey completely, were also removed from the data set, which left the sample with a total of 224 participants between the age of 18 to 32.

2.3. Instruments

In order to answer the research questions and to be able to reject or accept the hypothesis, a survey was designed, consisting of four different parts, specifically, demographics, the perceived stress level, the emotional state, as well as the fear of the coronavirus.

2.3.1. Demographics

The survey started with some general background questions, which concerned the demographics of the participants. In total eight questions were stated. The first two open questions concerned age and the participants country of origin, as well as six closed ended questions which focused on their gender, whether they were enrolled at a university and on which degree the participants were working on, at the time they took part in this study. Furthermore, since the study aimed to explore the impact of the COVID-19 pandemic on university students' mental wellbeing, it was decided to include individual variables. For instance, whether the participants have been previously infected with the SARS-COV-2 virus. In addition, they were also asked to indicate whether they have been diagnosed with a mental

health condition, as well as if they ever sought psychological or pharmacological treatment for any mental health concerns.

2.3.2. Perceived Stress Scale (PSS-10)

In order to measure the current stress level of university students, as the first questionnaire the Perceived Stress Scale (PSS-10) was included. It is one of the most universally used psychological instruments to measure the awareness of stress (Cohen, Kamark & Mermelstein, 1994). The questionnaire consisted of 10 items asking about the participants' feelings and thoughts during the last month, for example: "In the past month, how often have you been upset because of something that happened unexpectedly?". It was scored on a 5-point Likert scale ranging from 0 = never to 4 = very often. In order to be able to correctly score the PSS-10, the responses of items 4, 5, 7, and 8 have to be reversed, as the questions are negatively stated, thereupon the scores of all items can be summarized (Cohen, Kamark & Mermelstein, 1994). The total scores can range from 0-40, while higher scores represent higher levels of perceived stress. Particularly, scores running from 0-13 were considered as low stress, scores ranging from 14-26 were considered as moderate stress, and lastly, scores ranging from 27-40 were considered as high perceived stress (Cohen, Kamarck, Mermelstein, 1983).

As for the matter of psychometric properties, a Cronbach's alpha reliability coefficient of 0.75 was found, illustrating a high internal consistency (Huang et al., 2020). Furthermore, a review of the psychometric evidence of the PSS-10 on 19 studies found acceptable psychometric properties regarding internal consistency reliability and factorial validity (Lee, 2012), which are in line with the beforehand mentioned psychometric data.

2.3.3. Positive and Negative Affect Schedule (PANAS)

Next, the Positive and Negative Affect Schedule (PANAS) was included. The questionnaire consisted of 10 items which measured the Positive Affect (PA) (e.g., interested) and 10 items which measured the Negative Affect (NA) (e.g., distressed) (Watson, Clark, & Tellegen, 1988). It was scored on a 5-point Likert scale ranging from 1 = very slightly or not at all to 5 = extremely. To indicate the PA score, the sum of the items 1, 3, 5, 9, 10, 12, 14, 16, 17, and 19 was calculated. The scores can range from 10-50, while higher scores demonstrated higher levels of PA with a mean score of 33.3 (SD±7.2). In order to calculate the NA score, the sum of the items 2, 4, 6, 7, 8, 11, 13, 15, 18, and 20 was calculated. The scores can range from 10 to 50, while lower scores illustrate lower levels of NA with a mean score of 17.4 (SD ± 6.2

(Watson, Clark, & Tellegen, 1988).

As for the psychometric properties, the internal consistency was high, with a Cronbach's alpha of .86 for the PA and a Cronbach's alpha of .87 for the NA. In addition, the questionnaire displayed evidence for validity, as the scales exhibited excellent convergent, as well as discriminant correlations (Watson, Clark, & Tellegen, 1988). Similar results were found in a study with Australian youth, which also displayed scores of good internal consistencies with a PA of α = .89 and a NA of α= .87 (Melvin, & Molly, 2000).

2.3.4. Fear of Corona-virus Scale (FCS)

Finally, the Fear of Corona-virus Scale (FCS) was included. It consisted of 18 items which are related to the fears that are accompanied with the coronavirus, for instance that a close relative may die. The questionnaire can be evaluated with an intensity scale ranging from 1 "Not at all or very little" to 5 "Very much or extremely". However, it should be noted that the FCS was only used partially and adjusted in accordance with the study at hand. In total, the modified FCS consisted of 10 questions, thereby, 7 items from the FCS were used, for instance "During the last week please indicate how often you feared that a relative or loved one could die".

In addition to the items of the FCS the three following questions were added in order to address the hypotheses of this study. They were scored similarly to the FCS. First, a question regarding the fear of the future labour market was included: "During the last week, please indicate how often you feared that you will not be able to find a job in the future". Moreover, a question concerning loneliness and isolation was included: "During the last week, please indicate how often you feared that you are not able to see family members or friends". Further, a question about self-determination was incorporated: "During the last week, please indicate how often you feared that you are not able to determine one's own life". With regards to the validation and reliability of the questionnaire, only insufficient data was provided by the time this survey was conducted, since the instrument was developed because of the COVID-19 pandemic (Sandín, Valiente, García-Escalera, Campagne, & Chorot, 2020). Therefore, Cronbach's Alpha was computed for the FCS. The scale displayed a high level of internal consistency, as determined by a Cronbach's alpha of 0.802 (Appendix A).

2.4.Procedure

The survey was created with the online survey software Qualtrics. After receiving the ethical approval, the questionnaire was distributed by the researchers, using the SONA system of the University of Twente, further the link of the survey was shared on social media platforms and instant messenger channels. Before the participants were able to start with the questionnaire, they were informed about the purpose of the study and had to give their consent. In addition, it was elucidated that their responses are anonymous, and no names will be used in the process of data analysis. At the end of the questionnaire, the participants were thanked for their participation. In total it took approximately fifteen to twenty minutes to complete the survey.

2.5. Analysis

The data set was exported from Qualtrics to SPSS (version 27). As the first step of the data analysis, responses which did not fulfil the inclusion criteria were removed from the data set. Afterwards, the remaining data was tested for normality. The PSS-10 scores, as well as the PA scores and the FCS scores were normally distributed, as assessed by Shapiro-Wilk's test ($p > .05$). The NA scores were not normally distributed, as assessed by Shapiro-Wilk's test ($p < .05$) (Appendix B), even after outliers were deleted. However, after the visual inspection of Q-Q Plots no significant deviations were evident (Appendix C), therefore parametric tests were employed. Since some reversed questions were asked, it was crucial to conduct the reversed coding first, before continuing with the data analysis. Further, the total scores from PANAS, PSS and FCS were computed and the new variables "totalscorePA", "totalscoreNA", "totalscorePSS" and "totalscoreFCS" were created.

Consequently, after preparing the data set, descriptive statistics were conducted in order to explore the demographic information of the participants, including age, gender, level of education and nationality. Additionally, demographics were calculated for the individual variables of the participants. Furthermore, the maximum, minimum, as well as standard deviation and the mean of the demographics were computed.

In order to answer HP_1, descriptive and frequency analyses were carried out to explore. the mean from the NA and PA of the subscale from PANAS.

In deliberation of HP_2, a Pearson correlation was run to test the relationship between the FCS item *fear of not being able to determine one's own life* and the total scores of NA, the

subscale from PANAS.

To explore HP_3, a Pearson correlation was conducted in order to analyse the relationship between the NA and perceived stress. Therefore, the total score from the subscale NA was correlated with the total score of the PSS.

For HP_4, a Pearson correlation analysis was conducted between the FCS item *fear of an infection with the coronavirus* and the total score of the PSS.

To test the fifth hypothesis another Pearson correlation was conducted in order to analyse the relationship between the *fear of isolation* due to the coronavirus and perceived stress. Accordingly, the FCS item *fear of isolation* and the total score of the PSS were correlated.

Lastly, in deliberation of exploring the sixth hypothesis a linear regression was run to understand the effect of perceived stress on the fear of the coronavirus. To assess linearity a scatterplot of the total score of the FCS was plotted against the total score of the PSS. Visual inspection of the scatterplot indicated a linear relationship between the variables (Appendix D). Moreover, there was independence of residuals, as assessed by a Durbin-Watson statistic of 2.07. Further, there was homoscedasticity, as assessed by visual inspection of the plot of standardized residuals versus standardized predicted values (Appendix E). In addition, residuals were normally distributed as assessed by visual inspection of normal probability plot (Appendix F). Furthermore, no outliers were detected. Since all assumptions were met, a Linear regression analysis was conducted using the FCS total score and the PSS total score.

3. Results

3.1. Demographics

After considering the inclusion criteria, a total of 224 participants were included (table 1). Generally, the sample consisted mostly of female participants (70.1%) with the minority being male (28.1%) and others (0.9%). The age of the participants ranged from 18 to 32 with a mean of 21.77 (SD= 2.02). Furthermore, most participants indicated that they were currently studying on a bachelor's degree (88.4%) and with the greatest part living in Germany and the Netherlands (e.g., other countries: Turkey; Romania; Poland; Morocco;). Regarding the infection with SARS-COV-2, only a minority was already infected (9.4%). In addition, some individual variable questions were asked in order to explore the mental health of the participants. Accordingly, 41 participants (18.3%) indicated that they have sought

psychological or pharmacological treatment for any mental health concerns like anxiety, depression or eating disorder (Table 1). Additionally, 30 participants (13.4%) specified that they have been diagnosed with a mental health condition. Regarding the general perceived stress among university students, the results indicated that the mean value of the PSS concerns 21.46 (SD= 6,93) which was categorized as a moderate stress level. However, having a look at the prevalence, 13.8% of the participants scored on a low perceived stress level, while 66.4% scored on a moderate perceived stress level and 19.6% of the participants scored even on a high perceived stress level. Furthermore, it should be noted that the scores ranged from 2 to 39, with 40 as the maximum value which can be achieved.

Table 1

Demographic Characteristics

Characteristic	N (224)	Minimum	Maximum	M/(SD)/%
Education:				
Bachelor	198			88.4%
Master	24			10.7%
PhD	2			0.9%
Age:	224	18	32	21.77 (2,02)
Gender:				
Male	63			28.1%
Female	159			71.0%
Other	2			0.9%
Country of origin:				
Germany	155			69.2%
The Netherlands	30			13.4%
Others	39			17.4%
Sought psychological treatment:				
Yes	41			18.3%
No	183			81.7%
Diagnosed mental health condition				

Yes	30			13.4%
No	194			86.6%
Infection:				
Yes	21			9.4%
No	203			90.6%
Total Scores:				
NA	224	10,00	46,00	24.66 (7,86)
PA	224	10,00	46,00	27.10 (6,94)
FCS	224	10,00	47,00	24.92 (7,03)
PSS	224	2,00	39,00	21.46 (6,93)
Low	31			13.8%
Moderate	149			66.5%
High	44			19.6%

3.2. Correlation Analyses

In deliberation of answering H_1, two total score variables were created to display how the participants scored on the PA and NA. The results revealed a mean score of 27.1 (SD= 6.94) for the PA and a mean score of 24.7 (SD= 7.86) for the NA (Table 2). Generally, higher scores of the PA represented higher levels of PA, while lower scores of the NA represented lower levels of NA. The scores for both subscales of PANAS ranged from a minimum of 10.00 to a maximum of 46.00. Due to the higher scores of PA, H_1 was rejected.

In deliberation of answering H_2, the analysis revealed that there was a statistically, positive correlation between the *fear of not being able to determine one's own life* and Na, $r(222) = .445$, $p < .005$, with the *fear of not being able to determine one's own life* explaining 19.8% of the NA among university students (Table 2). Thus, H_4 can be accepted.

To examine H_3, a Pearson correlation was conducted. The results revealed that there was a statistically significant, strong correlation between NA and perceived stress, $r(222) = .744$, $p < .005$ Consequently, the NA explained 55.4% of the perceived stress among university students (Table 2). Again, leading to an acceptance of H_3.

To test H_4, a Pearson correlation was conducted. The analysis revealed that there was a

statistically significant positive correlation between the *fear of an infection* with the coronavirus and PSS, r(222) = .137, p = .040. Consequently, the *fear of an infection* statistically explained 1.9% of the perceived stress of university students (Table 2), leading to the acceptance of H_4.

In deliberation of H_5, the Pearson correlation displayed that there was a statistically significant positive correlation between the *fear of isolation* and perceived stress, r(222) = .399, p < .005. Therefore, the *fear of isolation* explained 15.9% of the perceived stress among university students (Table 2). Thus, H_5 can be accepted.

Table 2

Results Pearson Correlation

Variables	M	SD	1	2	3	4	5	6
1. PA	27.10	6.94						
2. NA	24.66	7.86		1	.744**	.222**	.402**	.444**
3. PSS	21.46	6.93		.744**	1	.137*	.399**	.481**
4. Fear of infection				.222**	.137*	1	.244**	.169
5. Fear of isolation				.402**	.399**	.244**	1	.469**
6. Fear of not being able to determine one´s own life				.444**	.481**	.169*	.469**	1

*p ≤ 0.05; **p ≤0.01

3.3. Regression Analysis

Lastly, to examine H_6, a simple linear regression was calculated to predict the fear of coronavirus based on the perceived stress (table 3). A significant regression equation was found, (F(1,221) = 61,70, p < .0005), with an R^2 of .215. The perceived stress accounted for 21,8% of the explained variability in the fear of coronavirus. Participants predicted fear of coronavirus was equal to 14.87 + 0.46*totalscorePSS. Based on the mentioned results, H_6 was accepted.

Table 3

Results Regression Analysis

Model		Unstandardized Coefficients		Standardized Coefficients		
		B	Std.	Beta	t	Sig
	Constant	14.870	1.331		11.172	.000
	totalscorePSS	.464	.059	.467	7.855	.000

4. Discussion

The research aimed at exploring stressors which impact university students' mental wellbeing during the COVID-19 pandemic. Generally, the relation between corona related stressors and the emotional state, as well as the implications on the perceived stress of university students was scrutinized. Lastly, the study aimed at investigating the relation between the emotional state and perceived stress.

4.1. Implications on Emotional State

Against the expectations, the results of the analysis presented higher scores in PA than NA. Even though, it should be noted that the difference between both mean scores were not extensive and could be categorized on a moderate level. Nevertheless, the COVID-19 pandemic has had a significant effect on university students´ affect. The research of Wang, et al. (2020) found similar results which corroborate to the current findings. In addition, they identified that the PA and NA depend on common determinants such as the education of the participants, sleep duration, the satisfaction with the preventive measurements, as well as the risk for an infection itself and how the pandemic impacts daily life. Therefore, personal characteristics can be established as an influencing factor concerning the emotional state of the respondents.

Henceforth, regarding the emotional state of university students, the study at hand identified a relation between the *fear of not being able to determine one's own life* and NA. Apparently, being exposed to a newly pandemic which restricted one's own life and was followed by rules, led to uncertainty concerning the determination of one's own life. An expanded research on the Self-Determination Theory (SDT) already elaborated that basic psychological needs need to be satisfied to promote well-being. One of them concerns the need

for autonomy, it was identified that the satisfaction with life increased when the need for autonomy was satisfied (Šakan, Žuljević, & Roković, 2020). Furthermore, in deliberation of these findings, it is necessary to elucidate that high scores of PA can be related to higher levels of energy and concentration, while a lower score of PA can be associated with sadness and lethargy (Watson, Clark, & Tellegen, 1988). In addition, a previous study which investigated the structure of adolescent affective well-being, determined that NA was correlated with emotional distress and health problems, while PA displayed correlations with self-efficacy and resilience (Jovanović, & Gavrilov-Jerković, 2016). Therefore, PA might be a protective factor to promote/foster (mental) resilience in university students.

Furthermore, consistent with previous research, the study established a relation between perceived stress and NA. Generally, research displayed that older adults reported experiencing fewer daily stressors than compared to younger adults. Besides, it was revealed that both younger and older adults indicated to experience higher levels of NA on stressful days (Stawski, Sliwinski, Almeida, & Smyth, 2008). Hence, these results indicate that generally, individuals reported higher levels of NA, while finding oneself in stressful situations. However, it became apparent that usually younger adults found themselves more frequently in stressful situations. In addition to those findings, a study demonstrated that the expectations towards the pandemic influenced the perceived stress level among older adults, which was further affiliated with their level of NA (Whitehead, 2021). Thus, not only age can amplify the stress level and in turn the level of NA, but also the expectations towards the pandemic.

4.2. Implications on Perceived Stress

Next to the implications on the emotional state, it was further elaborated how the COVID-19 pandemic influenced the perceived stress among university students. Generally, more than 60% of the participants experienced a moderate level of stress, whereas nearly a fifth of the university students even experienced a high level of stress. These results are alarming, since perceived psychological stress can lead to physiological impairments which can express itself in a decreased function of the immune system and an increase for the receptivity of infections (Largo-Wright, Peterson, & Chen, 2005). Next to the psychological impairments, research demonstrated that stressful life events have implications on one´s mental health. For instance, a relationship was found between experienced stress and the onset of depression (Mazure, 1998). Therefore, the question arises which factors contribute to the stress level of

university students.

The study at hand identified as one stressor the *fear of an infection with the novel coronavirus*. These results are in line with a study conducted to determine the level of fear of COVID-19 among Spanish university students. The presence of fear was detected on a medium- or moderate level (Martínez-Lorca, Martínez-Lorca, Criado-Álvarez, & Armesilla, 2020). In addition, another study demonstrated that having experienced an infection with COVID-19 increased not only depression, but stress as well (Mazza, et al., 2020). These results were not surprising, as the concept of fear is generally associated with stress or distress (Shin, & Liberzon, 2010).

As another stressor, the research identified *the fear of isolation due to the novel coronavirus*. Due to the COVID-19 pandemic students are confronted with loneliness and isolation as most of the universities had to close their facilities and shifted their on-campus teaching to a solely online teaching environment. Next to that, preventive measures restricted social contact. Previous research already indicated social isolation due to the pandemic as a key factor that enhanced mental health concerns. These findings are in line with the study from Hamza, Ewing, Heath, and Goldstein (2020) who identified that stressors which include loneliness and social isolation significantly increased during the COVID-19 pandemic. However, it should be noted that those findings could only be established for participants who did not report having pre-existing mental health concerns. In addition, a study which investigated college students´ stress and health in the COVID-19 pandemic contributed to the existing literature and to the results of the study at hand. They identified that being separated from classmates, family members and friends led to perceived stress and anxiety, as social groups are part of an individual's identity and self-worth (Yang, Chen, & Chen, 2021). Furthermore, loneliness was identified as a risk factor for physical, as well as psychiatric dysfunctions. For instance, it can lead to depressive symptoms, suicidal thoughts, alcoholism, anxiety, or even aggressive behaviour. Furthermore, a relation between loneliness and cognitive decline was established (Cacioppo, Grippo, London, Goossens, & Cacioppo, 2015). Thus, experienced loneliness or social isolation can be considered as an actual risk factor for the individual's mental health with expected long-term consequences.

4.3. Causal Relationship between PSS and FCS

Lastly, this research identified perceived stress as a predictor of the fear of coronavirus. Those results are not surprising since, as before mentioned, the COVID.19 pandemic has already had a tremendous effect on university students´ mental wellbeing. The current results are in line with a study which investigated the influence of stress on the regulation of fear. The research which was discussed in their review clearly indicated that stress impaired the inhibition of fear, by changing the prefrontal cortex function (Rajo, & Phelps, 2015). Therefore, it was not surprising to find stress as a predictor of fear of the coronavirus. Nevertheless, it is noteworthy to underline that these results foremost concerned being briefly exposed to stress. However, long-term stress can even lead to more subtle changes in certain brain regions, leading to a flattened cortisol release, which in turn can lead to depression or even post-traumatic-stress-syndrome (PTSD) (Rajo, & Phelps, 2015).

4.4. Limitations

Prior to deliberate recommendations for future research possibilities, some limitations to the study at hand must be discussed, which hinder the generalization of the results. First, the survey was answered mostly by Dutch and German students, therefore the findings might be different for other nationalities. Moreover, mainly students from the University of Twente, which is located in the Netherlands, participated. Even though most countries demanded similar restrictions to prevent the unrestrained spread of the coronavirus, they were not universally utilized. Especially, with regard to restrictions concerning social distancing and implemented curfews. These differences can lead to contrasting perceptions of the COVID-19 pandemic and its implications on the general wellbeing of university students. Further, the gender distribution was imbalanced, as most participants were female. Hence, the perception of the COVID-19 pandemic could differ between the genders. Lastly, those students who already sought psychological treatment or who have been diagnosed with a disease might experience this pandemic differently. Specifically, since the prevalence of anxiety, stress and depression increased.

4.5. Recommendations for future research

As the COVID-19 pandemic has not been overcome yet, further research will be necessary to capture all the long-term consequences. Especially concerning the implications on the general mental wellbeing. The study at hand already presented alarming results, which

might even worsen if the pandemic and restrictions continue. Therefore, it is necessary to further investigate its impact and to consider possibilities which could improve the situations among university students and boost their mental wellbeing.

4.6. Conclusion

The study at hand identified several stressors which impact the university student´s mental wellbeing. It demonstrated that the COVID-19 pandemic had an affect on the emotional state of university students. In Particular, the *fear of not being able to determine one's own life* influenced the NA. Moreover, it was established that the students experienced a moderate stress level due to the pandemic. In deliberation of the perceived stress, the study identified that the *fear of an infection with the novel coronavirus* and the *fear of isolation* were stressors which increased the perceived stress level among those university students. Lastly, it was determined that perceived stress was a predictor for the fear of the coronavirus.

References

Aucejo, E. M., French, J., Araya, M. P. U., & Zafar, B. (2020). The impact of COVID-19 on student experiences and expectations: Evidence from a survey. *Journal of public economics*, *191*, 104271. https://doi.org/10.1016/j.jpubeco.2020.104271

Ayittey, F. K., Ayittey, M. K., Chiwero, N. B., Kamasah, J. S., & Dzuvor, C. (2020). Economic impacts of Wuhan 2019-nCoV on China and the world. Journal of Medical Virology, 92(5), 473-475. https://doi.org/10.1002/jmv.25706

Blaxton, J., Bergeman, C. S., & Wang, L. (2020). Daily stress reactivity across the life span: Longitudinal and cross-sectional effects of age. *The Journals of Gerontology:* Series B, 75(3), 494-503. https://doi.org/10.1093/geronb/gby046

Boden, M., Zimmerman, L., Azevedo, K. J., Ruzek, J. I., Gala, S., Magid, H. S. A., ... & McLean, C. P. (2021). Addressing the mental health impact of COVID-19 through population health. Clinical psychology review, 102006. https://doi.org/10.1016/j.cpr.2021.102006

Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. *Perspectives on Psychological Science*, *10*(2), 238-249. https://doi.org/10.1177/1745691615570616

Chen, N., Zhou, M., Dong, X., Qu, J., Gong, F., Han, Y., ... & Zhang, L. (2020). Epidemiological and clinical characteristics of 99 cases of 2019 novel coronavirus pneumonia in Wuhan, China: a descriptive study. *The lancet*, *395*(10223), 507-513. https://doi.org/10.1016/S0140-6736(20)30211-7

Cohen, S., Kamarck, T., & Mermelstein, R. (1983). A global measure of perceived stress. *Journal of health and social behavior*, 385-396. https://doi.org/10.2307/2136404

Cohen, S., Kamarck, T., & Mermelstein, R. (1994). Perceived stress scale. *Measuring stress: A guide for health and social scientists*, *10*, 1-2

Fernández-Abascal, E. G., & Martín-Díaz, M. D. (2021). Longitudinal study on affect, psychological well-being, depression, mental and physical health, prior to and during the COVID-19 pandemic in Spain. *Personality and Individual Differences*, 172, 110591. https://doi.org/10.1016/j.paid.2020.110591

Ge, H., Wang, X., Yuan, X., Xiao, G., Wang, C., Deng, T., … & Xiao, X. (2020). The epidemiology and clinical information about COVID-19. *European journal of clinical microbiology & infectious diseases: official publication of the European Society of*

Clinical Microbiology, *39*(6), 1011–1019. https://doi.org/10.1007/s10096-020-03874z

Gostin, L. O., & Wiley, L. F. (2020). Governmental public health powers during the COVID 19 pandemic: stay-at-home orders, business closures, and travel restrictions. *Jama*, *323*(21), 2137-2138. https://doi.org/10.1001/jama.2020.5460

Hamza, C. A., Ewing, L., Heath, N. L., & Goldstein, A. L. (2020). When social isolation is nothing new: A longitudinal study psychological distress during COVID-19 among university students with and without preexisting mental health concerns. *Canadian Psychology/Psychologie Canadienne*, 62(1), 20–30. https://doi.org/10.1037/cap0000255

Hosseini, E. S., Kashani, N. R., Nikzad, H., Azadbakht, J., Bafrani, H. H., & Kashani, H. H. (2020). The novel coronavirus Disease-2019 (COVID-19): Mechanism of action, detection and recent therapeutic strategies. *Virology*, *551*, 1-9. https://doi.org/10.1016/j.virol.2020.08.011

Hossain, M. M., Tasnim, S., Sultana, A., Faizah, F., Mazumder, H., Zou, L., ... & Ma, P. (2020). Epidemiology of mental health problems in COVID-19: a review. *F1000Research, 9.* https://doi.org/10.12688/f1000research.24457.1

Huang, F., Wang, H., Wang, Z., Zhang, J., Du, W., Su, C., ... & Zhang, B. (2020). Psychometric properties of the perceived stress scale in a community sample of Chinese. *BMC psychiatry,* 20(1), 1-7. https://doi.org/10.1186/s12888-020-02520-4

Jovanović, V., & Gavrilov-Jerković, V. (2016). The structure of adolescent affective well-being: The case of the PANAS among Serbian adolescents. *Journal of Happiness Studies*, *17*(5), 2097-2117. https://doi.org/10.1007/s10902-015-9687-8

Largo-Wight, E., Peterson, P. M., & Chen, W. W. (2005). Perceived problem solving, stress, and health among college students. *American journal of health behavior*, *29*(4), 360-370. https://doi.org/10.5993/AJHB.29.4.8

Lee, E. H. (2012). Review of the psychometric evidence of the perceived stress scale. *Asian nursing research*, 6(4), 121-127. https://doi.org/10.1016/j.anr.2012.08.004

Lei, L., Huang, X., Zhang, S., Yang, J., Yang, L., & Xu, M. (2020). Comparison of prevalence and associated factors of anxiety and depression among people affected by versus people unaffected by quarantine during the COVID-19 epidemic in Southwestern China. *Medical science monitor: international medical journal of*

experimental and clinical research, 26, e924609-1. https://doi.org/10.12659/MSM.924609

Lotfi, M., Hamblin, M. R., & Rezaei, N. (2020). COVID-19: Transmission, prevention, and potential therapeutic opportunities. *Clinica chimica acta*. https://doi:10.1016/j.cca.2020.05.044

Mahase, E. (2020). Covid-19: death rate is 0.66% and increases with age, study estimates. *BMJ: British Medical Journal (Online)*, *369*. https://doi.org/10.1136/bmj.m1327

Martínez-Lorca, M., Martínez-Lorca, A., Criado-Álvarez, J. J., & Armesilla, M. D. C. (2020). The fear of COVID-19 scale: validation in Spanish university students. *Psychiatry research*, 113350. https://doi.org/10.1016/j.psychres.2020.113350

Mazure, C. M. (1998). Life stressors as risk factors in depression. *Clinical Psychology: Science and Practice*, *5*(3), 291-313.https://doi.org/10.1111/j.14682850.1998.tb00151

Mazza, C., Ricci, E., Biondi, S., Colasanti, M., Ferracuti, S., Napoli, C., & Roma, P. (2020). A nationwide survey of psychological distress among Italian people during the COVID-19 pandemic: immediate psychological responses and associated factors. *International journal of environmental research and public health*, *17*(9), 3165. https://doi.org/10.3390/ijerph17093165

Melvin, G. A., & Molloy, G. N. (2000). Some psychometric properties of the Positive and Negative Affect Schedule among Australian youth. *Psychological reports, 86*(3_suppl), 1209-1212. https://doi.org/10.2466/pr0.2000.86.3c.1209

Pedrozo-Pupo, J. C., Pedrozo-Cortés, M. J., & Campo-Arias, A. (2020). Perceived stress associated with COVID-19 epidemic in Colombia: an online survey. *Cadernos de saude publica*, 36, e00090520. https://doi.org/10.1590/0102-311X00090520

Raio, C. M., & Phelps, E. A. (2015). The influence of acute stress on the regulation of conditioned fear. *Neurobiology of stress*, *1*, 134-146. https://doi.org/10.1016/j.ynstr.2014.11.004

Šakan, D., Žuljević, D., & Rokvić, N. (2020). The Role of Basic Psychological Needs in Well-Being During the COVID-19 Outbreak: A Self-Determination Theory Perspective. *Frontiers in Public Health*, 8, 713. https://doi.org/10.3389/fpubh.2020.583181

Sahu, P. (2020). Closure of universities due to coronavirus disease 2019 (COVID-19): impact on education and mental health of students and academic staff. Cureus, 12(4).

https://doi.org/ 10.7759/cureus.7541

Salari N, Hosseinian-Far A, Jalali R, Vaisi-Raygani A, Rasoulpoor S, Mohammadi M, Rasoulpoor S, Khaledi-Paveh B. Prevalence of stress, anxiety, depression among the general population during the COVID-19 pandemic: a systematic review and meta-analysis. *Global Health*. 2020 Jul 6;16(1):57. http://doi.org/10.1186/s12992-020-00589-w

Sandín, B., Valiente, R. M., García-Escalera, J., Campagne, D. M., & Chorot, P. (2020). Psychological impact of the COVID-19 pandemic: Negative and positive effects in Spanish population during the mandatory national quarantine. *Journal of Psychopathology and Clinical Psychology/Revista de Psicopatología y Psicología Clínica*, 25(1), 1-21. https://doi.org/10.5944/rppc.27569

Shin, L. M., & Liberzon, I. (2010). The neurocircuitry of fear, stress, and anxiety disorders. Neuropsychopharmacology, 35(1), 169-191. https://doi.org/10.1038/npp.2009.83

Son, C., Hegde, S., Smith, A., Wang, X., & Sasangohar, F. (2020). Effects of COVID-19 on college students' mental health in the United States: Interview survey study. *Journal of medical internet research*, *22*(9), e21279. https://doi.org/10.2196/21279

Stawski, R. S., Sliwinski, M. J., Almeida, D. M., & Smyth, J. M. (2008). Reported exposure and emotional reactivity to daily stressors: the roles of adult age and global perceived stress. *Psychology and aging*, *23*(1), 52. https://doi.org/10.1037/0882-7974.23.1.52

UNESCO, U. (2021). COVID-19 educational disruption and response. *UNESCO*.

Velavan, T. P., & Meyer, C. G. (2020). The COVID-19 epidemic. *Tropical medicine & international health*, *25*(3), 278. https://doi.org/10.1111/tmi.13383

Wang, X., Hegde, S., Son, C., Keller, B., Smith, A., & Sasangohar, F. (2020). Investigating mental health of US college students during the COVID-19 pandemic: cross-sectional survey study. *Journal of medical Internet research*, *22*(9), e22817. https://doi.org/10.2196/22817

Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: the PANAS scales. *Journal of personality and social psychology*, *54*(6), 1063.

Whitehead, B. R. (2021). COVID-19 as a stressor: Pandemic expectations, perceived stress, and negative affect in older adults. *The Journals of Gerontology: Series B*, *76*(2), e59-e64. https://doi.org/10.1093/geronb/gbaa153

World Health Organization (2021). *WHO Coronavirus (COVID-19) Dashboard*. Retrieved from https://covid19.who.int/

Yang, C., Chen, A., & Chen, Y. (2021). College students' stress and health in the COVID-19 pandemic: The role of academic workload, separation from school, and fears of contagion. *PloS one*, 16(2), e0246676. https://doi.org/10.1371/journal.pone.0246676

Zhai, Y., & Du, X. (2020). Addressing collegiate mental health amid COVID-19 pandemic. *Psychiatry research*, *288*, 113003. https://doi.org/10.1016/j.psychres.2020.113003

Appendix A

Cronbach's alpha FCS

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
,802	,807	10

Appendix B

Tests of Normality

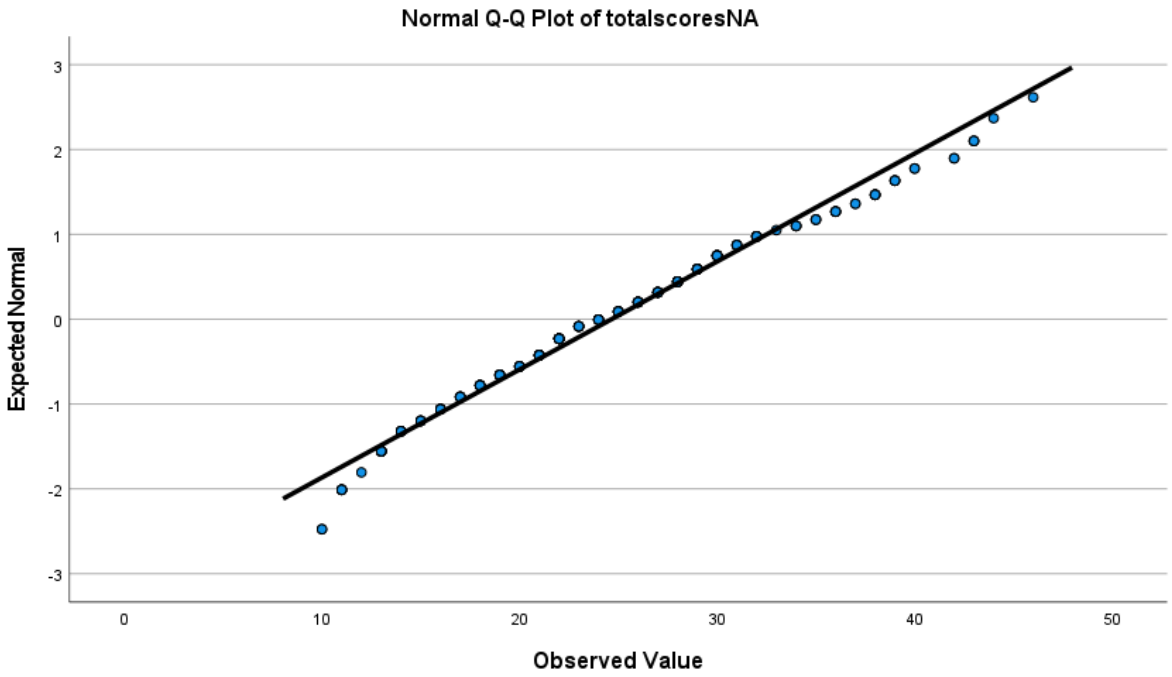
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
totalscoresFCS	,067	224	,017	,990	224	,138
totalscorePSS	,064	224	,028	,993	224	,326
totalscorePA	,062	224	,036	,989	224	,102
totalscoresNA	,083	224	,001	,980	224	,003

a. Lilliefors Significance Correction

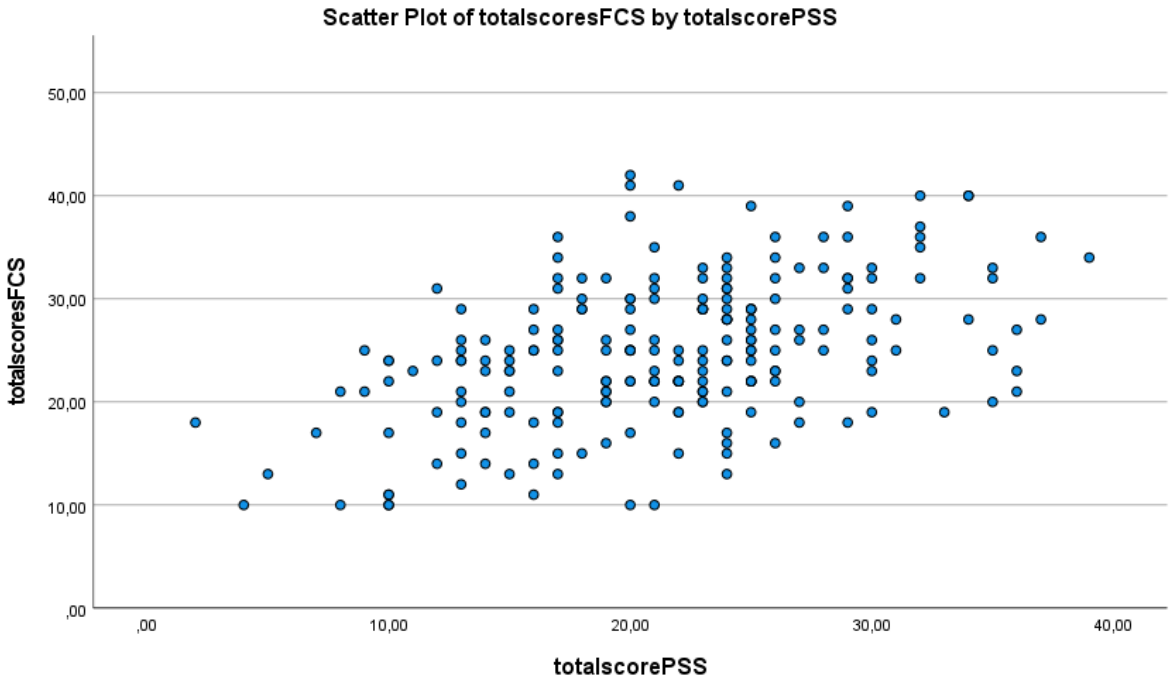
Appendix C

Normal QQ plots of NA scores



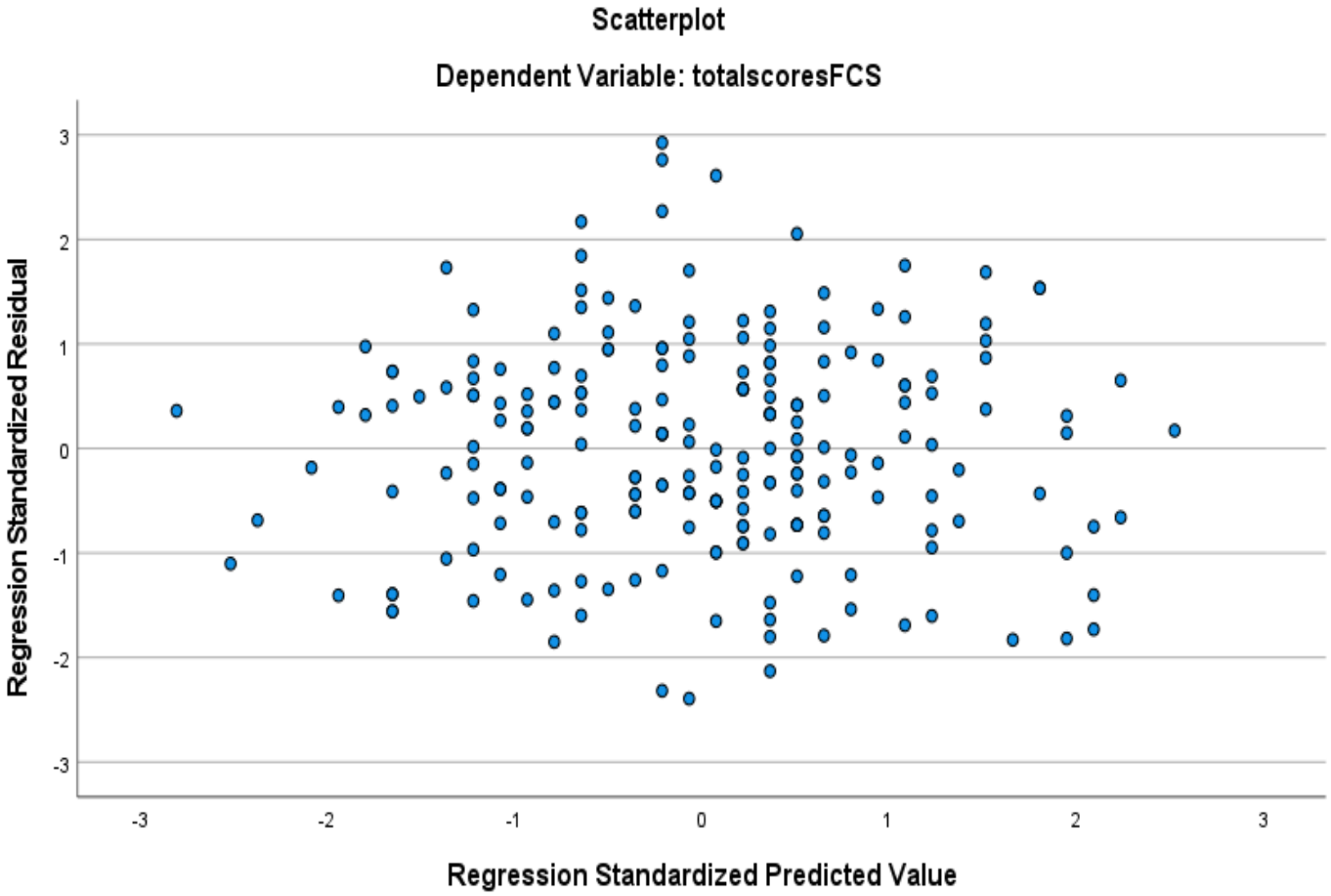
Appendix D

Scatterplot Linearity Assumption



Appendix E

Scatterplot Homoscedasticity



Appendix F

Normal P-P Plot