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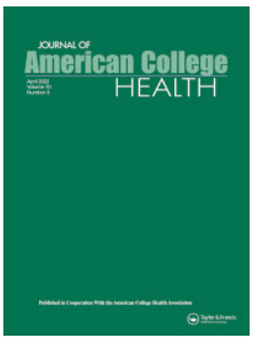

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# Academic stress, mindfulness-related skills and mental health in international university students

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**ABSTRACT**

This study investigated the relationships between academic stress, mindfulness-related constructs (ie, mindfulness, self-compassion and psychological flexibility) and anxiety and depressive symptoms in a sample of 190 international university students. Participants filled in an online questionnaire. Multiple Regression Analyses showed that anxiety and depressive symptoms were significantly related to higher levels of perceived academic stress, and to lower levels of acting with (mindful) awareness, lower self-compassion and lower psychological flexibility. None of the mindfulness-related constructs was found to moderate the relationship between perceived academic stress and anxiety and depressive symptoms. The results provide possible targets for mental health interventions in international university students. Especially the training of mindfulness-related skills could be a promising path.

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Academic stress; mental health; mindfulness; psychological flexibility; self-compassion

## Introduction

In recent years, the prevalence of anxiety and depression among university students in general has increased and has been recognized as a global issue.[1,2] In their study among freshmen in nineteen universities spread over eight countries, Auerbach et al[3] found that approximately one third of first-year university students experience at least one mental disorder, with major depressive disorder (18.4%, 12-month prevalence) and generalized anxiety disorder (16.7%, 12-month prevalence) being the most common. In general samples of university students (in among other Australia and Taiwan), associations have been suggested between symptoms of anxiety and depression and perceived academic stress, the latter of which has been defined as the interplay of the multiple academic, personal and social demands students have to deal with.[4–6]

At the same time, increasing numbers of university students decide to go abroad to pursue their academic careers. For example, in the Netherlands, international students, ie, students following a study program in countries other than their country of origin,[7] made up 11.5% of total enrolled students in the academic year 2018–2019.[8] International students represent a special group of students as they have to deal with several challenges on top of the "usual" academic, personal and social stressors that domestic students experience. They also experience acculturative stressors, referring to the problems associated with the adjustment to a new environment.[9] For example, they have to adapt to an academic environment and culture that is different from their home country, with unfamiliar educational methods, different interactions between students and professors, and potential language problems.[10–12] In a review of the acculturation experiences of international students, it has been suggested, that these stressors aggravate academic stress in international students.[12] In addition, it has been suggested that this would place them at a greater risk of developing mental health problems compared to domestic students.[13] High rates of anxiety and depression have been reported in international students in several countries.[10,11,14] For example, in a sample of 490 international students of a US Campus, 45.3% met the clinical cutoff score for depression (Center for Epidemiological Studies-Depression Scale; CES-D), and 24.7% met the clinical cut-of score for moderate to severe anxiety (Beck Anxiety Inventory; BAI).[11] In addition, higher levels of acculturative stress have been shown to be associated with more symptoms of depression.[11] Thus, mental health among university students is becoming an increasingly important societal issue, and is perhaps even more pressing among international students.

Poor coping abilities have been associated with mental health problems in general populations of students[15] and may worsen the acculturative stress in international university students.[12] Conversely, it has also been claimed, based on general student populations, that positive psychological abilities could act as resilience factors against symptoms of psychological distress when faced with academic demands.[2] Especially constructs related to mindfulness, compassion, and acceptance have received increasing attention as resilience factors. This follows the growing interest in third wave

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behavioral therapies, like mindfulness-based cognitive therapy (MBCT), compassion focused therapy, and acceptance and commitment therapy (ACT). In the following, the constructs of mindfulness, self-compassion, and psychological flexibility will be reviewed, and their relation to anxiety and depressive symptoms will be discussed. These constructs together have been referred to as "mindfulness-related constructs."[16] In the remainder of this article, we will adopt this term, to refer to the three attributes.

### *Mindfulness, self-compassion and psychological flexibility*

The first construct, mindfulness, refers to "paying attention in a particular way: on purpose, in the present moment, and nonjudgmentally."[17(p4)] Mindfulness is usually conceptualized as a construct consisting of five separate facets: 1) Observing (ie, perceiving stimuli in the environment and in one's inner world), 2) Describing (ie, the ability to label one's inner experiences), 3) Acting with awareness (ie, paying attention to one's current activities rather than performing them automatically), 4) Nonjudging of inner experience (ie, having a non-judgmental attitude toward one's cognitions and emotions) and 5) Nonreactivity to inner experience (ie, the ability to let thoughts and cognitions appear and vanish by not getting overly involved with them).[18] Generally speaking, a mindful attitude has been shown to have a positive association with various components of mental health, such as better subjective well-being, decreased symptom severity, less cognitive and emotional disruption and enhanced regulation of behavior.[19,20]

Concerning the five facets of mindfulness different results were found for their relationship to anxiety and depression due to different research designs and analyses.Looking at the bivariate correlational results, they all have been shown to significantly correlate with (fewer) symptoms of anxiety and/or depression.[5,21,22]. With regard to the Multiple Regression Analyses results, where the effects of the other facets were being controlled for, especially higher levels of non-judging of inner experience and acting with awareness have been found to be strongly related to fewer symptoms of anxiety and depression.[5,21–23] In addition, it has also been investigated in general student samples whether there is an interaction effect between the mindfulness facets and perceived academic stress, that could moderate the relationship between perceived stress and anxiety and depression. One study demonstrated that – among students in Australia - a higher score on mindfulness (total score of the five facets) reduced the effects of academic stress on anxiety and depression (significant interaction effect between mindfulness and stress)[5]. With regard to the separate facets: the describing and observing facet,[5] as well as the acting with awareness facet, non-reactivity facet and non-judging facet,[24–26] have all been demonstrated to be able to moderate the relationship between stress and various indicators of psychological adjustment, such as symptoms of depression and anxiety, and negative affect. The findings indicated, that higher mindfulness facet scores weakened the negative effects of stress, suggesting a buffering effect. Overall, wheras the acting with awareness and non-judging facets have been shown to consistently correlate with anxiety and depression symptoms and moderate the relationship between stress and mental health, results were mixed for the describing, observing and non-reactivity facets.

The second construct, self-compassion, is defined as being open and understanding toward one's suffering.[27] It is assumed to involve self-kindness instead of self-judgement, common humanity rather than isolation and mindfulness versus over-identification of thoughts and feelings. A self-compassionate coping style includes strategies such as being nice to oneself, giving oneself loving attention, being understanding of oneself and saying friendly things to oneself.[28] Higher levels of self-compassion have consistently been shown to be associated with lower levels of psychopathology.[29–31] Self-compassion has also been suggested to buffer against mental health problems under the experience of negative life events.[32]

The third construct, psychological flexibility is a core concept of ACT. It refers to an attitude of fully contacting the present moment with all thoughts and emotions and - based on the context - changing or persisting with one's behavior to act in accordance with chosen goals and values.[33] Six interacting subprocesses are assumed to underlie and foster psychological (in)flexibility: acceptance (ie, accepting unwanted personal experiences), cognitive defusion (ie, getting detached from ones thoughts), present moment awareness (ie, non-judgmental attitude to ongoing events), self as context (ie, seeing oneself as the experiencer), values (ie, chosen personal values or life directions), and committed action (ie, acting in a direction toward ones values).[33,34] In a longitudinal study, higher levels of psychological flexibility have been shown to predict overall psychological health over a time course of one year.[35] Furthermore, higher levels of psychological flexibility have been shown to reduce the relationship between stress and depression and anxiety in the general population.[36] Conversely, lower levels of psychological flexibility, which involves a rigid way of acting according to one's inner reactions (ie, avoiding unpleasant feelings or thoughts) instead of acting in line with one's chosen goals and values, have been found to be associated with mental health problems, including higher levels of depression and anxiety.[33,37–40]

There is a limited amount of research that has looked at these constructs combined in one study. Woodruff et al[16] explored the individual contribution to variation in positive and negative psychological health explained by self-compassion, mindfulness, and psychological inflexibility. In their general sample of undergraduate university students they found that self-compassion was more strongly related to (positive and negative) psychological health than a total score of mindfulness. Additionally, they identified psychological inflexibility to be a stronger predictor of negative mental health in that student sample than self-compassion. One study found preliminary evidence that mindfulness, self-compassion and psychological flexibility together could predict less disability and better quality of life in a sample of war veterans.[41] However, in that study the constructs had been combined into a single latent so-called 'mindful awareness' factor.

All in all, considerable evidence showed that mindfulness, self-compassion and psychological flexibility may individually contribute to good mental health. In addition, preliminary evidence in various populations suggested that these factors might even buffer against psychopathology. An important question is whether these mindfulness-related constructs could also act as buffer against mental health problems in international students in the context of academic stress. International students, not only facing the usual academic, personal, and social challenges, but also the additional challenges of being in another cultural and academic environment, have already been shown to be extra vulnerable for the experience of academic stress and symptoms of anxiety and depression. Nevertheless, it has never been investigated before whether the combination of the three mindfulness-related constructs could reduce the burden of their stressors and thereby reduce symptoms of depression and anxiety. Studying these issues could provide helpful information for the content of prevention and intervention-focused initiatives for this group.

There is enough literature showing that international students report even more mental health problems than domestic students. At the same time there is no specific help or expertise for this group. In the Netherlands and many other countries, the first place where international students report psychological problems is the student counseling service. However, international students can only use the facilities that have been developed for the domestic students. It is time that separate preventive activities and interventions aimed at this group will be developed, with ingredients that match the needs of this group. The present study aims to find targets that can be used to shape the content of individual and group interventions and help to develop good preventive initiatives, for example in the form of tutored groups.

### The present study

With this goal in mind, the present study investigated the relationships between perceived academic stress, mindfulness-related constructs and anxiety and depressive symptoms in international university students. The first research question was: To what extent is perceived academic stress in international university students related to anxiety and depressive symptoms. The second research question was: To what extent do the mindfulness-related constructs (ie, the five facets of mindfulness, self-compassion and psychological flexibility) explain additional variance in anxiety and depressive symptoms, over perceived academic stress? The third research question that we explored was: Do the mindfulness-related constructs moderate the relationship between academic stress and anxiety and depressive symptoms? It was hypothesized that a significant amount of variance in anxiety and depressive symptoms would be explained by perceived academic stress, that – on top of that – significant amounts of variance would be explained by the mindfulness-related constructs, and that – on top of these direct effects –, mindfulness, self-compassion and psychological flexibility would moderate the relationship between academic stress and anxiety and depressive symptoms. It was expected that the relationship between higher levels of academic stress and severity of anxiety and depressive symptoms would be weakened for those with higher levels of mindfulness, self-compassion and psychological flexibility.

## Method

### Participants

Participants were 190 international students recruited from different Universities in the Netherlands, of whom 129 students were from Erasmus University Rotterdam (67.9%), 47 students from Leiden University (24.7%), 11 students from other universities in the Netherlands (5.7%) and 3 had a missing value on this variable (1.6%). The majority was female (81.1%) and the age range was 18 to 43 years (mean age 22.86; $SD = 3.33$). Participants were from 53 different nationalities, with German (30.5%), Greek (6.3%) and Chinese (5.3%) being the most frequent. Students were recruited from various studies, with most being enrolled in gamma studies (eg, psychology, politics, sociology, economics) (84.7%), followed by alpha studies (eg, language, anthropology, history, religion, philosophy, law, performing arts) (5.3%), beta studies (eg, natural sciences, medicine, engineering, informatics) (2.1%), or a combination of two fields of studies (2.6%). The remaining 5.3% fell in the category: other studies.

### Procedure and design

This study was a cross-sectional, empirical quantitative research conducted with an online questionnaire. The inclusion criterion was being an international student currently enrolled at a Dutch University. International students studying in a different country than the Netherlands and Dutch students following an international program were not eligible to participate. In the period between March and May 2019 an online questionnaire was available on Qualtrics. Participants were recruited by distributing flyers with a QR code on campus or by providing a weblink to the survey by Facebook announcements or email. At the beginning of the questionnaire participants were informed that the questionnaire would take approximately 15 minutes and that participation was voluntary and anonymous. Participants filled out an informed consent form. This was followed by several self-report measures. The study was approved by the Psychology Research Ethics committee of Leiden University (CEP18-0417/215). A total of 249 students initially filled out the questionnaire of whom 190 students met the inclusion criteria and had sufficiently completed the survey (>80%), to be used for statistical analyses.

### Measures

#### Perceived academic stress

Perceived academic stress was measured by a modified Law Student Perceived Stress Scale (LSPSS),[5] where we replaced "law school" or "law students" with terms applicable to

students in general across studies. The LSPSS is a 24-item self-report questionnaire including the following four dimensions of academic stress: academic demands, social isolation, career pressure and study/life imbalance. Responses were given on a five point response scale from 1 = *not at all stressful* to 5 = *very stressful*. Individual scores were obtained by summing up all the items to obtain a total score. Higher scores on this measure refer to a greater appraisal of university stressors as stressful (possible range: 24–120). Internal reliability of the LSPSS has been shown to be high and its validity has been supported.[5]

### Mindfulness

To measure mindfulness the Five Facet Mindfulness Questionnaire (FFMQ) was used.[21] The FFMQ consists of 39 items and was developed by integrating items from five independent mindfulness questionnaires, resulting in the five facets of mindfulness (observing, describing, acting with awareness, non-judging of inner experience, and non-reactivity to inner experience). Responses were given on a Likert scale ranging from 1 = *never or very rarely* true to 5 = *very often or always true*. Reverse scored items were recoded. The conceptualization of mindfulness as a multifaceted construct has been supported.[17] Here, individual subscale scores for each of the five facets of mindfulness were obtained by summing up the items corresponding to a particular subscale. Higher scores on each subscale indicate higher levels of mindfulness. The five factors have been shown to have acceptable to good psychometric properties.[18]

### Self-compassion

To measure self-compassion the newly developed four-item self-compassionate coping measure (SCCM) was used.[28] Answers were given on a Likert scale ranging from 1= *almost never* to 5 = *almost always*. Individual scores were obtained by making sum scores of the items (possible range: 4 to 20). Higher scores on the SCCM are associated with higher self-compassionate coping. The reliability and validity of the SCCM have been supported.[27]

### Psychological flexibility

To measure psychological flexibility, the Acceptance and Action Questionnaire II (AAQ-II) was used,[37] which includes seven self-report items that measure psychological inflexibility. The responses were rated on a seven-point scale ranging from 1 =*never true* to 7= *always true*. The scale is scored by summing the seven items (possible range: 7 to 49). In this study, items were coded in such a way that higher scores represent greater levels of psychological flexibility. The consistency, reliability and validity of the AAQ-II have been supported.[37]

### Symptoms of anxiety

Symptoms of anxiety were assessed with the Generalized Anxiety Disorder Scale (GAD-7).[42] This self-report questionnaire is based on the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; text rev.; *DSM-IV-TR*) criteria for generalized anxiety disorder and major depression.[43] The GAD-7 consists of seven items measuring the presence and severity of anxiety. Responses were given on a four-point Likert scale from 0 = *not at all* to 3 = *nearly every day*. Individual scores were obtained by summing up the items (possible range: 0 to 21). Higher scores on this measure represent greater levels of anxious symptoms with more functional impairment and more days on which anxious symptoms are experienced. Cutoff scores indicating the severity of anxiety symptoms are: 0–4 (no symptoms), 5–9 (mild symptoms), 10–14 (moderate symptoms), and 15–19 (higher severe symptoms).[43] The internal consistency and validity of the GAD-7 have been supported.[42]

### Symptoms of depression

Symptoms of depression were assessed with the Patient Health Questionnaire for Depression (PHQ-9)[44], based on the *DSM-IV-TR* criteria for major depression.[43] The PHQ-9 consists of nine items measuring the presence and severity of depression. It is scored on a four-point Likert scale ranging from 0 = *not at all* to 3 = *nearly every day*. Individual scores were obtained by making a sum score (possible range: zero to 27). Higher scores on this measure represent greater presence and severity of depressive symptoms. Cutoff scores indicating the severity of depressive symptoms are: 0–4 (no symptoms), 5–9 (mild symptoms), 10–14 (moderate symptoms), 15–19 (moderately-severe symptoms), and 20–27 (severe depressive symptoms).[44] The reliability and validity of the PHQ-9 have been supported.[44]

### Negative life events (control variable)

An adjusted version of the negative life event scale was used (available at www.cerq.leidenuniv.nl) to check the experience of 16 potential life events, for example, divorce of parents, been a victim of bullying or been a victim of physical abuse. If a negative life event happened in their lives a score of 1 was given, leading to a total number of negative life events (possible range: zero to 16). Higher scores refer to a higher presence of negative life events. We used negative life events as control variable given that negative life events is a strong predictor of anxiety and depressive symptoms.

### Statistical analysis

Means, standard deviations and ranges of the study variables (perceived academic stress, subscales of mindfulness, self-compassion, psychological flexibility, anxiety, and depression) were calculated. Furthermore, the number of negative life events was examined. In addition, Pearson Correlations between the study variables were calculated.

To answer the study questions whether there is a direct effect of perceived academic stress on anxiety and depressive symptoms and whether constructs related to mindfulness explain variation in anxiety and depression over and above those of perceived stress hierarchical multiple regression analyses were performed (with listwise deletion of missing

data). Separate analyses were performed for each outcome variable (anxiety and depression). Age, gender and the number of negative life events experienced were used as control variables and entered into the model in the first step. In the second step the total score of perceived stress was added. In the third step the five facets of mindfulness and the total scores of self-compassion and psychological flexibility were added. Prior to analyses, assumptions of linearity, multicollinearity, independent errors, homoscedasticity and normally distributed errors were checked. No outliers or influential cases were identified using Cook's distance and case wise diagnostics.

To explore the moderating effects of the mindfulness related constructs (mindfulness subscales, self-compassion, and psychological flexibility), interactions with perceived academic stress, were examined for depression and anxiety separately, resulting in 14 moderation analyses. Moderation analysis were performed via PROCESS in SPSS.[45] Variables were mean centered prior to analyses.

A two-tailed alpha level of $p < .05$ was used for all analyses. All statistical analyses were performed with IBM SPSS Statistics (version 24).

## Results

Examination of the life events score revealed that the participants reported to have experienced three life events on average ($SD = 2.84$). Table 1 shows the descriptive statistics of the study variables.

With regard to the severity of anxiety symptoms according to GAD-7 cutoff scores, 66 students scored in the category 0–4 (34.7%; no symptoms), 62 students scored between 5 and 9 (32.6%; mild symptoms), 41 students scored between 10 and 14 (21.6%; moderate symptoms), and 21 students had a score in the category 15–19 (11.1%; higher severe symptoms).

With regard to the severity of depression symptoms according to PHQ-9 cutoff scores, 53 students scored in the category 0-4 of the PHQ-9 (27.9%; no symptoms), 73 students scored between 5 and 9 (38.4%; mild symptoms), 33 students scored between 10 and 114 (17.4%; moderate symptoms), 18 students scored between 15 and 19 (9.5%; moderately-severe symptoms), and 13 students had a score higher than 20 (severe depressive symptoms).

Pearson correlations between all study variables are shown in Table 2. Perceived academic stress was positively related to anxiety and depression, with a large effect size.[46] With regard to the five facets of mindfulness: acting with awareness, nonjudging, and nonreactivity showed significant negative relationships to anxiety and depression, while observing and describing were not significantly related to anxiety and depression. Nonjudging showed the strongest negative relationships with anxiety and depression. Self-compassion showed a negative relationship to anxiety and depression, with a moderate effect size.[46] Psychological flexibility was negatively related to anxiety and depression and the magnitude of this effect was large.[46]

**Table 1.** Means, standard deviations and ranges of the study variables.

| Variable | *N* | *M* | SD | Range |
|---|---|---|---|---|
| Total perceived stress | 190 | 53.86 | 10.29 | 24–80 |
| Mindfulness subscales | | | | |
| Observing | 183 | 25.60 | 5.89 | 10–39 |
| Describing | 183 | 27.27 | 6.19 | 13–40 |
| Acting with awareness | 183 | 24.95 | 6.38 | 8–40 |
| Nonjudging | 183 | 25.52 | 6.70 | 8–39 |
| Nonreactivity | 183 | 19.13 | 4.43 | 9–30 |
| Self-compassion | 190 | 11.22 | 4.05 | 4–20 |
| Psychological flexibility | 180 | 32.48 | 9.56 | 7–49 |
| Anxiety | 190 | 7.74 | 5.17 | 0–21 |
| Depression | 190 | 8.48 | 6.07 | 0–27 |

The results of the two separate hierarchical regression analyses for anxiety and depression as the dependent variable are given in Table 3. The predictors were entered into the model in the order as displayed in the table. In the regression analysis with anxiety as the dependent variable, the control variables were entered into the model in the first step and accounted for a significant proportion of variance in anxiety, $R^2$=.07, $F(3,175)$=4.20, $p < .01$. Perceived academic stress was entered in the second step and led to a significant change in variance in anxiety, $R^2_{change=}$.35, $F(4,174)$=31.30, $p$<.001. Next, the five facets of mindfulness, self-compassion and psychological flexibility were entered into the model and together accounted for a significant increase in explained variance, $R^2_{change}$=.19, $F(11,167)$=23.37, $p < .001$. The final model accounted for 60.6% of the variance in anxiety. Perceived academic stress explained a significant amount of variance in anxiety in the final model. Over and on top of this effect, of the five facets of mindfulness, the observing facet was a positive unique contributor to variance in anxiety, ie, the more this strategy was used the more symptoms of anxiety were reported. Psychological flexibility was a significant negative unique contributors to variance in anxiety, ie, the more this strategy was used the less symptoms of anxiety were reported. Of the control variables only the number of life events experienced explained a significant amount of variance in anxiety.

In the regression model with depression as the dependent variable, the variables were entered in the same sequence. Introduction of the control variables together accounted for a significant proportion of variance in depression, $R^2$=.10, $F(3,175)$=6.55, $p < .001$. Entering perceived academic stress in the second step led to a significant change in variance in depression, $R^2_{change}$=.22, $F(4,174)$=20.14, $p$<.001. The addition of the five facets of mindfulness, self-compassion and psychological flexibility accounted for a significant increase in explained variance, $R^2_{change}$=.21, $F(11,167)$=16.84, $p < .001$. The final model explained 52.6% of the variance in depression. Findings showed that perceived academic stress also explained a significant amount of variance in depression in the final model. Over, and above this effect, the acting with awareness subscale of the five facets of mindfulness, self-compassion, and psychological flexibility were significant negative contributors to variance in depression, ie, those that had reported higher levels of acting with awareness, self-compassion and psychological flexibility reported less symptoms of depression. In addition, the total sum of experienced life events significantly contributed to variance in depression.

**Table 2.** Bivariate pearson correlations of the study variables.

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
|---|---|---|---|---|---|---|---|---|---|---|
| 1. Total Perceived stress | – | | | | | | | | | |
| 2. Observing | −.09 | – | | | | | | | | |
| 3. Describing | −.18* | .27*** | – | | | | | | | |
| 4. Acting with awareness | −.34*** | −.02 | .24** | – | | | | | | |
| 5. Nonjudging | −.49*** | −.11 | .22** | .57*** | – | | | | | |
| 6. Nonreactivity | −.23** | .38*** | .22** | .13 | .16* | – | | | | |
| 7 .Self-compassion | −.25** | .33*** | .25** | .16* | .24** | .44*** | – | | | |
| 8. Psychological flexibility | −.49*** | .02 | .22** | .54*** | .67*** | .24** | .42*** | – | | |
| 9. Anxiety | .61*** | .11 | −.13 | −.40*** | −.54*** | −.24** | −.33*** | −.65*** | – | |
| 10. Depression | .51*** | .06 | −.10 | −.43*** | −.48*** | −.16* | −.35*** | −.64*** | .76*** | – |

*$p < .05$, **$p < .01$, ***$p < .001$.

**Table 3.** Hierarchical multiple regression analyses of perceived academic stress on anxiety and depression ($N = 179$).

| | Anxiety | | | Depression | | |
|---|---|---|---|---|---|---|
| Step and variable | *B* | *SEB* | *β* | *B* | *SEB* | *β* |
| Step 1 | | | | | | |
| Age | −.01 | .08 | −.00 | −.18 | .10 | −.10 |
| Gender | .24 | .68 | .02 | 1.07 | .88 | .07 |
| Negative life events | .25 | .09 | .14** | .37 | .12 | .17** |
| Step 2 | | | | | | |
| Perceived stress | .19 | .03 | .38*** | .13 | .04 | .23** |
| Step3 | | | | | | |
| Observing | .19 | .05 | .21*** | .11 | .06 | .10 |
| Describing | .01 | .05 | .01 | .07 | .06 | .07 |
| Acting with awareness | −.04 | .05 | −.05 | −.15 | .07 | −.16* |
| Nonjudging | −.02 | .06 | −.03 | .03 | .07 | .03 |
| Nonreactivity | −.13 | .07 | −.11 | −.07 | .09 | −.05 |
| Self-compassion | −.13 | .08 | −.10 | −.20 | .10 | −.13* |
| Psychological flexibility | − .18 | .04 | −.34*** | −.24 | .05 | − .37*** |

*Note.* The values for Beta indicate Bs after Step 3.
*$p < .05$,**$p < .01$, ***$p < .001$.

Results of the moderation analyses showed that none of the interaction terms reached statistical significance. Thus no evidence was found that these constructs moderated the relationship between perceived academic stress and anxiety or depression.

## Discussion

This study investigated the role of constructs related to mindfulness (ie, mindfulness, self-compassion and psychological flexibility) in the relationship between perceived academic stress and anxiety and depression symptoms in a sample of international university students in the Netherlands. In line with the hypotheses, this study confirmed relationships between higher levels of perceived academic stress and higher levels of reported anxiety and depression symptoms in international university students, expanding the results of Bergin and Pakenham[4] who had demonstrated this relationship in a sample of law students in Australia.

Furthermore, the results confirmed relationships between mindfulness-related constructs and symptoms of depression and anxiety. [16] Bivariate analyses showed that three of the five mindfulness facets (acting with awareness, nonjudging and nonreactivity), self-compassion and psychological flexibility were negatively and significantly related to both anxiety and depression. Multivariate analyses showed that, on top of the effect of number of life events and perceived stress, the mindfulness-related constructs together still explained a significant amount of variance in symptoms of anxiety and depression.

With regard to the facets of mindfulness: some of them were unique predictors of anxiety or depression in the multivariate analyses. A significant, unique contributor to the prediction of anxiety was the observing facet of mindfulness, showing a positive relationship with anxiety. This finding was consistent with some previous studies also showing a weak positive correlation between the observing facet and anxiety and confirmed the suggestion, that an increased observation of one's internal and external experiences on its own may not be beneficial for anxiety.[4,22]. It should be noted, however, that the observing facet had its significant effect only after partializing out the life events, stressors and other mindfulness-related constructs; the bivariate correlation with anxiety was, albeit positive, small and not significant. In addition, the acting of awareness facet of mindfulness appeared to be a significant, unique contributor in the prediction of depression, showing a negative relationship with depression. This was also in line with previous research and provides further evidence, that individuals who pay attention to their activities rather than performing them automatically are less likely to experience depressive symptoms.[22,23]. Contrary to the bivariate findings, after controlling for life events, stress and the other predictors, a relationship between the acting with awareness facet and anxiety could not be confirmed. The same was true for the non-judgmental facet and the nonreactivity facet of mindfulness: after controlling

for the other variables, the relationship between these facets and anxiety and depression became non-significant, in contrast to previous findings.[16,21–23] While prvious studies found a positive relationship for the describing facet and anxiety and depression in bivariate studies this was not the case in this study. This may be due to different research designs. In line with previous research, the multivariate analyses confirmed that the describing facet was not significantly related to symptoms of anxiety and depression.[22,23]

With regard to self-compassion: after controlling for the other variables, higher levels of self-compassion only remained associated with less depressive symptoms. This finding confirmed previous studies showing an association between higher self-compassion and better mental health.[29–31] Hence, this study provided evidence that self-compassion measured as being nice to oneself, giving oneself loving attention, being understanding to oneself and saying friendly things to oneself, [28] was positively related to decreased depressive symptoms. Although the bivariate correlation between self-compassion and anxiety was significant, this relationship turned to non-significance after controlling for the other variables, in contrast to the findings of some other studies.[29–31]

With regard to psychological flexibility: also after controlling for life events, stressors and the other predictors, this remained a significant and unique (negative) predictor of both anxiety and depression, suggesting that the more flexible students were the less symptoms of anxiety and depression were reported. This finding was in line with previous studies.[33,37–40] More specifically, it seems to tie in with the assumption that people with depression would use more inflexible response styles like rumination and have a diminished ability to derive pleasure from activities. In addition, people with anxiety have been assumed to often engage in experiential avoidance, defined as not wanting to experience unpleasant experiences (eg, cognitions, emotions, bodily sensations).[47]

Additionally, on the basis of preliminary evidence on buffering effects of these constructs,[5,24–26,30,32,36] this study explored the possibility that mindfulness, self-compassion, and psychological flexibility could act as potential moderators in the relationship between perceived academic stress and anxiety and depressive symptoms in international university students. In the present study, such an effect could not be confirmed. However, it is difficult to compare this result to previous studies that demonstrated moderating effects of the mindfulness-related constructs, because samples and predictors to demonstrate moderation differed to a large extent. One study found that mindfulness facets moderated the relationship between academic stress and psychological well-being[5]; however, the sample consisted of domestic students and did not include international students; sample size and power were high, whereas the strength of the coefficients was small. Another study included negative affect as the independent predictor to demonstrate the moderating effect of self-compassion, which is not comparable to academic stress.[30] In another study life threatening experiences and daily stress were included as the independent predictors to demonstrate the moderating effect of psychological flexibility, also not comparable to academic stress.[36] In the present study, the sample consisted of international students; none of the other studies did. In addition, our sample size was smaller and the power to find significant effects was lower. Our independent predictor was academic stress, which already explained a large amount of the variance of the outcome variables. Although there is not sufficient evidence in our data to conclude that there is a buffering effect, this does not mean that there is no such effect in the population. Future studies need to confirm this finding.

There are several limitations of this study that need to be addressed. First, the sample used here was a convenience sample of international students from different Universities in the Netherlands. The overrepresentation of females and the high proportion of students in gamma studies (eg, psychology) might limit generalizability to males and people from other study programs. Although this study included a nationally diverse sample, a high proportion of participants were from Germany which limits generalizability to international students from other nationalities. Furthermore, the results cannot be generalized to international students in different countries. Considering the large amount of variables included, the sample size was rather small, which has consequences for the power of this study. Second, the method of self-report used here, is susceptible to bias. For example, the self-reports might be influenced by a lack of awareness or social desirability bias.[48] Third, the cross-sectional nature of the study does not allow for any conclusions about causality or directions of influence. Furthermore, other variables, like the similarity of the home culture to the Dutch culture or the demands of the specific study program could have influenced the relationships between the study variables that were not accounted for in the present study.

Thus, to increase generalizability future studies could repeat this study, with the same constructs, in larger, population based or clinical samples. In addition, this study could be repeated with other methods. As mindfulness, self-compassion and psychological flexibility include interactions of an individual with the environment, structured interviews might add to grasp these constructs more fully.[40] To make conclusions about causality, experimental, longitudinal studies, measuring stress, mindfulness related constructs and anxiety and depressive symptoms at different points in time are needed. In addition, other variables that could influence the relations between these variables should be investigated.

All in all, the results confirmed the relationships of mindfulness-related constructs with symptoms of depression and anxiety.[16] Important practical implications can be drawn on the basis of this study. The results might inform and guide the development of interventions to prevent and reduce stress and increase mental health of international university students. At the moment there are no special facilities for international students. They can use the same facilities as the domestic students. Since the problems in the group of international students seem to be more serious, it is important to develop new preventive and interventional activities especially for this group. With regard to prevention, consideration could be given to setting up tutor groups

for international students soon after arrival in the host country, in which mindfulness-related skills could be taught. As in many countries, among which the Netherlands, international students with symptoms of depression and anxiety can turn to a student counselor facility, this would be the perfect place to develop and offer interventions around mindfulness-related constructs. Some specific suggestions for these interventions can be made. First, as this study revealed that higher levels of the observing facet were associated with increased anxiety, it is not recommended to focus solely on observation of internal experiences. It might be more beneficial to teach this skill in combination with other facets of mindfulness to be better able to respond to one's internal experiences. Second, this study revealed that acting with awareness, focusing on current tasks instead of performing them in "auto mode" could be advocated to decrease depressive symptoms. Third, another target for interventions is emphasizing a flexible attitude toward one's unwanted experiences and to act in accordance with one's values. Fourth, fostering a compassionate attitude toward oneself may be especially important in students with depressive symptoms. Combining these topics in future interventions seems to be an important step, as all of them have been shown to be unique and important cognitive resources to cope with (academic) stressors.

Overall, this study concludes that there is a strong relationship between perceived academic stress and anxiety and depressive symptoms in international university students and that mindfulness-related constructs, particularly the facet of acting with awareness, self-compassion and psychological flexibility might be important targets for interventions to help to prevent and decrease symptoms of depression and/or anxiety in international university students.

## Conflict of interest disclosure

The authors have no conflicts of interest to report. The authors confirm that the research presented in this article met the ethical guidelines, including adherence to the legal requirements, of the Netherlands and received approval from the Review Board of the Institute of Psychology, Leiden University.

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