

**The buffering effect of self-esteem and mindfulness on worrying in the context of
intolerance of uncertainty**

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Abstract

Previous studies have shown that the number of worries and the intolerance of uncertainty (IU) is rising in the population. It has been established that heightened worry and IU are transdiagnostic factors related to anxiety disorders. In contrast, mindfulness and self-esteem have been related to reduced anxiety. This study aimed to investigate whether the established findings of self-esteem and mindfulness remain significant when tested as moderators between IU and worry. This study was a cross-sectional study where participants were 434 bachelor's students of the behavioral science department of a Dutch university aged 18 – 58 years ($M = 22$; $SD = 3.26$). All constructs were assessed through self-report questionnaires. The two moderators' self-esteem and mindfulness were added individually stepwise before they were combined, which led to a total of three regression models. The results of the regression analysis did not support the moderator role of self-esteem and mindfulness (e.g., $\Delta R^2 = 0.001$, $\Delta F(3, 433) = 0.82$, $p = .365$). More specifically, the main effects of self-esteem and mindfulness reduced worry; however, as moderators, they could not reduce the association between IU and worry. The results could not support the hypothesized effects, yet, supported the stance that self-esteem and mindfulness have a reducing tendency towards worry while IU has an increasing effect on worry and vice versa.

Keywords: worry, intolerance of uncertainty, self-esteem, mindfulness, mediation, COVID-19

The buffering effect of self-esteem and mindfulness on worrying in the context of intolerance of uncertainty

62,1% of Germans reported that they are worried about the uncertainty related to COVID-19, according to a recent study by Gerhold (2020). *Worrying* is a typical cognitive process in times where nothing about the future seems definite. This mental process can be understood as repetitive negative thoughts that refer to the future and seem relatively uncontrollable (Lai et al., 2014). Worry is strongly related to intolerance of uncertainty (IU) (Buhr & Dugas, 2006), and IU might even be specific to worry (Ladouceur et al., 1997). *IU* can be defined as a cognitive and emotional interpretation style regarding uncertain situations and how individuals perceive, interpret and respond to them (Buhr & Dugas, 2006). This can lead to a misapprehension of the world and its problems, leading to non-reality-based worry. Both IU and worry are more prominent traits in some individuals than others. If both are heightened, an increased risk of developing a psychological disorder, like generalized anxiety disorder (GAD), is present (Buhr & Dugas, 2006).

It is well established that IU and worry are related to several psychological disorders due to their definition as transdiagnostic factors (Topper et al., 2017a). Moreover, they interact with each other; According to Buhr and Dugas (2006), worry moderated IU and anxiety, thereby increasing anxiety and depression. Nevertheless, IU and worry are also related in non-clinical populations; evidence for this was found by Dugas et al. (1997), who indicated that every individual worries about some uncertainties, like possible accidents, in their daily lives. Sari et al. (2017) showed, for example, that students who worry more extensively perform worse in academic contexts, while heightened levels of IU have a similar effect on students in the medical sector (Hancock & Mattick, 2020). They can still manage their daily lives, while others get depressed or pathologically anxious. The number of students who reached the cutoff for GAD and depression heightened during the COVID-19

pandemic. Chen and Lucock (2022) showed that these risen numbers are related to the increase in IU and worrying in students during these uncertain times.

Mindfulness and relaxation are more relevant than ever due to the worldwide COVID-19 pandemic (Angermeier, 2021). Mindfulness is often associated with well-being and mental health, both up-and-coming topics on social media (Angermeier, 2021). *Mindfulness* is a technique introduced by Kabat-Zinn in 1990 that focuses on the present moment in a non-judgmental and non-reactive stance. In the meta-analytic review by Hofmann et al. (2010), it is presented that mindfulness-based treatment (MBT) may have general applicability, not just for anxiety, as mindfulness influences the cognitive processes and not the disorder symptoms. Therefore, it is assumed that mindfulness can challenge the mental processes of worrying. Evans and Segerstrom (2011) showed that the non-judgmental approach of mindfulness provides a filter for negative repetitive thoughts and therefore reduces worrying. They further showed that mindfulness's open and accepting attitude helps let negative thoughts go and promotes more positive reviews. Thus, enhancing mindfulness might help reduce one's worrying and increases cognitive flexibility. According to Vlemincx et al. (2013), this flexibility goes beyond cognition and is relevant for a more stable respiratory response in mindful individuals. Nekić and Mamić (2019) indicated in their study that mindfulness could reduce the negative bias towards the future that people with higher IU entail. They argued that mindfulness could help in students' academic and private sectors. Kraemer et al. (2016) stated that a mindful stance can help tolerate the uncertainty of the future and thereby reduce the worrying.

Self-esteem, defined as the sense of personal worth, is inversely related to anxiety and other psychological disorders, indicating that higher self-esteem is related to lower anxiety levels and vice versa (Rosenberg, 1962; Silverstone, 1991). Research indicated that low self-esteem predicts an increase in anxiety over time and that low levels of self-esteem are related

to several mental health problems (Silverstone, 1991). According to the anxiety-buffer hypothesis, self-esteem can protect against life stressors and adverse events by shifting the focus to the "bigger picture" (Greenberg et al., 1993). The recent study by Rossi et al. (2020) investigated the associations between COVID-19 and loneliness and how self-esteem may shield anxious thoughts. The researchers were able to show that self-esteem reduced anxious thoughts and therefore supported the anxiety-buffer hypothesis by Greenberg et al. (1993) in the context of COVID-19.

Intolerance of uncertainty and self-esteem are both transdiagnostic factors, which are often discussed together in the context of social anxiety disorder. Several studies have established that the two constructs are negatively related, meaning that those individuals who score high on IU are more likely to have low self-esteem (Boelen et al., 2010). For instance, Innes et al. (2017) showed that individuals who rate their social skills below-average score higher on IU than those who rate their skills higher. Thus, self-esteem is likely a protective factor for IU and worrying (e.g., Dar et al., 2017).

Considering the anxiety buffering hypothesis, it is evident that self-esteem has an established buffering effect on anxiety (Greenberg). Due to the close relationship between worry and GAD, it is apparent to assume that a similar effect is present between self-esteem and worry. The effectiveness of mindfulness concerning stress and anxiety has also been well established; however, not yet concerning worry and IU specifically. Buffering effects of mindfulness and self-esteem might broaden the applicability and usability of self-esteem and mindfulness-based interventions. Mindfulness has a positive relationship with self-esteem, arguing for combining both constructs to increase effectiveness (Randal et al., 2015). The increasing number of students suffering from anxiety and depression during the uncertainty of COVID-19 argue for interventions and insights (Chen & Lucock, 2022).

Given that no research ever evaluated whether the anxiety-buffer hypothesis by Greenberg also applies to worrying and its relation to intolerance of uncertainty, this research aims to answer the following research questions: Does self-esteem buffer against the effect of intolerance of uncertainty on worrying? Furthermore, does mindfulness serve as a protective tool for the result of intolerance of uncertainty on worrying? Based on the above-discussed evidence, it is hypothesized that self-esteem will have a buffering effect on the association between IU and worrying. Further, a similar effect is hypothesized for a higher level of mindfulness. Lastly, this research will investigate the individual and combined influence of self-esteem and mindfulness to inform further research and treatment development.

Methods

Participants

Bachelor students enrolled in the behavioral sciences department at Utrecht University were recruited via the "proefpersoonuren" website to participate in this study. Students were rewarded for their participation with credit points for their program. A total of 493 participants started the series of questionnaires. Yet, only the 434 individuals who completed all relevant questionnaires for this study who were above 18 years old were used for the subsequent analysis. The sample consisted of 78.6% ($N = 341$) of women and 21.2% ($N = 92$) men, while one individual indicated being "diverse." The age ranged from 18 to 58 years, with a mean age of 22 ($SD = 3.26$). The power was calculated using G*Power3 (Faul et al., 2007), using a two-tailed test, a medium effect size ($d = .15$), and an alpha of .05. The result showed that a total sample of 77 participants was required to achieve a power of .80. The number of participants in this study was more extensive than 77 ($N = 434$), indicating sufficient power. All participants were asked to inform consent before completing the questionnaires. The study has been approved by the Faculty Ethics Assessment Committee

(FEAC). This study was conducted according to the code of ethics on human experimentation established by the Declaration of Helsinki (1964) and amended in Seoul (2008).

Measures

Penn-State Worry Questionnaire – Abbreviated version (PSWQ-A)

The Penn State Worry Questionnaire-Abbreviated (PSWQ-A; Hopko et al., 2003) is an 8-item instrument measuring pathological worry and worry symptoms. The PSWQ-A is based on the 16-item version developed by Meyer et al. (1990). The abbreviated version only consists of non-reversed items like: "I am always worrying about something" or "I have been a worrier all my life" (Hopko et al., 2003), which are rated on a 5-point Likert scale, ranging from 1 ("*not at all typical*") to 5 ("*very typical*"). The total score range lies between 8 and 40, while no official cutoff is publicized for students. Spence et al. (2012) mentioned the following cutoffs in a student sample; For high worries to lie above 30 or 32, while the cutoff for the low worry group lies below a total score of thirteen. The Cronbach's alpha in this study ($\alpha = .95$) reflected excellent reliability.

Intolerance of Uncertainty Scale (IUS-12)

The Intolerance of Uncertainty Scale (IUS-12) is a 12-item measure of life uncertainty and the consequences of this distress, which was developed by Carleton et al. (2007) and is based on the 27-item version by Freeston et al. (1994). The IUS-12 includes items like "One should always look ahead to avoid surprises," assessing the probability of uncertainty, and "when it is time to act, uncertainty paralyzes me," measuring the amount of inhibition that the intolerance causes. These items are scored on a 5-point Likert scale ranging from 1 ("*not at all a characteristic of me*") to 5 ("*entirely characteristic of me*"). The total score ranges between 12 and 60, calculated by adding all responses, while higher scores indicate higher IU. The Cronbach's alpha in the current study was .92, representing excellent reliability.

Rosenberg Self-Esteem Scale (RSES)

The Rosenberg Self-esteem scale is a 10-item scale that measures self-esteem (Rosenberg, 1965). The scale includes positively worded items ("*I am able to do things as well as most people*") and reversed items ("*I certainly feel useless at times*"), which are rated on a 4-point Likert scale, where one indicates "strongly disagree," and four expresses "strongly agree." This amounts to a total score range between 10 and 40, where higher total scores indicate higher self-esteem. Scores on the reversed items thus need to be changed before calculating the total score. This study's Cronbach's alpha was .90, implying good to excellent reliability.

Mindfulness-Attention-Awareness-Scale (MAAS)

The Mindfulness-Attention-Awareness-Scale (MAAS) is a 15-item scale that measures the state of mind that is attentive in the present moment and observes what is taking place in a non-judgmental way (Brown & Ryan, 2003). Items like "I find myself preoccupied with the future or the past" and "I snack without being aware of what I am eating" are scored on a 6-point Likert scale, evaluating how frequently the individual is experiencing each item ranging from 1 ("*almost always*") to 6 ("*almost never*"). The total score is computed by calculating the mean (average) of the 15 items, where higher scores reflect higher mindfulness. The Cronbach's alpha was .90, which reflects excellent internal reliability.

Procedure

After registering for the study on the university website, the participants received an individual log-in for the Qualtrics webpage (Qualtrics XM // the Leading Experience Management Software, 2022). Participants were able to choose the time of completion freely. The study's objective was explained in the first wave, and the participant's informed consent was asked. After that, the participants were asked to fill out several questionnaires (as part of

a more extensive study), including Likert-scale and open-response questions. The completion took approximately 45 to 60 minutes. The participant received study-program credits in return for completing the first wave. The second wave assessment was sent six months after completion and took ten to twenty minutes. The second wave was not used for this study's purposes.

Statistical analysis

The data has been analyzed in the IBM software SPSS (Version 28, macOS). Exploratory analysis, including an independent samples t-test and regression analysis, were pertained to test the hypothesis. The hypotheses of this study concerned the two moderator variables mindfulness and self-esteem, which led to a total of three individual multiple regression analyses. The dataset was screened for residuals which were subsequently removed. The multiple regression analyses were performed with the independent variable intolerance of uncertainty (IUS-12) and worry (PSWQ) as the outcome variable, including the possible moderator variables mindfulness (MAAS) and self-esteem (SES). All scores were centered beforehand, and the interaction terms were calculated. Due to the hypotheses of this study which concern the individual and the combined influence of the independent variables, three separate multiple regression analyses were introduced. The assumptions of multiple regression analysis have been checked beforehand. Additionally, the assumption of a linear relationship was tested based on the normal P-P plot between the dependent and independent variables, calculated in the regression analysis, which showed a linear relationship in all three analyses. Multicollinearity was investigated using the VIF-score-cutoff of below four and tolerance above 0.25. The Durbin Watson test investigated the independence of observations. Homoscedasticity was established by plotting standardized residuals against predicted values. The assumption of normality has been checked visually

using the Q-Q Plots. If not further mentioned, non-violation of the assumptions can be assumed.

Results

Descriptive statistics

Means, standard deviations, and correlations are provided in Table 1. To rule out gender differences, an independent samples t-test was conducted on all independent and dependent variables. This indicated that females ($M = 23.89$; $SD = 8.35$) differ significantly from males ($M = 18.51$; $SD = 7.12$) in worry ($t(431) = 6.186$, $p < .001$). Females ($M = 29.04$; $SD = 9.95$) differ also significantly from males ($M = 25.10$; $SD = 8.22$) on intolerance of uncertainty ($t(431) = 3.90$, $p < .001$). Males differed significantly from females in self-esteem ($t(431) = -3.15$, $p < .05$). No significant gender differences were visible in the moderator variable mindfulness ($t(431) = 1.13$, $p = .228$). A series of Pearson correlations were performed. See Table 1 for an overview. The independent variable intolerance of uncertainty correlates positively with the outcome variable worry. Mindfulness, one moderation variable, shows a medium negative correlation with worry and IU. The second moderator of this study, self-esteem, was largely negatively correlated with both worry and IU. A negative medium correlation was present between mindfulness and self-esteem.

Table 1

Descriptive and Pearson Correlations between the dependent variable worry and the independent variables intolerance of uncertainty, self-esteem, and mindfulness.

Variable	Min.	Max.	M	SD	1	2	3	4
1. PSWQ	8	40	22.76	8.39	1	-	-	-
2. IU-12	12	55	28.23	9.73	.68*	1	-	-
3. MAAS	15	84	3.89	0.85	-.33*	-.38*	1	-
4. SES	11	40	30.61	5.50	-.59*	-.65*	-.38*	1

Note. M and SD are used to represent mean and standard deviation, respectively. PSWQ = Pen-state worry questionnaire, IU= Intolerance of uncertainty scale; MAAS = Mindful attention awareness scale; SES = Self-esteem scale. * $p < .05$; ** $p < .001$

Predictive value of IU towards worry

The first analysis aimed to test the hypothesis whether self-esteem moderates the relationship between intolerance of uncertainty and worrying. The main effects of self-esteem IU and gender were tested in a first regression step, leading to an explained variance of 51,2%, $F(3,433) = 152.21, p < .001$. The interaction between IU and self-esteem was added in a second regression step. The two-way interaction did not significantly add incremental variance in worry over and beyond the main effects ($\Delta R^2 = 0.001, \Delta F(3, 433) = 0,82, p = .365$). As visible in Table 2, self-esteem has a significant negative influence on worrying. Apart from gender, intolerance of uncertainty had the greatest individual influence on worry across all regression steps (e.g. $B = 0.42, t(433) = 11.10, p < .001$).

Table 2

Hierarchical Regression analysis for gender, IU, and self-esteem on worrying. (N = 434)

	Standardized Coefficients			
	B	SE	t	p
Step 1				
Gender	-2.80	.68	-4.10	< .001
IU	0.42	.04	11.07	< .001
SES	-0.39	.07	-5.72	< .001
Step 2				
Gender	-2.81	.68	-4.11	< .001
IU	0.43	.04	11.10	< .001
SES	-0.39	.07	-5.79	< .001
IUxSES	0.00	.01	0.91	.365

Note. M and SD are used to represent mean and standard deviation, respectively. PSWQ = Pen-state worry questionnaire, IU= Intolerance of uncertainty scale; MAAS = Mindful attention awareness scale; SES = Self-esteem scale.

A second regression analysis has been conducted to investigate the moderating effects of mindfulness. Gender, IU, and mindfulness have been added in the first step of the regression (48,1%, $F(3,433) = 134.60, p < .001$), while the two-way interaction between IU and mindfulness has been added in the second step ($\Delta R^2 = 0.00, \Delta F(3, 433) = 0,31, p = .579$), which did not add to the variance beyond the main effects. Mindfulness had a negative individual influence on worrying ($B = -0.84, t(433) = -2.27, p < .05$), while the interaction had a non-significant influence as seen in Table 3.

Table 3

Hierarchical Regression analysis for gender, IU, and mindfulness on worrying. (N = 434)

	Standardized Coefficients		t	p
	B	SE		
Step 1				
Gender	-3.01	.70	-4.28	< .001
IU	0.54	.033	16.39	< .001
MAAS	-0.84	.371	-2.27	.024
Step 2				
Gender	-3.01	.70	-4.27	< .001
IU	0.54	.30	16.30	< .001
MAAS	-0.85	.37	-2.90	.023
IUxMAAS	0.02	.03	0.56	.579

Note. M and SD are used to represent mean and standard deviation, respectively. PSWQ = Pen-state worry questionnaire, IU= Intolerance of uncertainty scale; MAAS = Mindful attention awareness scale; SES = Self-esteem scale.

Both moderators, mindfulness and self-esteem, were added in the first step (51,2%, $F(3,433) = 114,78, p < .001$) and the two-way interactions between all independent variables in the second step of the regression ($\Delta R^2 = 0.001, \Delta F(3, 433) = 0,59, p = .554$). In the third step of the regression model the three-way interaction between IU, self-esteem, and mindfulness was added, which did not add to the explained variance of worry beyond the main effects in the first step of the model ($\Delta R^2 = 0.00, \Delta F(3, 433) = 0,31, p = .733$). Table 4 indicates, among other effects, that the main effect of mindfulness is no longer significant ($B = -0,48, t(433) = -1.32, p = .189$) in the regression model where self-esteem and mindfulness are tested together.

Table 4

Hierarchical Regression analysis including all independent variables and interaction terms on worrying. (N = 434)

	Standardized Coefficients		t	p
	B	SE		
Step 1				
Gender	-2.820	.682	-4.133	< .001
IU	0.413	.039	10.609	< .001
SES	-0.369	.068	-5.388	< .001
MAAS	-0.482	.366	-1.317	.189
Step 2				
Gender	-2.82	.68	-4.13	< .001
IU	0.42	.04	10.64	< .001
SES	-0.38	.07	-5.16	< .001
MAAS	-0.50	.37	-1.35	.178
IUxMAAS	0.02	.04	0.54	.587
IUxSES	0.00	.01	0.60	.552
Step 3				
Gender	-2.87	.69	-4.17	< .001
IU	0.42	.04	10.59	< .001
SES	-0.38	.07	-5.51	< .001
MAAS	-0.65	.42	-1.55	.123
IUxMAAS	0.00	.05	0.07	.941
IUxSES	0.00	.01	0.41	.683
SESxMAAS	-0.02	0.08	-0.22	.829
IUxSESxMAAS	-0.00	0.01	-0.72	.472

Note. M and SD are used to represent mean and standard deviation, respectively. PSWQ = Pen-state worry questionnaire, IU= Intolerance of uncertainty scale; MAAS = Mindful attention awareness scale; SES = Self-esteem scale.

Discussion

The present study is one of the first studies to investigate the idea of the anxiety buffering hypothesis by Greenberg et al. (1993) in the context of IU and worrying while extending the hypothesis to mindfulness. This study supported previous research's stance that mindfulness and self-esteem have a negative relationship with the transdiagnostic factors of worry and IU (e.g., Evans & Segerstrom, 2011; Rosenberg, 1962), while only the main effects displayed a significant result. All tested interactions between IU, self-esteem, and mindfulness produced non-significant results, thereby not supporting the hypothesized buffering effect of mindfulness, self-esteem, and the combination of the constructs on the association of IU and worry.

The first hypothesis of this study concerned the possible buffering effect of self-esteem on the relationship between IU and worry, which was not supported by this study. However, the main effect of self-esteem showed significant negative relationships to both IU and worry, which means that higher self-esteem is related to lower levels of worry and IU and vice versa, not excluding the possibility of the influence of a third variable. One possible explanation for the non-significant interactions in this study might be that the outcome variable worry is a transdiagnostic factor and not a specific disorder. The relationship between self-esteem and several psychological disorders was established before (Rossi et al., 2020). Earlier research seldomly introduced many transdiagnostic factors in one regression model, which might explain the lack of significant interactions. Due to the transdiagnostic character of the variables, the aim is more specific, and many third variables could have

influenced earlier findings on the specific disorders. Possible future research could manipulate self-esteem to investigate its unique influence on worry and other transdiagnostic factors related to anxiety and depression to find possible third variables that influenced this study's interactions.

A similar buffering effect was hypothesized for mindfulness because it is known to reduce the negative consequences of repetitive thoughts (Evans & Segerstrom, 2011). As expected from earlier research, there is a negative effect on worry, meaning that a person with higher mindfulness scores scored lower on worrying (Vlemincx et al., 2013). Mindfulness-based interventions successfully reduced IU in panic patients (Kim et al., 2016) and positively influenced individuals suffering from disorders related to worrying, like anxiety or depression (Corbally & Wilkinson, 2021). However, the effect of mindfulness did not hold when it was tested to buffer against the association between IU and worrying.

One possible explanation for the findings of this study might be that earlier mindfulness research focused mostly on anxiety or depression rather than worrying (e.g., Corbally & Wilkinson, 2021). This research could indicate that a different transdiagnostic factor than worry was affected by mindfulness in earlier research. Thus, future research could investigate what other transdiagnostic factors are affected by the positive influence of mindfulness.

Due to the considerable overlap between mindfulness and self-esteem and their positive correlation, the interaction effects between the three variables IU, mindfulness, and self-esteem were investigated (Williams, 2008). Even though higher mindfulness and higher self-esteem individually reduced worry, they were not able to reduce the association between IU and worry in a significant manner. Mindfulness and self-esteem were hypothesized to increase each other's influence on worry based on the positive relationship between self-

esteem and mindfulness (Randal et al., 2015). Yet, no further worry reduction was discovered in individuals who were more mindful and had higher self-esteem.

The lack of significance of mindfulness when tested together with self-esteem remains unclear in this study. A possible explanation could be that the established relations between self-esteem and mindfulness are often based on mediation rather than moderation. The effect of mindfulness is enhanced by self-esteem due to the positive effect of mindfulness on self-esteem (e.g., Bajaj et al., 2016; Rasmussen & Pidgeon, 2011). In this study, the two constructs were tested on the same level, and therefore, the order of the enhancement as presented above was overlooked by this study design.

Recent studies showed that mindfulness was reduced during the COVID-19 pandemic (Sbrilli et al., 2021). This is problematic since mindfulness is assumed to be a resilience factor for pathologies and is often relatively low in patients with psychological disorders (Sbrilli et al., 2021). The data collection of this study started in September 2020 and lasted one year, while the pandemic started in March 2020, which is why a reduced average of mindfulness was expected. The sample of this study seemed to be untouched by the pandemic, as the average mindfulness was 3.88, which is higher than the US undergraduate student average on the MAAS ($M = 3.85$; (Miller, 2022)). The reason for the lack in the shift of mindfulness might be due to the sample itself, which was based on behavioral sciences students, who might have learned something about the possible resilience effects of mindfulness in their programs, or due to the rising accessibility of mindfulness-based apps (Antonini Philippe et al., 2021).

In some cases, mindfulness-based interventions might be contra-indicative, accounting for the lack of moderation in this study. According to Britton (2019), the effectiveness of mindfulness can be understood as an inverted U-shaped curve. They argued

that specific mindfulness processes like self-observation, interception, and exposure could lead to adverse effects like anxiety when performed excessively. These processes are also counterintuitive to the avoidance present in individuals who are intolerant of uncertainty (Leite & Kuiper, 2008). The inverted U-shape was not found by this study, possibly due to the usage of the MAAS, which only covers the first phase of the U-shape, or the deficiency of mindfulness, which does not allow for the full range of the U-shape but rather a linear relationship between mindfulness and well-being (Britton, 2019; see Appendix). A study from 2019 showed that a quarter of the participants reported adverse effects after meditation, including fear (Schlosser et al., 2019). These possible adverse effects might also explain that the NICE guidelines do not recommend mindfulness-based interventions for disorders with the transdiagnostic factor worry (NICE, 2011).

This study informed a somewhat disregarded field by addressing the transdiagnostic factor of worry instead of anxiety or depression, while earlier research often focused on a specific diagnosis based on the categorical diagnostic approach (e.g., Corbally & Wilkinson, 2021). Looking at worry, as a transdiagnostic factor, instead of specific disorders allows for insights into more pathologies at once (Topper et al., 2017). This study nevertheless had some limitations. The main limitation is the low cultural variability of the sample. The sample was based on students of the behavioral sciences department of a Dutch university, which was represented by a predominantly female student body (78%). Females have psychological disorders related to worry more often (Lai et al., 2014), which influenced the model significantly. The results showed that the female gender added to the risk of worry in a meaningful manner, while a more balanced sample might allow for more generalizability. Furthermore, this study was conducted in a western country, reducing generalizability to western, educated individuals. Nevertheless, most studies conducted on similar topics also focused on western samples and university students, with a few exceptions, which used Asian

samples. Thus, the outcome is limited to individuals with access to higher education. The study was not based on a randomized controlled trial and did not allow for causal conclusions but allowed for the interpretation of the correlations presented above. Results were based on self-report tools and may therefore suffer from bias. The study was conducted during the beginning of the COVID-19-pandemic, which did not affect the means of the measures used in this study compared to pre-pandemic measures.

Despite these limitations, this study confirmed the established main effects of IU, self-esteem, and mindfulness towards worry. IU was a constant predictor for higher worry levels, while self-esteem was a constant predictor of lower worrying. Mindfulness was only a predictor of lower worry levels when tested without self-esteem. Understanding the hypothesized relationship between IU and worry and the moderating properties of self-esteem and mindfulness could not be advanced. The transdiagnostic factor of worry is a valuable construct for future studies due to its crucial part in many psychological disorders. Universities could raise their awareness of the growing problem of psychological disorders in students and offer more assistance. This study indicated that self-esteem and mindfulness entail the property to reduce the level of worry, while the combination of both did not add to the effect. Offering mindfulness or self-esteem-enhancing programs could stop the rising number of students who reach the cutoff for meeting a psychological disorder (Radwan et al., 2021).

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Appendix

