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Self-Compassion, Perceived Academic Stress, Depression and Anxiety Symptomology Among Australian University Students

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Abstract: 30 years of research has identified university students as an at-risk group for the development of depression and anxiety symptomology. Furthermore, research published between 2003 and 2013 suggests the prevalence and severity of depression and anxiety symptomology among university students continues to rise. Researchers have theorized that perceived academic stress is associated with increased depression and anxiety symptomology among university students. However, only recently has a scale been developed to measure perceived academic stress among university students. In addition, self-compassion has shown promise as a protective factor against the development of depression and anxiety symptomology. Therefore, the current study aimed to first, examine the relationship between perceived academic stress, depression and anxiety symptomology, and second, explore the utility of self-compassion as a buffer between perceived academic stress, depression, and anxiety symptomology. The sample consisted of 207 Australian university students (145 females and 52 males). The study employed a cross-sectional correlational design. Item analysis and exploratory factor analysis did not support the original 18-item, four-factor Perception of Academic Stress Scale [5]. A revised 15-item, three-factor Perception of Academic Stress Scale with improved psychometric properties was used in this study. MANOVA analysis revealed no significant group differences between sex, age and household income across depression and anxiety symptomology. Results of the moderation analyses revealed that perceived academic stress was significantly associated with increased depression and anxiety symptomology among Australian university students. Self-compassion was shown to significantly reduce the effect of perceived academic stress on depression symptomology. However, self-compassion was not shown to moderate the relationship between perceived academic stress and anxiety symptomology. The results suggest that strategies focused on reducing perceived academic stress and increasing self-compassion may be beneficial in preventing the development of depression and anxiety symptomology among Australian university students. Further implications, future research, and limitations are discussed.

Keywords: Depression, Anxiety, Symptomology, Perceived Academic Stress, Self-Compassion, University Students, Australia, Moderation

1. Introduction

University students have been identified as an at-risk group for developing depression and anxiety symptomology [1, 3, 9, 11, 21, 49]. Research suggests that university students experience rates of depression and anxiety symptomology substantially higher than those found among the age-matched general population [3, 21, 65]. Furthermore, a recent systematic review revealed that research published between 2005 and 2010 indicates that the prevalence and severity of depression and anxiety symptomology among university students continue to rise [34]. As such, further examination of the stressors and protective factors relating to depression and anxiety symptomology, specifically among Australian university students is warranted.

University students experience a unique variety of stressors that have been associated with the development of depression and anxiety symptomology [6, 21, 59]. Recently a scale has been developed to measure the unique and specific stressors

related to perceived academic stress among university students [5]. The newly developed Perception of Academic Stress Scale is a multifaceted construct which incorporates perceived pressure to perform, academic self-perception, perceived time restraint and perceived workload that has yet to be explored in relation to depression and anxiety symptomology among university students [5].

In addition, the construct of self-compassion has shown promise as a protective factor for the prevention of depression and anxiety among university students [45, 51, 60]. Self-compassion has been described as a psychologically adaptive way of relating to the self when considering personal inadequacies or difficult life circumstances [44]. To date, no studies have examined self-compassion as a buffer between perceived academic stress, depression and anxiety symptomology among university students.

Furthermore, research examining the relationship between demographic characteristics of university students such as age, sex and household income across depression and anxiety symptomology have found inconsistent results [21, 28, 34]. A recent systematic review, exploring the results of 24 articles assessing sex, age and household income across depression and anxiety symptomology among university students stated that the use of varying instrumentation and assumption violations appear to be the cause of the variation in results [34]. In addition, no research to date has been conducted with an Australian sample

As such there were three aims of this study. First, examine the relationship between perceived academic stress, depression and anxiety symptomology among Australian university students utilizing the Perception of Academic Stress Scale. Second, explore the utility of self-compassion as a buffer between perceived academic stress, depression and anxiety among Australian university students, and third, examine the relationship between sex, age and household income across depression and anxiety symptomology among Australian university students to measure for appropriate demographic control variables.

1.1. Depression and Anxiety Among University Students

Depression symptomology has been characterized as feelings of dysphoria, hopelessness, devaluation of life, self-deprecation, lack of interest/involvement, anhedonia, and inertia [38]. Anxiety symptomology has been stated as an increase in autonomic arousal, which includes situational anxiety and subjective experiences of anxious affect [38]. The prevalence rates of depression and anxiety symptomology among university students have been consistently reported to be up to eight times higher than the age-matched general population [34]. For example, among a sample of 2,843 North American university students, 15.6% of undergraduate and 13.0% of graduate students screened positive for a depressive or anxiety disorder [21]. In addition, among a sample of 10,261 North American university students, 19.6% presented with increased depressive symptomology, while 13.4% presented with increased anxiety symptomology. The study also revealed that 11% of females and 8% of males reported they were "so depressed it was difficult to function" on nine or more occasions per year.

Most notably increased depression and anxiety symptomology among university students has been associated with an increase in suicidal ideation [18, 21, 28, 33, 40, 67]. A recent study revealed that among a sample of 729 North American undergraduate students, 24% of university students who reported moderate to severe depression symptomology and 41% of students who reported severe to extremely severe depression symptomology also reported suicidal ideation. Furthermore, of the 81 participants who reported suicidal ideation within the sample, 75 suffered from self-reported anxiety [28].

Although there is substantial literature reporting the increased prevalence of depression and anxiety among university students, a recent systematic review stated that the large variation observed in epidemiological benchmarking is due to the use of varying instrumentation used to measure depression and anxiety among university students [34]. The current study aimed to address this limitation by examining depression and anxiety symptomology among Australian university students utilizing the depression and anxiety subscales of the Short-Form Depression Anxiety Stress Scales (DASS-21) [38]. The DASS-21 is a measure of depression, anxiety and stress symptomology that has well established psychometric properties and age-matched Australian normative data allowing for reliable and valid comparisons [15, 32].

1.2. Perceived Academic Stress, Depression and Anxiety Among University Students: A Cognitive Perspective

Perceived academic stress has been defined as a unique set of academic stressors specific to the university student experience [5]. Reference [5] states that the Perception of Academic Stress Scale should be used to "examine the relationship between academic stressors and psychiatric disorders, especially depression and anxiety disorders, which is lacking in the literature" [5, p. 7-8].

Applying Beck's cognitive model of psychopathology, perceived academic stress may be an important activating stimulus for latent negative schemas, which throughout a student's degree perpetuate a negative self-view, resulting in the development of depression and anxiety symptomology [4]. The Perception of Academic Stress Scale incorporates four constructs; perceived pressure to perform, academic self-perception, perceived time restraint, and perceived workload as specific academic stressors that university students must manage during tertiary education [5].

Academic self-perception refers to an individual's self-confidence relating to academic success, future career success and ability to make the 'right' academic decisions [5]. The construct of academic self-perception has been linked to university students perceived self-worth [16, 17]. In Beck's cognitive model of psychopathology, negative self-worth is proposed as a belief that creates biased interpretations of

experiences, leading to the perpetuation of depression and anxiety symptoms over time [4].

Although academic self-perception has been theorized to influence the development of depression and anxiety symptomology among university students [16], to date there has been limited research exploring this relationship. Reference [29] reported that among a sample of 480 university students aged 25 years or older that academic self-perception was correlated with depression symptomology $r = .15$, $p < .001$. Therefore, a negative academic self-perception may act as a biased schema leading to the development of depression and anxiety symptomology among university students.

Perceived pressure to perform refers to the external stressors stemming from competition with peers, expectations of parents' and teachers', along with critical comments regarding students' academic performance [5]. Limited research has examined the relationship between academic pressure to perform, depression and anxiety symptomology. Reference [64] reported that among 163 current university student-athletes and 117 recent graduates, current student-athletes were twice as likely to suffer from depression symptoms compared to recent graduates (16.8% vs. 8.0%). It was proposed that the primary factor for the increased depression symptomology among current university student-athletes was the combination of academic and sporting pressure to perform. Therefore, perceived academic pressure to perform may be a distinct stressor among university students which triggers and perpetuates negative automatic schemas leading to the development of depression and anxiety symptomology.

The final constructs within the Perception of Academic Stress Scale are perceived workload and perceived time restraint [5]. Perceived workload refers to the stressors relating to excessive workload, assignments, and anxiousness regarding examinations [5]. Perceived time restraint refers to stressors that result from an inability to finish coursework, poor time management and limited ability to relax [5]. An increase in perceived time restraint and workload has been linked to an increase in stress among university students [12, 52]. However, limited research has explored the relationship between perceived workload and time restraint on depression and anxiety symptomology among university students [19, 54].

Based on the findings reported above, it is proposed that perceived academic stress is a unique set of specific stressors, that in combination with the performance-based structure of tertiary education, increases the likelihood of university student's developing depression and anxiety symptomology. Applying Beck's cognitive model of psychopathology, the constructs of perceived academic stress may serve as activating stimuli for latent negative schemas, which throughout a student's degree perpetuate a negative self-view, resulting in the development of depression and anxiety symptomology. To date, no research has examined the relationship between perceived academic stress as outlined by reference [5], depression and anxiety symptomology among Australian university students.

If perceived academic stress is theorized to influence depression and anxiety symptomology among university students, then it is equally important to identify factors that may protect university students from the demands of tertiary education that lead to the development of depression and anxiety.

1.3. Self-Compassion as a Protective Factor for Depression and Anxiety Among University Students

Self-compassion comprises three contrasting constructs: self-kindness vs. self-judgment, common humanity vs. isolation and mindfulness vs. overidentification. Self-kindness reflects being kind and understanding to oneself in instances of perceived personal hardship. Conversely, self-judgment refers to being overly critical of one's self during times of adversity. Common humanity is defined as the ability to recognize that pain and failure are unavoidable aspects of the shared human experience. Whereas isolation represents a feeling that 'you are alone in your suffering.' Mindfulness entails a balanced awareness of one's emotions, and overidentification reflects excessive fixation on negative experiences or emotions [43]. Although the constructs of self-compassion are conceptually distinct and can be experienced differently at the phenomenological level, they also interact to enhance each other [43]. Therefore, self-compassion is a specific, positive emotional self-attitude that has been proposed to protect an individual from the negative consequences of self-judgment, isolation, and rumination which lead to the development of depression and anxiety symptomology [45].

Previous research has reported an association between increased self-compassion and decreased depression and anxiety symptomology [44, 45, 47, 51, 56, 60, 63]. For example, a study utilizing 119 first-year undergraduate students found that increased self-compassion among university students was significantly associated with decreased depression symptomology [60]. In addition, a longitudinal study assessing 439 first year university students in Belgium, reported that increased self-compassion acted as a protective factor against the development of depression symptomology during university students first year of studies [51]. University students within the study who scored higher in self-compassion at the beginning of the academic year were significantly less likely to develop depression symptomology at the end of their first year of study. Furthermore, self-compassion has been shown to be negatively correlated with depression and anxiety symptomology among university students between $r = -.51$ and $-.73$ [45, 47].

While this body of research is promising, there is still more to be learned about self-compassion if it is to gain widespread acceptance as a psychologically adaptive mindset [47]. For example, research conducted on self-compassion to date has focused on the negative association with psychopathology. This study aimed to extend the research on self-compassion by examining self-compassion as a buffer between perceived

academic stress, depression and anxiety symptomology among Australian university students.

1.4. The Present Study

A 2 x 2 x 4 MANOVA examining sex, age and household income across depression and anxiety symptomology was conducted to identify appropriate control variables among a sample of Australian university students. The main analysis consisted of two moderation analyses designed to investigate the following three hypotheses:

H1: A significant direct effect, whereby increased perceived academic stress would be significantly associated with increased depression and anxiety symptomology.

H2: A significant direct effect, whereby increased self-compassion would be significantly associated with decreased depression and anxiety symptomology.

H3: A significant interaction effect, whereby increased self-compassion would significantly reduce the effect of perceived academic stress on depression and anxiety symptomology.

2. Method

2.1. Participants

Of the 207 Australian university students who participated in the study, ten chose not to answer any of the demographic questions. The remaining 197 participants consisted of 145 (70.7%) females and 52 (25.4%) males. The sample consisted primarily of undergraduate students 176 (85.9%), of which 174 (88.3%) were in their first three years of their degree. Table 1 presents participants age, relationship status, household income per year, employment status, current degree level and current year level of the degree across sex.

Table 1. *Participants Age, Relationship Status, Household Income, Employment, and Education Characteristics across Males and Females.*

Participants' Demographic Characteristics	Males n (%)	Females n (%)	All N (%)
Age			
18–24	42 (80.8)	128 (88.3)	170 (82.9)
25–29	4 (7.7)	3 (2.1)	7 (3.4)
30–34	1 (1.9)	2 (1.4)	3 (1.5)
35–44	2 (3.8)	7 (4.8)	9 (4.4)
45–54	3 (5.8)	5 (3.4)	8 (3.9)
Relationship Status			
Single	30 (57.7)	79 (54.5)	109 (53.2)
In a Relationship	15 (28.8)	42 (29.0)	57 (27.8)
Living Together	3 (5.8)	14 (9.7)	17 (8.3)
Married	2 (3.8)	7 (4.8)	9 (4.4)
Divorced/Separated	2 (3.8)	3 (2.1)	5 (2.4)
Household Income Per Year			
< $15,000	11 (21.2)	54 (37.2)	65 (31.7)
$15,000-$24, 999	7 (13.5)	10 (6.9)	17 (8.3)
$25,000-$34,999	5 (9.6)	13 (9.0)	18 (8.8)
$35,000-$44,999	0	2 (1.4)	2 (1.0)
$45,000-$54,999	0	5 (3.4)	5 (2.4)
$55,000-$64,999	3 (5.9)	5 (3.4)	8 (3.9)
$65,000-$74,999	2 (3.9)	8 (5.5)	10 (4.9)
> $75,000	24 (46.2)	48 (33.1)	72 (35.1)
Employment Status			
Unemployed	12 (23.1)	70 (48.3)	82 (40.0)
Casual	3 (5.8)	8 (5.5)	11 (5.4)
Part Time	29 (55.8)	58 (40.0)	87 (42.4)
Full Time	8 (15.4)	7 (4.8)	15 (7.3)
Self Employed	0	2 (1.4)	2 (1.0)
Current Degree			
Dip/Certificate	3 (5.8)	6 (2.9)	9 (4.4)
Bachelor	42 (80.8)	134 (92.4)	176 (85.9)
Masters	7 (13.5)	5 (3.4)	12 (5.9)
Current Year Level			
First Year	15 (28.8)	49 (33.8)	64 (31.2)
Second Year	18 (34.6)	38 (26.2)	56 (27.3)
Third Year	14 (26.9)	40 (27.6)	54 (26.3)
Fourth Year	4 (7.7)	16 (11.0)	20 (9.8)
Fifth Year	0	2 (1.4)	2 (1.0)
Sixth Year	1 (1.9)	0	1 (0.5)

Note. N = 197, n = total number of participants in each group. % = percentage of participants in each group.

2.2. Measures

Demographics. The demographic questionnaire included seven items, each collected as categorical variables reflecting groups utilized in previous research [21, 28, 34]. Participants provided their age, sex, current degree level, current year level of degree, employment status, relationship status, and yearly household income.

Short Form Depression Anxiety Stress Scales (DASS-21) [38]. The DASS-21 is a set of three, seven-item self-report scales designed to measure distinct factors of depression, anxiety and stress symptomology. Adequate psychometric properties for the DASS-21 have been observed in Australian and British non-clinical samples [15, 32]. Furthermore, consistent psychometric properties have been reported across four racial groups within a North American Sample (African-American, Caucasian, Hispanic and Asian), providing evidence for cross-cultural stability [46]. As such, the depression and anxiety subscales of the DASS-21 were used to operationalize depression and anxiety symptomology in this study.

Perception of Academic Stress Scale (PAS) [5]. The Perception of Academic Stress Scale was designed to enable researchers to reliably explore the relationships between stressors specific to the university experience and their influence on university student wellbeing and performance [5].

As a new measure, the reliability and validity of the PAS still requires thorough exploration. The psychometric properties presented by reference [5] need to be interpreted with caution as the sample size would be considered small N = 100 [26], item statistics have not yet been reported [57], no Kaiser-Meyer-Olkin measure of sampling adequacy is provided [58], and reliability statistics for the subscales are yet to be reported [26]. Therefore, item analysis and exploratory factor analysis were conducted to examine the psychometric properties of the PAS with the current sample. Item corrected total correlations revealed that three items (items 4, 5 and 6) were correlated below the .30 minimum, suggesting that these items did not load onto a single overarching construct and therefore were removed from the scale [25]. The remaining 15 items displayed item total corrected correlations ranging from .35 to .52 suggesting all 15 items were moderately correlated to a single overarching construct. Utilizing the Revised 15-Item Perception of Academic Stress Scale, the Kaiser-Meyer-Olkin measure of sampling adequacy confirmed that the sample size was adequate for factor analysis, KMO = .78 [26]. The anti-image correlation matrix provides a measure of the sampling adequacy of each item [26]. All 15 items were above the minimum .50 criteria for sampling adequacy [26].

The initial four-factor model examined via principal components analysis with varimax rotation [5] was not supported in this sample. Eigenvalues for the initial analysis revealed four factors over the Kaiser's criteria of 1, which accounted for a cumulative 59.0% of the variance. However, the scree plot showed significant inflection at two and three factors. As such, solutions using principal components analysis, principal axis factoring and maximum likelihood with oblimin and varimax rotation were conducted to assess the most appropriate factor structures [58].

The three-factor model using principal axis factoring with varimax rotation produced the solution with best fit. The three-factor model accounted for 51.7% of the variance compared to 43% of variance explained in the original four-factor model [5]. The three factors represented academic self-perception, perceived pressure to perform, while perceived time restraint and perceived workload converged onto one factor. The three-factor model produced equivalent factor loadings (.33 to .88) when compared to the original four-factor model [5]. Item 6 "The unrealistic expectations of my parents stresses me out" loaded .38 on to factor one (academic self-perception) and .34 onto factor two (perceived pressure to perform). Although the factor loading was marginally higher for factor one, it was determined that the content of item 6 related more closely to factor two [57].

Furthermore, the internal consistency as measured by Cronbach's alpha was improved on both factors when item six was placed on factor two. Adequate internal consistency for the Revised 15-item Perception of Academic Stress Scale as measured by Cronbach's alpha was observed at $\alpha = .83$, an improvement from $\alpha = .7$ [5]. The current study observed adequate internal consistency as measured by Cronbach's alpha for the subscales of the Perception of Academic Stress Scale ranging from $\alpha = .71$ to .80. Table 2 presents factor loadings after rotation, percent of variance explained, communalities and Cronbach's alpha for the three-factor principal axis factoring analysis with varimax rotation. The Revised 15-Item Perception of Academic Stress and scoring instructions can be found in the Appendix. The total score of The Revised 15-Item Perception of Academic Stress was used to operationalize perceived academic stress in this study.

Self-Compassion Scale (SCS) [43]. The SCS is a 26-item questionnaire that aims to measure total self-compassion along with individual factors of self-compassion. The SCS conceptualizes self-compassion as consisting of six key components: self-kindness versus self-judgment, common humanity versus isolation, and mindfulness versus over-identification [43]. The total score of the SCS is derived by computing a grand mean of all six subscale means. The total score was used to operationalize self-compassion in this study. Reference [43] provides reliability and validity measures for the SCS that have been replicated in several studies across multiple population subgroups [14, 27, 41, 48].

Table 2. *Factor Loadings, Communalities, Percent of Variance Explained and Cronbach's Alpha for the Revised 15-Item Perception of Academic Stress Scale.*

Item Number	Rotated Factor Loadings			
	Academic Self Perception	Perceived Pressure to Perform	Perceived Workload/Time Restraint	Communalities
1.	.83	.07	-.01	.70
2.	.78	.05	.01	.62

Item Number	Rotated Factor Loadings			
	Academic Self Perception	Perceived Pressure to Perform	Perceived Workload/Time Restraint	Communalities
3.	.58	.04	.12	.36
4.	.45	.30	.21	.36
5.	.41	.33	.23	.32
6.	.38	.33	.06	.41
7.	.05	.34	.19	.85
8.	.00	.65	.14	.62
9.	.12	.63	.16	.19
10.	.07	.44	.18	.26
11.	.27	.42	.15	.28
12.	.14	.39	.13	.41
13.	-.02	.30	.88	.23
14.	.11	.28	.73	.46
15.	.28	.26	.52	.27
Variance %	29.87	13.93	8.05	
α	.74	.71	.80	

Note. N = 190. α = Cronbach's alpha. Cronbach's alpha for total score = .83. Extraction method = Principal axis factoring. Rotation method = Varimax with Kaiser normalization. Rotation converged in 5 iterations. Item number refers to the item numbers presented for the 15-Item Revised Perception of Academic Stress Scale presented in the appendix.

2.3. Procedure

Ethics approval was obtained through the Bond University Human Research Ethics Committee (BUHREC) before the recruitment of any participants or data collection. Inclusion criteria required participants to be 18 years or over and currently enrolled in tertiary education. Participants were recruited via the student participation pool at Bond University.

The study employed a web-based design and was presented through the online survey platform Qualtrics. Eligible participants could access the link via computer or mobile device. Excluding the demographic measures, each scale was presented in an individual survey block to counterbalance the presentation of the scales. In each scale block, participants were required to respond to all items before selecting the 'next' button taking them to the following scale block. Missed items were highlighted, and participants were prompted to answer before continuing.

2.4. Design

The current study employed a cross-sectional, correlational design. A 2 x 2 x 4 MANOVA examining the differences between sex, age and household income across depression and anxiety symptomology was conducted to examine the need to control for demographic variables within the main analysis. Sex was explored across two levels (male/female). Age was explored across two levels (18-24 years old/25 years and older). Household income was explored across 4 levels (low/low-middle/middle-high/high). Participants were assigned to income groups based on their reported yearly household income: low income = less than $15,000, low-middle = $15,000-$34,999, middle-high = $35,999-$74,999 and high = greater than $75,000.

Two-moderation analyses were conducted to investigate the hypotheses. Grand mean centering was utilized to ensure interpretable beta parameters of the interaction effect [26]. The Andrew Hayes, Process Macro in SPSS was used to run the moderation, simple slopes and Johnson-Neyman analyses [30]. G*Power software [24] was utilized to determine the sample size required to observe a medium effect size $f^2 = .15$, at $\alpha = .05$, with a power level of .95. For the 2 x 2 x 4 MANOVA examining the difference between sex, age and household income across depression and anxiety a sample size of N = 46 would be required. For the two moderation analyses, each with two independent variables, and an interaction variable a sample size of N = 119 would be required.

3. Results

3.1. Response Rate

Of the 207 participants who volunteered to participate in the study, 190 (91.8%) fully completed the online survey. Six participants (2.9%) did not continue past the first question regarding inclusion criteria and directions to receive course credit. Two participants (0.2%) completed question 2 'I consent to participate in this research,' and chose not to continue. Three participants (1.5%) discontinued their participation at various stages of the survey. Six participants (2.9%) completed the eligibility, consent, and demographic questions and did not continue with the survey.

3.2. 2 x 2 x 4 MANOVA Examining Sex, Age and Household Income Across Depression and Anxiety Symptomology

The Dataset was screened for univariate and multivariate outliers, multicollinearity of the dependent variables, multivariate normality, linearity, homogeneity of variance, and equality of covariance matrices. Two participants were observed to have Mahalanobis distance scores greater than the 13.82 critical value for multivariate outliers and therefore were removed from the analysis. As such, N = 188 for the MANOVA analysis. All other assumptions were met for the MANOVA analysis.

As the covariance matrices were approximately equal, Wilk's Lambda F statistic was reported for the multivariate analysis [62]. Results of the MANOVA analysis examining sex, age and household income across depression and anxiety

revealed there were no statistically significant differences between any of the variables, sex, F(2, 171) = .16, p = .850; age, F(2, 171) = 2.16, p = .130; and income, F(6, 342) = .32, p = .930. Further, no statistically significant interaction effects were observed between the variables, age and sex F(2, 171) = .63, p = .533, age and income F(6, 342) = 1.11, p = .360, sex and income F(6, 342) = 2.15, p = .059, age, sex and income F(6, 342) = .52, p = .800. Therefore, no demographic control variables were used in the moderation analyses.

3.3. Moderation Analyses

The Dataset was screened for univariate and multivariate outliers, multicollinearity, multivariate normality, linearity and homogeneity of variance. One participant in both analyses scored above the critical leverage value of .06 for multivariate outliers and therefore was removed from the moderation analyses. As such N = 189 for the moderation analyses. The assumptions of multicollinearity, multivariate normality and linearity were met. Heteroskedasticity-consistent standard error estimators were employed for both the depression and anxiety moderation analyses. Table 3 presents the means, standard deviations, and intercorrelations between perceived academic stress, self-compassion, depression and anxiety symptomology.

Table 3. *Means, Standard Deviations and Intercorrelations between Perceived Academic Stress, Self-Compassion, Depression and Anxiety Symptomology.*

Measure	1	2	3	4	M	SD
1. PAS	—				40.21	8.38
2. SCS	-.48**	—			3.02	.57
3. Depression	.42**	-.53**	—		7.70	3.56
4. Anxiety	.44**	-.36**	.67**	—	8.40	3.72

Note. N = 189. M = Mean. SD = Standard Deviation. PAS = Total of Revised Perception of Academic Stress Scale score. SCS = Total Self-Compassion Scale score [46]. Depression = Total score for subscale of the DASS-21 [40]. Anxiety = Total score for the anxiety subscale of DASS-21 [40]. Both depression and anxiety scores have been doubled as outlined in the manual for the depression anxiety stress scales [40].
** $p < 0.01$.

3.4. Moderation Analysis One: Perceived Academic Stress, Self-Compassion, and Depression Symptomology

Results of the first moderation analysis revealed that using a linear model significantly improved prediction of the outcome compared to using the mean as assessed by ANOVA F(3, 185) = 36.82, p < .001). Perceived academic stress was significantly positively associated with depression symptomology (b = 0.11, 95% CI [.04, .17], t = 3.34, p = .001) suggesting that as perceived academic stress increased by one unit, depression symptomology increased by .11 units. Self-compassion was significantly negatively associated with depression symptomology (b = -2.82, 95% CI [-3.69, -1.95], t = -6.40, p < .001), suggesting that as self-compassion increased by one unit, depression symptomology decreased by 2.82 units. Self-compassion was further shown to significantly moderate the relationship between perceived academic stress and depression symptomology as highlighted by a significant interaction effect (b = -.13, 95% CI [-.24, -.03], t = -2.45, p = .015).

The model summary revealed that perceived academic stress and self-compassion accounted for 35% of the variance in depression symptomology as measured by R2. Table 4 presents the unstandardized beta coefficients, standardized error of the beta, t statistics and 95% confidence intervals for the moderation analysis.

Table 4. *Moderation Analysis Examining Perceived Academic Stress, Self-Compassion and the Interaction effect on Depression Symptomology.*

Predictors	b	SE b	t	95% CI
Constant	3.54	0.22	16.09***	[3.10, 3.97]
PAS (Centered)	0.11	0.03	3.34***	[0.04, 0.17]
TSC (Centered)	-2.82	0.44	-6.40***	[-3.69, -1.95]
PAS x TSC	-0.11	0.06	-2.45*	[-0.24, -0.03]

Note. N = 189. b = Unstandardized beta coefficient. SE b = standard error of the beta coefficient. t = t statistic. PAS = Total perception of academic stress score. TSC = Total self-compassion score [46]. 95% CI = 95% confidence interval for b.
*p < .05. ***p < .001.

Simple slopes analysis further revealed that when self-compassion scores were one standard deviation below the mean, the relationship between perceived academic stress and depression symptomology was significant (b = 0.18, 95% CI [0.08, 0.29], t = 3.34, p = .001). At the mean value of self-compassion scores, the relationship between perceived academic stress and depression symptomology was significant (b = 0.11, 95% CI [0.04, 0.17], t = 3.34, p = .001). However, when self-compassion scores were one standard deviation above the mean, the relationship between perceived academic stress and depression was no longer significant (b = 0.03, 95% CI [-0.03 - 0.09], t = .94, p = .351), suggesting that increased self-compassion buffers the relationship between perceived academic stress and depression.

Furthermore, results of the Johnson-Neyman technique revealed that the boundary for grand mean centered values of self-compassion significantly moderating the relationship between perceived academic stress and depression was 0.38, b = 0.06, 95% CI [0.00, 0.11], t = 1.97, p = .050, of which 75.7% of self-compassion values were below.

As depicted in figure 1, when perceived academic stress scores were one standard deviation above the mean, and self-compassion scores were one standard deviation below the mean, the predicted depression score was 13.40 (mild depression symptomology) [38]. However, when perceived academic stress scores were one standard deviation above the mean, and self-compassion scores were one standard deviation above the mean, the predicted depression score was 4.34 (normal depression symptomology) [38].

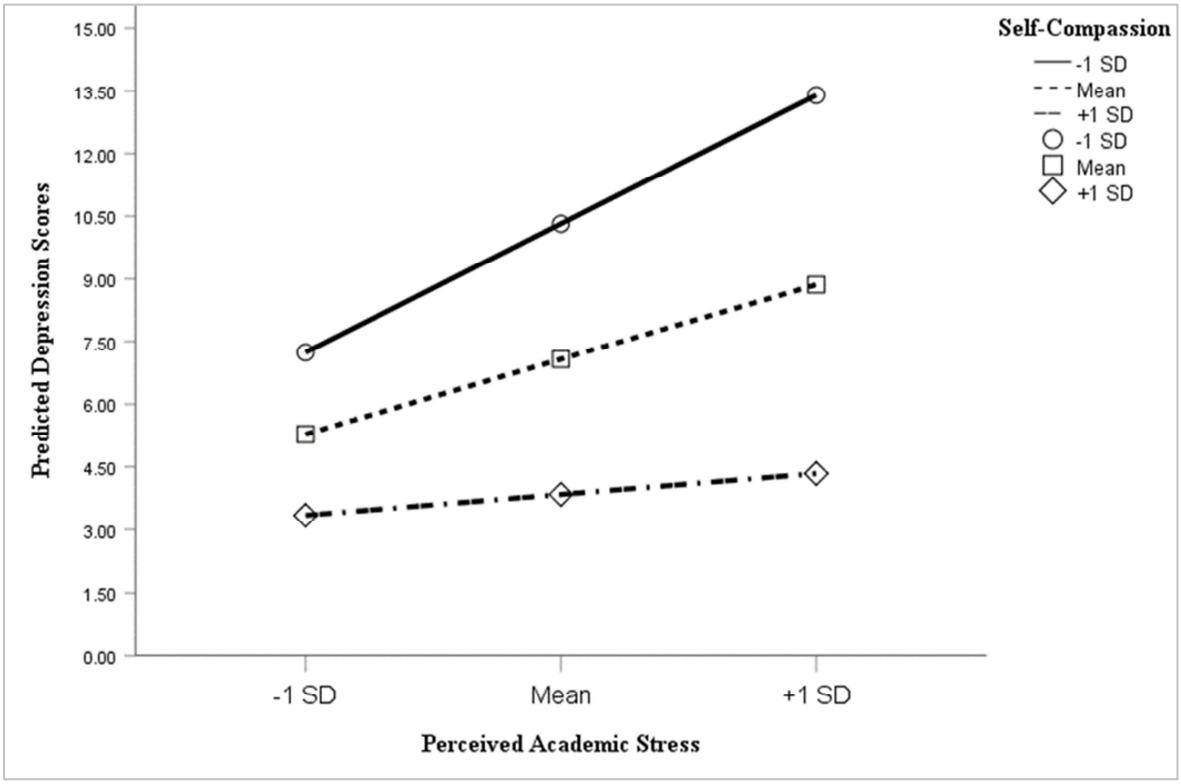

Figure 1. *Line graph demonstrating the interaction between perceived academic stress and self-compassion on depression symptomology among Australian university students. SD = Standard Deviation. N = 189.*

3.5. Moderation Analysis Two: Perceived Academic Stress, Self-Compassion and Anxiety Symptomology

Results of the second moderation analysis revealed that using a linear model significantly improved prediction of the outcome compared to using the mean as assessed by ANOVA $F(3, 185) = 22.12$, $p < .001$. Perceived academic stress was significantly positively associated with anxiety symptomology (b = 0.16, 95% CI [0.09, 0.24], t = 4.40, p < .001). Suggesting that as perceived academic stress increased by one unit, anxiety symptomology increased by .16 units. Self-compassion was also significantly negatively associated with anxiety symptomology; however, a smaller effect size was observed compared to depression symptomology (b = -1.35, 95% CI [-2.35, -.34], t = -2.63, p = .009). The result suggests that as self-compassion increased by one unit, anxiety symptomology decreased by 1.35 units. Unlike the first moderation analysis, self-compassion did not moderate the relationship between perceived academic stress and anxiety symptomology as shown by the non-significant interaction effect (b = -0.08, 95% CI [-0.19, -0.04], t = -1.34, p = .181). The model summary revealed that perceived academic stress and self-compassion accounted for 24% of the variance in anxiety symptomology as assessed by R2. Table 5 presents the unstandardized beta coefficients, standardized error of the beta, t statistics and 95% confidence intervals for the moderation analysis.

Table 5. *Moderation Analysis Examining Perceived Academic Stress, Self-Compassion and the Interaction effect on Anxiety Symptomology.*

Predictors	b	SE b	t	95% CI
Constant	4.02	0.28	14.27***	[3.47, 4.58]
PAS (Centered)	0.16	0.04	4.40***	[0.09, 0.24]
TSC (Centered)	-1.35	0.51	-2.63***	[-2.35, -0.34]
PAS x TSC	-0.08	0.06	-1.34	[-0.19, -0.04]

Note. N = 189. b = Unstandardized beta coefficient. SE b = standard error of the beta coefficient. PAS = Total perception of academic stress score. TSC = Total self-compassion score [46]. 95% CI = 95% confidence interval for b. ***p < .001.

4. Discussion

Hypothesis one predicted a significant direct effect, whereby increased perceived academic stress would be significantly associated with increased depression and anxiety symptomology among Australian university students. Results of the two moderation analyses supported the first hypothesis that increased perceived academic stress would be significantly positively associated with depression and anxiety symptomology among Australian university students. In both moderation analyses perceived academic stress was observed to have a similar positive effect on depression and anxiety symptomology as measured by the unstandardized beta coefficient (b = .11 for depression and b = .16 for anxiety).

The finding suggests that stressors specific to the university experience were associated with depression and anxiety symptomology among Australian university students. As such, strategies targeted at reducing perceived academic stress may provide an opportunity to proactively reduce depression and anxiety symptomology among Australian university students.

It is therefore suggested that changes in the university schedule aimed at reducing perceived academic stress should be explored as a possible means of reducing depression and anxiety symptomology among Australian university students. An example includes innovative university scheduling changes such as block mode learning or 'one course at a time' scheduling. Block mode learning incorporates a university schedule whereby students' study one unit at a time start to finish in a four-week block before progressing to the next unit [50]. This mode of learning has been shown to assist academic performance by allowing university students to have a single focus, rather than juggling multiple units with competing demands and deadlines, along with providing early success to build students confidence [7]. This style of learning has been introduced in the United States of America, Canada, and Scandinavia [53] with one Australian university successfully trialing the method in 2017 [23].

The blocked learning model specifically addresses the constructs related to perceived academic stress of workload, time restraint, pressure to perform and academic self-perception that have been shown in this paper to be associated with depression and anxiety symptomology. Therefore, future research should aim to examine the effect of strategies targeted at reducing perceived academic stress and effect on depression and anxiety symptomology among Australian university students.

Hypothesis two predicted a significant direct effect, whereby increased self-compassion would be significantly associated with decreased depression and anxiety symptomology among Australian university students. Results of the two moderation analyses supported the second hypothesis that increased self-compassion would be significantly negatively associated with depression and anxiety symptomology among Australian university students. The finding supports current literature that has reported a significant negative association between self-compassion, depression and anxiety symptomology among university students [44, 45, 47, 51, 60, 63]. As per previous literature, self-compassion was observed to have a smaller effect on anxiety symptomology compared to depression symptomology as examined by the unstandardized beta coefficients [39, 45, 63].

Although self-compassion has consistently been reported to have a smaller effect on anxiety than depression symptomology, very few authors have commented on possible explanations for the larger observed effect size of self-compassion on depression symptomology. Reference [45] states that self-compassion may have a greater effect on depression as self-compassion enhances an individual's ability to experience positive affect. Reference [13] reviewed the similarities and differences in anxiety and depression symptomology and reported that extensive theoretical and empirical work had converged on the claim that the relative absence of positive affect is critical in distinguishing depression from anxiety. If self-compassion does increase an individual's capacity to experience positive affect, this may explain why self-compassion has been observed to exert a larger effect on depression than anxiety symptomology. To further explore the difference in effect size, future research should examine positive affect as a mediator between self-compassion, depression and anxiety symptomology.

The third hypothesis predicted that a significant interaction effect, whereby increased self-compassion would reduce the effect of perceived academic stress on depression and anxiety symptomology. Results of the two moderation analyses examining the effect of self-compassion on the relationship between perceived academic stress, depression and anxiety symptomology only partially supported the third hypothesis. Results of the first moderation examining the effect of self-compassion on the relationship between perceived academic stress and depression symptomology revealed that self-compassion significantly reduced the effect of perceived academic stress on depression symptomology. Results of the second moderation examining self-compassion as a moderator between perceived academic stress and anxiety symptomology showed that self-compassion did not moderate the relationship between perceived academic stress and anxiety symptomology as assessed by the interaction term.

Although there is a growing body of research identifying self-compassion as a protective factor for depression and anxiety symptomology, previous research has explored self-compassion as a predictor of depression and anxiety [37, 39, 44, 45, 47, 51, 60, 63). Reference [8] states that utilizing different methodology to examine a construct improves the generalizability of a theory by extending the observed boundary conditions. As the current study is the first to report self-compassion as a moderator between perceived academic stress and depression symptomology, the boundary conditions for self-compassion have been extended improving the generality of self-compassion as a protective factor against the development of depression symptomology among university students. The current study provides promising results suggesting that self-compassion may act as an important protective factor between perceived academic stress and

depression symptomology among a sample of Australian university students.

Item analysis statistics and exploratory factor analysis did not support the original 18-item, four-factor Perception of Academic Stress Scale as presented in reference [5]. Item analysis statistics and exploratory factor analysis provided evidence for a Revised 15-Item, three-factor Perception of Academic Stress Scale which was used in this study. Along with the improved psychometric properties presented in this paper, the finding that the total score of the Revised 15-Item Perception of Academic Scale was significantly associated with depression and anxiety symptomology among Australian university students provides evidence for the predictive validity of the scale [57].

Results of the 2 x 2 x 4 MANOVA examining sex, age and household income across depression and anxiety symptomology found no significant group differences within the present sample. The finding resulted in no demographic control variables being included in the main analyses. The result that there were no differences between sex across depression and anxiety symptomology among Australian university students supports previous research among university students from North America, Mexico, Turkey and China [2, 21, 22, 36, 62, 66]. The result that there were no differences between age groups across depression and anxiety symptomology among Australian university students also supports previous research among university students from Turkey and Mexico [36, 66].

Of the four studies identified in reference [34] that have examined the influence of household income on depression and anxiety symptomology among university students, all four reported that as household income decreased, the prevalence of depression and anxiety symptomology increased among university students. Although this study did not support the current literature, none of the studies outlined utilized Australian samples.

Reference [10] outlines that Australia is one of the few countries that utilizes an income-contingent loan policy for higher education tuition. In addition, low-income Australian university students are eligible for government assistance which many other national governments do not offer [35]. As such, household income may have less of an effect on depression and anxiety symptomology among Australian university students compared to other national samples due to the financial support provided to Australian university students. Future research should aim to measure 'financial hardship' along with household income to gain a further understanding of how stress related to income may be related to depression and anxiety symptomology among Australian university students.

Reference [34] and [21] note that there is a wide variation of results published in the literature when examining demographic characteristics across depression and anxiety symptomology among university students. Reference [34] states that unbalanced cell designs and varying instrumentation are the likely cause of the wide variation in findings when examining sex and age across depression and anxiety symptomology among university students. The current study addressed this limitation by utilizing the depression and anxiety subscales of the DASS-21 [38] which have well established psychometric properties and age-matched Australian normative data [15, 32]. Further, this study reported a non-significant Box's M for the MANOVA analysis. The observation of a non-significant Box's M provides evidence that the covariance matrices were approximately equal, therefore limiting the chance of type 1 error due to unequal cell size and strengthening the reliability and validity of the observed result [58]. Additional exploration of the result among Australian samples is required, specifically using the DASS-21 [38] to ensure comparable results.

Interpretation of the results within this paper should be made with reference to the limitations. Firstly, the research relied exclusively on self-report scales to measure outcomes, therefore, increasing the chance that socially desirable responding biased results. Future research attempting to replicate results should include a measure of social desirability to enhance the internal validity of the observed result.

Secondly, the Revised 15-Item Perception of Academic Stress Scale should be examined using larger samples. Although the scale presented with adequate psychometric properties, the sample used in this paper to review the psychometric properties N = 190 would only be considered fair [57]. The finding that perceived academic stress is a significant predictor of depression, and anxiety symptomology among Australian university students should warrant further development of the scale. In addition, future research may aim to identify which factors within the Revised 15-Item Perception of Academic Stress Scale have the largest effect on depression and anxiety symptomology among university students.

Finally, as this is the first study to identify a direct relationship between perceived academic stress, depression, and anxiety symptomology, it is important to note the limited cross-cultural generality. The result reflects the influence of perceived academic stress among Australian university students; future research is needed to observe the cross-cultural effect of perceived academic stress on depression and anxiety symptomology among university students.

5. Conclusion

Considering the limitations, the results of this study indicate that perceived academic stress is a significant predictor of depression and anxiety symptomology among Australian university students. The finding suggests that proactive strategies targeted at reducing perceived academic stress may be effective in reducing depression and anxiety symptomology among Australian university students. Furthermore, self-compassion was shown to moderate the relationship between perceived academic stress and depression symptomology among Australian university students. However, self-compassion was not shown to

moderate the relationship between perceived academic stress and anxiety symptomology among Australian university students. As such, the result provides support for the notion that self-compassion is a significant protective factor for the prevention of depression symptomology, particularly among the Australian university student population. In addition, this study provides a Revised 15-Item, three-factor Perception of Academic Stress Scale with improved psychometric properties for use in future research. As this study is the first to examine the relationship between perceived academic stress, self-compassion, depression and anxiety symptomology among Australian university students, further research is required to strengthen the reliability of the observed result.

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Appendix

The Revised 15-Item Perception of Academic Stress Scale (R-PAS)

Please indicate your perceptions toward the following statements in relation to academic stress.

Table A1. *The Revised 15-Item Perception of Academic Stress Scale (R-PAS).*

		Strongly disagree	Disagree	Neither Agree nor disagree	Agree	Strongly Agree
		1	2	3	4	5
1.	I am confident that I will be a successful student	1	2	3	4	5
2.	I am confident that I will be successful in my future career	1	2	3	4	5
3.	I make academic decisions easily	1	2	3	4	5
4.	I fear failing courses this year	1	2	3	4	5
5.	I think that may worry about examinations is weakness of character	1	2	3	4	5
6.	Teachers have unrealistic expectations of me	1	2	3	4	5
7.	The size of the curriculum (workload) is excessive	1	2	3	4	5
8.	I believe that the amount of assignment I have is too much	1	2	3	4	5
9.	I am unable to catch up if I get behind on work	1	2	3	4	5
10.	The unrealistic expectations of my parents' stresses me out	1	2	3	4	5
11.	Competition with my peers for grades is quite intense	1	2	3	4	5
12.	The examination questions are usually difficult	1	2	3	4	5
13.	The examination time is too short to complete all the answers	1	2	3	4	5
14.	Examination time is very stressful for me	1	2	3	4	5
15.	Even if I pass my exams, I worried about getting a job	1	2	3	4	5

Reverse score items numbers 1, 2 and 3.

Total Perceived Academic Stress Score = All items summed

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