

**Exploring the Moderating Effect of Gender on the Relationship between Stress and
Mental Well-being among University Students**

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Abstract

Background: Research indicates that females have higher stress levels and lower mental well-being compared to male university students. It is expected that gender moderates the relationship between stress and mental well-being where women are more at risk than men.

Objective: This research aims to explore the moderating effect of gender on the relationship between stress and mental well-being among university students.

Method: A cross-sectional quantitative survey was used. The scales Mental Health Continuum – Short Form (MHC-SF) and Student Life Challenges (SLC) were selected. The data was analysed (N= 109), participants were mostly females, Germans, aged 21, and third-year psychology students from the University of Twente. A Pearson correlation coefficient, t-tests, and a moderation analysis were conducted.

Results: There was a negative relationship between stress and mental well-being for both genders. Women had higher stress levels compared to men. There were no gender differences in the level of mental well-being. Gender did not moderate the relationship between stress and mental well-being among university students.

Conclusion: Universities' mental health services should offer skill workshops and peer support groups to improve stress levels and mental well-being among university students.

Keywords: gender, stress, mental well-being, mental health, university students, moderation analysis

Exploring the Moderating Effect of Gender on the Relationship between Stress and Mental Well-being among University Students

Each year universities have an influx of students who enroll in courses to obtain a career and achieve an accomplished life. During the academic journey, many students experience stress deriving from various factors such as academic, personal, and work life (Graves et al., 2021). Students who do not possess adequate stress management skills might have difficulties handling responsibilities and their surrounding world (Kania, 2014; Ryff, 1989). Consequently, the academic lifestyle generates pressure on the student which could lead to an increase in stress levels, which ultimately impacts mental well-being (Zhang et al., 2018). Literature highlights that female students have higher perceived stress levels and consequently poorer mental well-being (Klibert et al., 2011; Rahardjo et al., 2013; Thawabieh & Qaisy, 2012). However, male students comprise 69% of university suicides due to depression, which is a higher rate when compared to female students (Mackenzie et al., 2011; Sagar-Ouriaghli et al., 2020). Nevertheless, research suggests that gender moderates the relationship between stress and mental well-being; where women are more at risk of stress and lower mental well-being (Schmaus et al., 2008). In this paper, the relationships between gender, stress, and mental well-being will be explored.

Definition of Stress

Stress can be conceptualised as the cognitive perception of uncertainty and/or uncontrollability that is manifested as a behavioural and physiological reaction (Koolhaas et al., 2011). Baghurst & Kelley (2014) postulate that stress comes from one's perception of the stressors and the inability to efficiently adapt and react to difficult and ongoing daily life conditions. Moreover, university student's stress derives from various factors encountered in their daily lives such as academic pressure, new environment, poor relationships, high expectations, financial difficulties, poor university resources and services, unhealthy habits, and loneliness (Hamaideh, 2011). University students' who do not effectively cope with stress and have a negative appraisal of stressors are at risk of psychological and physical issues in the long term (Kelley, 2007).

Definition of Mental Well-being

The World Health Organization (2001) defines mental well-being as the capacity to manage daily stressors, having the ability to actualize one's potential as well as being a productive member of society. Additionally, mental well-being includes having pleasant and positive feelings and reducing unpleasant and negative feelings (Keyes, 2009). Furthermore, well-being encompasses an individual having healthy functioning, being social, and absent of

physical and mental disease (Ryan & Deci, 2011; Sham et al. 2021). This multifaceted definition is in line with the definition of general well-being which Collie et al. (2015) describe as 'human flourishing'. According to Petrillo et al. (2015), mental well-being consists of three elements those are emotional, psychological, and social well-being which will be subsequently outlined in this section.

The dimension of emotional well-being can be defined as an individual's overall perception and feelings about life (Park et al., 2023). Moreover, life experience and reflection on one's life such as purpose, satisfaction, and meaning are key elements of emotional well-being (Park et al., 2023). Furthermore, context plays a role in an individual's emotional well-being such as culture, life circumstances, resources, and life trajectory (Feller et al., 2018, Park et al., 2023). Overall, emotional well-being includes the ratio of pleasant to unpleasant experiences and satisfaction in life (Keyes & Haidt, 2003). Additionally, emotional well-being is essential for mental and physical health (Langeland, 2022).

Another element is psychological well-being, which alludes to how well an individual's life is going. An important aspect of psychological well-being is to reduce prolonged or extreme negative emotions that can jeopardize an individual's ability to daily functioning. Therefore, psychological well-being can be explained as the capacity to function and have good feelings (Huppert, 2009). Moreover, meaningful activities such as having healthy relationships can influence an individual's psychological well-being. Additionally, well-being can be achieved if the individual's psychological needs such as purpose in life and belongingness are realised (Steger et al., 2008). This is aligned with Ryff (1989) definition of psychological well-being which encompasses having a purpose in life, positive relationships, autonomy, self-acceptance, environmental mastery, and personal growth. An individual's context can influence one's psychological well-being and hence overall health (Ryff & Singer, 2008).

The last component is social well-being which is comprised of having basic needs covered as well as participating in society, attaining goals, and having a sense of purpose. Society can influence an individual's well-being as employment, financial rewards, public services, and the country's politics are all key elements of social well-being (La Placa et al., 2013). Furthermore, an individual's perception of their social contribution, environment, potentiality, and integration all influence one's social well-being. Consequently, social well-being emphasizes the effective integration of an individual in the community as this increases one's health (Keyes & Shapiro, 2004).

Correlation between Stress and Mental Well-being

The perceived stress by an individual has an impact on the physical as well as a psychological response such as fear, anxiety, unpredictability, uncertainty, and lack of control (Miller & O'Callaghan, 2002). Moreover, stress has an impact on an individual as the psychological response to stress involves negative emotions that elicit mental disorders such as depression and anxiety (Kessler et al., 2003; Nicolaïdis, 2002). Additionally, stress may lead to burnout which in turn increases the chances of an individual having fatigue, mood disturbances, illnesses, and post-traumatic stress disorder (Salanova et al., 2010). Furthermore, stress can impair daily cognitive functions which are a key characteristic in mental health. Particularly the domains of learning, memory, and information processing such as performance and attention tasks can be hindered by stress (Marin et al., 2011).

Moreover, university students are challenged by the university's high environmental demands such as social, family, academic, and financial stressors (Graves et al., 2021). This lifestyle can lead to high stress levels therefore making university students vulnerable to mental health problems such as anxiety, depression, suicide, and self-harm as well as illnesses and accidents (Graves et al., 2021; Zhang et al., 2018). Furthermore, stress negatively influences student's self-concept and self-worth which could result in a decline in well-being (Largo-Wight et al., 2005). In conclusion, university students' can be stressed due to their academic lifestyle, and this might impact an individual's daily life and mental well-being (Hanawi et al., 2020).

Gender, Stress, and Mental Well-being

Gender can be defined, according to Hasan (2016), as the biological or social characteristics that define people as female or male. The World Health Organisation (2014) refers to gender, as roles socially constructed in which relationships, behaviours, attitudes, values, and personality traits are allocated differently according to one's gender. Hence, gender is not a straightforward and long-established dichotomy of male and female but rather a complex social system (Heise, et al., 2019).

There might be differences in the relationships between stress and mental well-being between male and female university students such as females using more emotion-focused coping strategies, venting, and self-distraction more than males (Graves et al., 2021). The used coping strategies could have an effect on stress and mental well-being among university students (Graves et al., 2021; Martínez et al., 2019). Another explanation is the gender differences in socialization such as cultural expectations in gender roles (Day & Livingstone, 2003). Moreover, gender identity might also play a role, as men are expected to cope with stress as it is traditionally associated with masculinity and manhood. Therefore, to avoid

conflict with their gender role identification, men might rate themselves as having lower stress levels whereas female university students may be more inclined to admit that they have higher perceived stress levels (Day & Livingstone, 2003; Roothman et al., 2003). Moreover, perceived stress levels and psychophysiological responses might also differ in gender (Graves et al., 2021; Schmaus et al., 2008). Lastly, biological differences in hormone fluctuation might influence stress and mental well-being (Dedovic et al., 2009).

Gender might influence stress among university students as men and women might perceive stress differently (Day & Livingstone, 2003; Graves et al., 2021). Female university students have an elevated rate of stress level concerning academic pressure, relationships, and future prospects (Day & Livingstone 2003; Kim, 2000). Female university students indicated higher stress levels compared to male university students (Backović et al., 2012; Brougham et al., 2009; Deatherage et al., 2014; Graves et al., 2021; Hall et al., 2006; Harutyunyan et al., 2020; Rahardjo et al., 2013). Moreover, women have a higher psychophysiological response when exposed to laboratory stressors indicating that women are in general more sensitive to continuous stress stimuli compared to men (Schmaus et al., 2008). However, Shaikh et al. (2004) concluded that male university students experienced more stress compared to female university students. Male university students' main sources of stress were exams, academia followed by relationships, and homesickness. Whereas for females, family, exams, and relationship issues were the most common reasons for their stress. Furthermore, both male and female university students who experienced stress also reported low moods, loss of temper, and inability to concentrate (Shaikh et al., 2004). Nevertheless, some research also indicates that there is no gender difference in stress levels among university students (Dyson & Renk, 2006; Gao et al., 2020). To conclude, most studies found that females experience higher stress levels than male university students.

Gender might influence mental well-being due to gender differences among university students (Hasan, 2016; Riecher-Rössler 2018). Mental health can be impacted by stress in the form of depression and anxiety (Graves et al., 2021). Research indicates that women are more susceptible to developing anxiety and depression disorders throughout their lives due to stress (Schmaus et al., 2008). More specifically, according to Bitsika et al, (2010), El Ansari et al. (2011), Gao et al., (2020), and Said et al. (2013), female university students have a higher rate of depression and anxiety compared to males. In a study conducted by Sax et al. (2004), female university students rated themselves lower in emotional well-being compared to males. According to AlQahtani et al. (2015), Gao et al. (2020), and Liu et al. (2017) male university students report having more serious mental health issues during their academic life

compared to females. Additionally, Taha & Sabra, (2012) found a high prevalence of emotional and social issues among male university students compared to female university students. Nevertheless, other research suggests that both male and female university students experience the same level of mental well-being; meaning that there are no gender differences (Hasan, 2016; Joshanloo & Jovanović, 2017; Shafiq & Yousaf, 2015).

Gender might influence the relationship between stress and mental well-being among university students. According to Schmaus et al. (2008), gender moderates the relationship between stress and mental well-being as women are more sensitive to continuous stress stimuli and therefore have lower mental well-being compared to men. However, Dyson & Renk's (2006) study on freshmen university students suggested that gender does not moderate the relationship between stress and mental well-being, meaning that there were no significant differences in stress levels and mental well-being among female and male university students. This is in line with Lopez & Gormley (2002) where gender did not moderate the relationship between life events resulting in stress and mental well-being.

To conclude, studies suggest that stress impacts university students' mental well-being. Various research indicates that females have higher stress levels compared to male university students. Although, there was conflicting evidence for gender differences in mental well-being among university students; it is expected that females will have lower mental well-being as they have higher stress levels compared to males.

The Present Study

The aim of this study is to explore the moderating effect of gender on the relationship between stress and mental well-being among university students. The research question is "What is the moderating effect of gender on stress and mental well-being among university students?" To answer the research question, further sub-questions are derived:

1. Is there a relationship between stress and mental well-being among university students?
2. Are there differences in levels of stress and mental well-being between male and female university students?
3. Does gender moderate the relationship between stress and mental well-being among university students and are female students more at risk of stress and lower mental well-being?

In this study, it is expected that gender moderates the relationship between stress and mental well-being among university students. Moreover, it is anticipated that women will have higher stress levels and lower mental well-being which is in line with previous research.

Methods

Design

A cross-sectional quantitative survey was selected to investigate the relationship between stress, mental well-being, and gender. The independent variable stress, the dependent variable mental well-being, and the moderator gender were recorded for each university student who participated in the survey at a single given point in time.

Participants

In total 164 university students participated in the survey. The participants took part in the survey through the SONA website or other social network services (i.e., WhatsApp). Participants had to be 18 years or older, study in a university in the Netherlands or Germany, be either Bachelor's or Master's students, and be fluent in English to participate in the survey. Respondents had to complete a consent form to participate in the survey (see Appendix A). From these 164 students, a sample size of 109 was used, a total of 55 participants were removed, 49 of which did not complete the survey and 6 of whom indicated being of a third gender or preferred not to say. The participants had a mean age of 21 and were mostly German and female. In terms of academia, most participants were in their third year and either studying psychology or other studies. The majority started university in either 2021 or 2023. Further, participants were mostly from the University of Twente or other universities. The participants' characteristics are outlined in Table 1.

Table 1*Characteristics of the Participants*

Participants	n	Percentage (%)
Total	109	
Age (mean)	21	
<i>Nationality</i>		
Dutch	25	23%
German	77	71%
Other	7	6%
<i>Gender</i>		
Male	27	25%
Female	82	75%
<i>Study phase</i>		
Bachelor year 1	25	23%
Bachelor year 2	19	17%
Bachelor year 3	35	32%
Master year 1	14	13%
Master year 2	8	7.5%
Other	8	7.5%
<i>Study programme</i>		
Psychology	42	39%
Other	67	61%
<i>Start of study</i>		
2018	3	3%
2019	5	4%
2020 -2023	94	87%
Other	7	6%
<i>University</i>		
University of Twente	53	49%
Other	56	51%

Materials

To partake in the survey, students needed an electronic appliance, access to Wi-Fi, and a link to the questionnaire which was posted on the SONA system and other social network services. The SONA system is an online university platform that students use to register for experiments or online surveys. Further, the online platform Qualtrics was used to create the surveys based on the Student Life Challenges (SLC) and Mental Health Continuum – Short Form scale (MHC-SF), and through this platform, the primary data was collected. Following the ethical policies, the survey was comprised of a total of 36 items: 14 items from the Mental Health Continuum – Short Form scale (MHC-SF) and 22 items from the Student Life Challenges (SLC).

Demographics

At the start of the survey, students had to complete questions regarding their demographics such as age, nationality (i.e. ‘Dutch’, ‘German’, ‘Other’), gender (i.e. ‘Male’, ‘Female’, ‘Non-binary/Third gender’, ‘Prefer not to say’), study phase (ranging from ‘Bachelor levels 1-3’ to ‘Master levels 1 or 2’ or ‘Other’), study programme, year of the start of the study and university.

Mental Health Continuum

The Mental Health Continuum (MHC-SF) is a questionnaire that assesses a person’s mental health through self-report by evaluating three different dimensions namely emotional, psychological, and social well-being (Petrillo et al., 2015). Participants must indicate on a five-point scale how they have felt for the past month for each item of the MHC-SF. Participants can indicate on a five-point scale that they have 0 = ‘Never’, 1 = ‘Once or twice’, 2 = ‘About once a week’, 3 = ‘2 or 3 times a week’, 4 = ‘Almost every day’ and 5 = ‘Every day’ felt or experienced for the past month the item of the MHC-SF. The questionnaire has a total of 14 items which encompasses three items pertaining to ‘emotional well-being’ (example: “During the past month, how often did you feel happy”), five items of ‘social well-being’ (example: “During the past month, how often did you feel that you had something important to contribute to society”), and six items related to ‘psychological well-being’ (example: “During the past month, how often did you feel that you liked most parts of your personality”). The Cronbach alpha (α) indicates the reliability of the scale and above .70 is deemed acceptable and more than .80 is deemed as having a high reliability (Kline, 2000). The MHC-SF scale has a Cronbach alpha of .90 suggesting that the scale has a high reliability (Demirci & Ahmet, 2015). Moreover, the subscales of the dimensions of ‘emotional well-being’ has a Cronbach alpha of $\alpha = .83$, for ‘psychological well-being’ $\alpha =$

.83, and for 'social well-being' $\alpha = .74$ all indicating high reliability (Lamers, 2012). In this study the MHC-SF also had a Cronbach's alpha of .90, and for the subscales of the dimensions 'emotional well-being' $\alpha = .86$, for 'psychological well-being' $\alpha = .78$, and for 'social well-being' $\alpha = .79$ all indicating high reliability. Furthermore, the MHC-SF has a satisfactory construct, convergent and discriminant validity, hence overall the MHC-SF is a valid tool (Lamers, 2012).

Student Life Challenges

The Student Life Challenges (SLC) is a questionnaire comprised of items on perceived student life stressors (Porru et al., 2022). Participants must indicate on a four-point scale the extent to which they agree to the item of the Student Life Challenges. Participants can indicate on a four-point scale that they 1 = 'Totally disagree', 2 = 'Somewhat disagree', 3 = 'Somewhat agree' and 4 = 'Totally agree' with the item of the Student Life Challenges. The questionnaire has a total of 22 items, and it utilizes six subscales from the Higher Education Stress Inventory (HESI) (Dahlin et al., 2005). There are seven items from 'faculty shortcomings' with a Cronbach alpha of $\alpha = .76$ which covers topics such as lack of personal development and study influence, learning styles, and education quality. Three items pertaining to 'worries about future competence' with a Cronbach alpha of $\alpha = .67$ which evaluates the uncertainties on the future profession. Five items related to 'unsupportive climate' with a Cronbach alpha of $\alpha = .65$ that assesses peer relationships. Three items associated with 'high workload' with a Cronbach alpha of $\alpha = .68$ addressing aspects of study trajectory and work-life balance. Two items on 'low commitment' with a Spearman's (r_s) of $r_s = .60$ which focuses on the satisfaction with the selected career. Two items linked to 'financial concerns' with a Spearman's of $r_s = .49$ measuring the economic conditions (Porru et al., 2022). Cronbach alpha for the total Student Life Challenges scale in this study was .83 suggesting high reliability, and for the subscales of the dimensions 'faculty shortcomings' $\alpha = .76$, for 'worries about future competence' $\alpha = .73$, for 'unsupportive climate' $\alpha = .71$, and for 'high workload' $\alpha = .74$ all indicating high reliability. Spearman's rho is used to measure the strength and direction of association between two variables (Schmid & Schmidt, 2007). In this study, the subscale 'low commitment' had a $r_s = .66$, and the subscale 'financial concerns' had a $r_s = .53$ indicated satisfactory reliability in this study. Furthermore, the Student Life Challenges is a valid scale as it is based on the subscales from the Higher Education Stress Inventory (HESI) (Dahlin et al., 2005).

Procedure

A survey was conducted for the data collection. Participants were provided with a link through WhatsApp and SONA system which led to the “Qualtrics Survey”. At the start of the survey, the purpose of the study was explained followed by the informed consent on having understood the purpose of the research, procedure, data handling, and participants’ rights. Furthermore, the participants were provided with the researcher’s contact details in case respondents had questions or remarks. Following the informed consent, students needed to complete the demographic questions, then the 14 items from the Mental Health Continuum (MHC-SF), and then the 22 items from the Student Life Challenges (SLC). Lastly, the participants were thanked for their participation. Students took approximately 15-20 minutes to complete the survey.

Data Analysis

To implement the data analysis, the program RStudio version ‘R 4.2.2’ was used. The data was prepared followed by removing a total of 49 participants from the dataset who gave incomplete answers and 6 participants who indicated being of a third gender or preferred not to say. Furthermore, the assumptions of normality, independence, homoscedasticity, and linearity were checked. Next, an exploratory factor analysis on Student Life Challenges (SLC) was performed to investigate whether one latent factor was viable. Additionally, the descriptive statistics for the study variables were performed which included computing the standard deviation and mean. Then a Pearson correlation coefficient between stress and mental well-being for each gender was computed. Further, the mean scores between men and women in stress and mental well-being were analysed with a t-test. Thereafter, the moderation analysis was conducted by doing a multiple regression analysis with mental well-being as the dependent variable, stress, and gender as well as the interaction between them as predictors. During the moderation analysis, bootstrapping was applied, multicollinearity was checked, and the predictors were centered. A significance level of $p \leq .05$ was used.

Results

Assumptions Check

The assumption of normality was checked by making a histogram and plotting the frequency of stress and mental well-being against its residuals, independence was checked by making a scatterplot with the residuals plotted against the observation number, homoscedasticity was checked by making a scatterplot and plotting the variance of the

residuals of the independent variable stress, and to check linearity the independent variable stress was plotted against the dependent variable mental well-being (see Appendix B).

Factor Analysis

A factor analysis on the 6 subscale scores of the Student Life Challenges (SLC) was performed to find out if one latent factor was feasible. The Kaiser-Meyer-Olkin (KMO) was applied to test whether the variables were sufficiently correlated to each other which indicates that a factor analysis could be further performed. The KMO was .74 which is above the sampling adequacy of .6 meaning that further analysis could be made (Shrestha, 2021). Next, Bartlett's test of sphericity was conducted and was deemed significant ($\chi^2 = 95.21, p < .001$) which means that the variables were sufficiently correlated, and the factor analysis could be executed on the correlation matrix (Shrestha, 2021). One factor was found explaining the SLC based on the criterion eigenvalue > 1 . The scree plot in Figure 1 shows that the first factor had an eigenvalue > 1 which means that a one-factor solution was appropriate. In Table 2, the first five subscales all had factor loadings $> .40$.

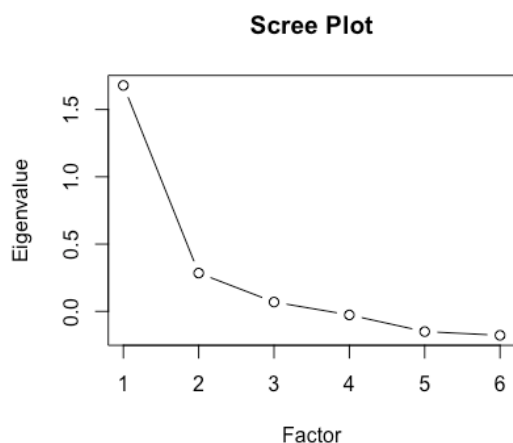
Table 2

Factor Loadings for the Six Subscales of the Student Life Challenges

Subscales of SLC	Loadings
Faculty shortcomings	.62
Worries about future	.57
Unsupportive climate	.58
High workload	.47
Low commitment	.56
Financial concerns	.34

Figure 1

Scree Plot with the Eigenvalues Plotted Against the Factors of the Student Life Challenges



Descriptive Statistics

The mean score from the Mental Health Continuum (MHC-SF) was 2.82 ($SD = 1.46$) indicating that the participants had average mental well-being. According to De Beurs et al. (2022), scores from the MHC-SF between 2.79 – 3.28 can be deemed as the sample having average mental well-being when compared to the general Dutch population. The mean score from the Student Life Challenges (SLC) was 1.93 ($SD = 0.41$). The score from SLC suggested stress in participants. The differences between men and women in stress and mental well-being were calculated through t-tests. Women had significantly higher stress scores than men. However, there were no significant differences in mental well-being between men and women (see Table 3).

Table 3*Descriptive Statistics and T-test*

Scale	Total Group Mean (SD)	Male Mean (SD)	Female Mean (SD)	t-value	p-value	df
MHC-SF – total	2.82 (1.46)	3 (0.96)	2.75 (0.83)	1.20	.24	40
Emotional	3.24 (0.10)	3.27 (1.16)	3.22 (0.95)	.40	.69	197.63
Social	2.43 (1.12)	2.77 (1.1)	2.31 (1.11)	4.03	< .001	338.66
Psychological	3.15 (1.00)	3.18 (1.22)	3.14 (0.93)	1.21	.23	348
SLC – total	1.93 (0.41)	1.75 (0.31)	1.99 (0.43)	-3.31	.001	81
Faculty shortcomings	1.71 (0.31)	2.74 (0.32)	2.72 (0.31)	.23	.82	407.04
Worries about future competence	2.56 (0.79)	2.21 (0.77)	2.68 (0.77)	-5.27	< .001	226.26
Unsupportive climate	1.88 (0.58)	1.67 (0.49)	1.95 (0.60)	-4.22	< .001	346.66
High workload	2.40 (0.78)	2.33 (0.64)	2.43 (0.83)	-1.13	< .001	257.95
Low commitment	3.28 (0.69)	3.43 (0.73)	3.23 (0.67)	2.39	.02	175.38
Financial concerns	4.72 (1.81)	4.33 (1.9)	4.85 (1.78)	-1.88	.06	184.35

Association between Stress and Mental Well-being

A Pearson correlation coefficient (r) was performed to determine the association between stress and mental well-being. The Pearson correlation coefficient reported a significant moderate negative correlation between stress and mental well-being (see Table 4), indicating that higher stress levels were related to lower levels of mental well-being. Moreover, the output in Table 4 indicated that the association between mental well-being and stress was significant for both females and males. Furthermore, the correlation was not significantly different for males and females as there was an overlap in the confidence intervals (see Table 4).

Table 4*Pearson Correlation Coefficient of Stress and Mental Well-being*

Group	Correlation (<i>r</i>)	p-value	95%CI Lower	95% CI Upper
Total	-.37	< .001	-.52	-.20
Male	-.39	.04	-.67	-.02
Female	-.46	< .001	-.62	-.27

Moderation Analysis

To prevent multicollinearity the predictors were centered. The outcome of the moderation analysis indicated that stress had a statistically significant relationship with mental well-being, meaning that higher levels of stress are related to lower levels of mental well-being. Furthermore, gender was not a significant predictor of mental well-being, indicating that there were no differences in mental well-being between men and women. Additionally, the association between the interaction of stress and gender and mental well-being was statistically non-significant, meaning that gender did not moderate the relationship between stress and mental well-being (see Table 5).

Table 5*Moderation Analysis to Explore the Effect of the Interaction between Stress and Gender on the Outcome Variable Mental Well-being*

Variable	Coefficient	SE	t	p	LLCI	ULCI
Constant	39.25	1.1	35.71	.000	37.07	41.43
Stress	-0.62	0.12	-5.00	.000	-0.87	-0.38
Gender	0.32	2.73	0.12	.91	-5.09	5.73
Int_1	0.20	0.34	0.58	.57	-0.48	0.87

Note. Product term key Int_1: Stress x Gender. Level of confidence for all confidence intervals in output: 95. Bootstrapping was applied. $R^2 = .21$, $F(3, 105) = 9.26$, $p < .001$

Discussion**Theoretical Implications**

The purpose of this study was to explore whether gender is a moderator of the relationship between stress and mental well-being among university students. The outcome of this investigation indicated that gender was not a moderator.

The study found a significant negative association between stress and mental well-being among university students, this suggests that higher levels of stress were related to lower levels of mental well-being. This finding has been supported by previous research conducted by Hanawi et al. (2020), Kessler et al. (2003) and Nicolaïdis (2002). It was expected that females would have higher stress levels and lower mental well-being compared to male university students and that gender moderates the relationship. However, the results of this study found that gender did not moderate the relationship which is aligned with previous research conducted by Dyson & Renk's (2006) and Lopez & Gormley (2002). Additionally, the association between mental well-being and stress was significant for both females and males with no significant difference in the correlation. Hence, this study indicates that men at university are equally as susceptible to stress and lower mental well-being as women which is in accordance with Hasan (2016), Joshanloo & Jovanović (2017), and Shafiq & Yousaf (2015).

The difference in levels of stress and mental well-being between male and female university students were explored and the results indicated that women had higher stress scores than men. This was aligned with previous research where female university students reported more stress in contrast to male university students (Backović et al., 2012; Brougham et al., 2009; Deatherage et al., 2014; Hall et al., 2006; Harutyunyan et al., 2020; Rahardjo et al., 2013). Gender role identification might have influenced the outcome as men might have rated themselves as having less stress in order to adhere to traditionally masculine traits and behaviours, whereas women might have been more inclined to admit to having higher stress levels (Day & Livingstone, 2003; Roothman et al., 2003). Hence, this could have influenced the results as men might have given more socially desirable answers that adhere to the traditionally masculine traits and behaviours.

However, there were no differences in mental well-being between men and women. Research conducted by Hasan (2016), Joshanloo & Jovanović (2017), and Shafiq & Yousaf (2015) also found no gender difference in mental well-being among university students. This could be due to the changes in gender norms where equal opportunities and self-actualization were promoted, thereby increasing awareness on mental well-being regardless of gender differences (Roothman et al. 2003). Another explanation could be that the items of the MHC-SF are invariant across genders, meaning that both genders interpret, understand, and respond to the questionnaire similarly (Joshanloo et al., 2017).

The highlight of this study is that gender was not a moderator in the relationship between stress and mental well-being among university students. The results imply that

irrespective of gender, university students' lifestyles such as academic, social, family, and financial demands lead to stress, therefore, affecting all university students' mental well-being (Graves et al., 2021; Hanawi et al., 2020; Zhang et al., 2018).

Strengths

The psychometric properties of the used scales, namely the Mental Health Continuum – Short Form (MHC-SF) and Student Life Challenges (SLC) were both reliable and valid as indicated by previous studies conducted by Dahlin et al. (2005), Demirci & Ahmet (2015), Lamers (2012) and Porru et al. (2022) and were also showed to be reliable in this study. This means that the scales are accurate in their measurements. The study can be replicated due to the reliability, and validity of the scales as well as the used methods. Further, the results of this study were consistent with previous literature. The research design and statistical techniques were appropriate for the research question and sub-questions. Furthermore, this study adhered to ethical guidelines such as confidentiality, informed consent, and debriefing.

Limitations

There was an unequal ratio of male to female students participating in this research. A more balanced ratio might yield more accurate and unbiased results. Furthermore, this research was carried out in a Western society with most participants being from Germany or the Netherlands which makes the results less applicable worldwide. Including more participants from different cultures could be of interest as gender roles and norms differ across countries and societies, therefore the results might vary. Moreover, the sample was a convenience sample, and hence not representative of the university student population due to the overrepresentation of German students. This could have affected the generalizability of the results, as lifestyle, stress, and mental well-being might differ across European and international university students. Further, the collected data was based on self-reporting hence participants could give less truthful and more socially desirable responses to the questionnaires. Additionally, in a cross-sectional design, the surveys are administered at a single given point in time and therefore do not allow for casual interpretations, and changes over time can't be examined.

Recommendation for Future Research

Further research on the moderating effect of gender on the relationship between stress and mental well-being among university students could be investigated. A recommendation for future research could be to include more diverse participants to enhance the generalisability of the study results. For instance, by including participants from different ethnic backgrounds as well as including more males to balance out the gender ratio.

Moreover, conducting a cross-cultural study to compare the findings with other cultural contexts could be of interest to have a better understanding of how gender roles and norms across countries might alter the results. Furthermore, future research could conduct the study over a longer time frame to understand the changes in the results over time by, for instance, implementing physiological stress measures.

Practical Implications

This study contributes to raising awareness on stress and mental well-being for all university students as well as shedding light on men's mental health as gender does not moderate the relationship between stress and mental well-being among university students. It has been reported that most university students who are struggling in their academic life underuse the services provided by the university due to financial difficulties, lack of information, lack of perceived need for help, lack of time, and stigma (Cage et al., 2020; Lee et al., 2021). Therefore, universities should make mental health resources more accessible for all students and create more awareness; more so for male students, as the suicide rate is higher in males compared to female students (Mackenzie et al., 2011; Sagar-Ouriaghli et al., 2020). Further, the results showed that males are equally as susceptible to having stress and low mental well-being as female university students. Consequently, universities should offer resources, support, and mental health services to sub-groups who are more vulnerable or at risk of stress and mental well-being (Backović, et al., 2022). To improve mental well-being and stress levels among university students, tailored mental health resources according to the students' study year should be offered, such as skill workshops regarding study methods and time management (Liu et al., 2019). Moreover, to cope with academic stressors, peer support groups on and off-campus could be valuable as they provide non-judgmental support, confidentiality, empathy, and easy accessibility to university students (Suresh et al., 2021). Furthermore, peer support groups have been shown to improve self-acceptance, self-esteem, and mental well-being among university students (Aladağ & Tezer, 2009; Byrom, 2018). To conclude, interventions and more mental health services at universities could help reduce stress and low mental well-being among university students.

Conclusion

In this study, it was expected that female university students would have higher stress levels and lower mental well-being as well as gender moderating the relationship. The results indicated that gender did not moderate the relationship. There was a negative relationship between stress and mental well-being. Both males and females were susceptible of having stress and low mental well-being. Women had higher stress levels compared to men but both

genders had similar mental well-being levels. This study contributes to raising awareness on stress and mental well-being for all university students and on men's mental health.

Universities' mental health services should offer skill workshops and peer support groups to improve stress levels and mental well-being among university students. Future studies should include more ethnically diverse participants, conduct a cross-cultural study, and explore the long-term effects of gender on the relationship between stress and mental well-being in students.

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Appendix A

Consent Form

Clicking "I agree and consent to participate in this study" means:

- you are 18 years of age or older
- you have carefully and thoroughly read this page
- you have been informed about the nature and method of this research in a manner that is clear to you,

and

- you voluntarily agree to participate in this study
 - I agree and consent to participate in this study
 - I do not agree and consent to participate in this study

Appendix B

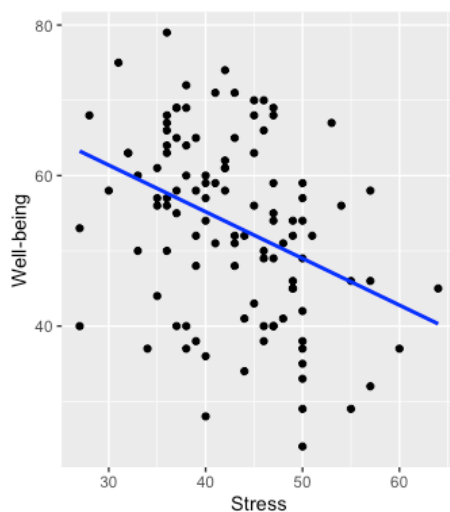
Assumptions Check

Linearity

To test the assumption of linearity the independent variable stress was plotted against the dependent variable mental well-being. The scatterplot shown in Figure 1 had no significant pattern that indicated a deviation from a linear pattern. Furthermore, there was a negative relationship between stress and mental well-being, indicating that if stress levels increase then mental well-being decreases.

Figure 1

Checking Linearity Assumption using a Scatterplot between the Independent Variable Stress and the Dependent Variable Mental Well-being

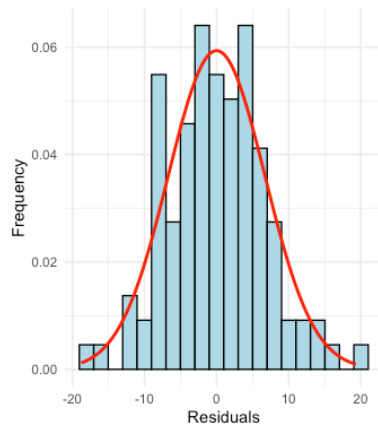


Normality

To test the assumption of normality a histogram was computed by plotting the frequency of stress and mental well-being against its residuals. Figure 2 shows a normal distribution of the residuals as it is bell-shaped.

Figure 2

Checking Normality Assumption by Plotting a Histogram with the Frequency Against its Residuals

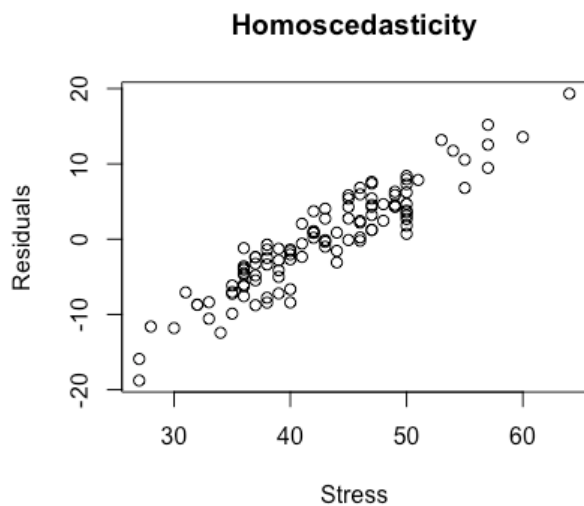


Homoscedasticity

To test the assumption of homoscedasticity, a scatterplot with the variance of the residuals of the independent variable stress was plotted. In Figure 3 the variance of the residuals is steady across the distinct values of the independent variable stress, indicating homoscedasticity as there are no clear patterns indicating heteroscedasticity.

Figure 3

Checking Homoscedasticity Assumption by Plotting a Scatterplot with the Variance of the Residuals of the Independent Variable Stress



	NEVER	ONCE OR TWICE	ABOUT ONCE A WEEK	2 OR 3 TIMES A WEEK	ALMOST EVERY DAY	EVERY DAY
that you belonged to a community (like a social group, your school, or your neighborhood)	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that our society is a good place, or is becoming a better place, for all people	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that people are basically good	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that the way our society works made sense to you	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that you liked most parts of your personality	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
good at managing the responsibilities of your daily life	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that you had warm and trusting relationships with others	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that you had experiences that challenged you to grow and become a better person	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
confident to think or express your own ideas and opinions	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
that your life has a sense of direction or meaning to it	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

Student Life Challenges (SLC)

The following statements refer to challenges that you might encounter in your academic life.

Place a checkmark in the box that best represents to what extent you agree with the following:

	Totally disagree	Somewhat disagree	Somewhat agree	Totally agree
I feel that my teachers treat me with respect.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The teachers often fail to clarify the aims of the activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The study stimulates my personal development.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a student you are often expected to participate in situations where your role and function is unclear.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am able to influence the studies or curriculum.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is too much focus on passive learning of facts and too little on active seeking of knowledge and time for reflection.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that the training is preparing me well for my future profession.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am worried that I will not acquire all the knowledge needed for my future profession.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The long hours and responsibilities of my future career worry me.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The insight I have had into my future profession has made me worried about the stressful workload.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>

	Totally disagree	Somewhat disagree	Somewhat agree	Totally agree
Studying has created a climate of anonymity and isolation among the students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The professional role presented in our course conflicts with my moral viewpoint.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
There is a competitive attitude among students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I feel that the studies have played a role in creating a cold and impersonal attitude among students.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
It seems to me to be treated worse on the basis of my sex.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
My study controls my life and I don't have a lot of time for other activities	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The literature is too difficult and extensive.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
The pace of study is too high.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am satisfied with my choice of career.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am proud of my future profession.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
As a student, my financial situation is worrying.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>
I am worried about my future financial situation and my ability to pay off my student loans.	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>	<input type="radio"/>