



**The moderating role of Emotional Regulation in the relationship between
Intolerance of Uncertainty and Depression**

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Abstract

Intolerance of uncertainty and its relationship with emotional disorders has been of growing interest in psychology research. This research aims to investigate whether emotional regulation (positive and negative) affects the relationship between intolerance of uncertainty and depression, acting as a moderator. To answer the research questions, the quantitative analysis method was used. A total of 493 individuals participated in a cross-sectional survey and were administered four different questionnaires (Intolerance of Uncertainty Scale-12, Beck Depression Scale, Responses to Positive Affect, and Ruminative Response Scale). The data were collected, and SPSS 23 was used for the analysis. According to the results, positive emotional regulation is essential for predicting depression and even acts as a moderator through "inhibitory anxiety". However, negative emotional regulation does not seem to be a moderator in predicting depression through Intolerance of Uncertainty. The complex interactions of IU, emotional regulation and depression were highlighted in this study, suggesting possible psychotherapeutic targets. Limitations of the study include a cross-sectional design and demographic factors such as socio-economic level and gender. Future studies could benefit by checking for comorbid situations such as anxiety disorders, which appear commonly with depression and in which IU also seems to play an important pathogenetic role.

Keywords: Intolerance of uncertainty, depression, emotional regulation, moderator

Depression is a frequent and often disabling psychiatric condition in the general population as well as in university students. Mental health among university students, studied during the Covid-19 period, represents an important and growing public health concern, especially when it comes to depression, as pointed out by several recent studies (Al-Qaisy, 2011; Hamaideh et al., 2022; Young et al., 2010). In the systematic review from an international scope (population from the USA, Canada, EU countries and Asia) of Ibrahim et al. (2013) the mean prevalence of depression in undergraduate students is reported as 30,6%. According to neurobiological, phenomenological, clinical and epidemiological studies, depression is linked to a general 'distress' factor (Braam et al., 2014), described as "negative affect" (Möller et al., 2016). Given the high prevalence rates of depression in students, it is important to research factors that are related to these symptoms. Thus, understanding the nature, mechanisms and correlates of depression is crucial, as such discoveries open the way to improve existing treatments and design new ones. The factor of Intolerance of uncertainty (IU) is among the key risk factors for the development and maintenance of affective disorders in the general population (Carleton, 2016; Dugas, 2001) and has been associated with negative affect, which increases the individual's vulnerability to depression (Toro Tobar et al., 2020; Yook et al., 2010).

Intolerance of Uncertainty (IU) has been defined as "a dispositional characteristic that results from a set of negative beliefs about uncertainty and its implications and involves the tendency to react negatively on an emotional, cognitive, and behavioural level to uncertain situations and events" (Buhr & Dugas, 2009, p. 216). Originally considered the risk factor for worry and generalised anxiety disorder, IU has been linked with a range of other disorders, such as major depressive disorder (McEvoy & Mahoney, 2012), obsessive-compulsive disorder (Lind & Boschen, 2009) and social anxiety (Boelen & Reijntjes, 2009). It is suggested that IU is a transdiagnostic risk and maintaining element contributing to a range of emotional disorders (McEvoy & Mahoney, 2012). Cognitive models about IU suggest that specific components of IU are associated in different ways with emotional disorders. More specifically, the "inhibitory IU", which refers to avoidance responses to uncertainty (i.e. avoiding actions or experiences, due to them being perceived as uncertain) (Bottesi et al., 2019) is uniquely associated with depression (McEvoy & Mahoney, 2012), whereas prospective IU, which refers to active information seeking in order to reduce uncertainty

(Bottesi et al., 2019), is associated with comorbidity of depression and anxiety disorders, but not uniquely associated with them (McEvoy & Mahoney, 2012). According to Carleton (2016) IU is shown to be associated with the presence of depressive symptomatology, especially with severe depressive symptoms, which describes a positive association between IU and depression (Carleton, 2016). According to Liao and Wei (2011) individuals with cognitive risk factors for depression (such as IU) tend to engage in a negative emotional regulation (negative rumination) as a coping mechanism, resulting in a negative emotional state. In the literature, IU has been shown to correlate positively with rumination (Gervais & Dugas, 2006), since feelings of uncertainty would keep people trapped in a rumination process, perhaps as a way of managing these uncertain feelings (Ward et al., 2003).

According to American Psychology Association (APA), emotion regulation (ER) is “the ability of an individual to modulate an emotion or set of emotions”. Emotional regulation processes affect the quality and the quantity of emotions and people use specific strategies to adapt these emotions (Gross, 1998). ER strategies have been typically categorised as adaptive (e.g., positive rumination, savouring positive experiences, cognitive reappraisal, problem-solving, acceptance) or maladaptive (e.g., negative rumination, avoidance, suppression, denial) (Cai et al., 2018) . Using adaptive strategies is related to better mental health, whereas maladaptive strategies are associated to poorer psychological outcomes (Aldao et al., 2010). Emotion regulation has been considered to be a component which explains the onset and maintenance of anxiety and emotional disorders. An individual's strategy and capacity to manage his emotions are essential in understanding the aetiology, maintenance, and treatment of emotional disorders (including depression) (Cisler, 2012). It has been observed that rumination seems to be a significant factor in understanding the relationship between emotional regulation and depression since rumination (both negative and positive) can be conceptualized as an emotional regulation strategy.

More specifically, rumination is an ER strategy, whether it is adaptive (positive rumination) or maladaptive (negative rumination). In general, rumination is defined as “the process of thinking perseveratively about one’s feelings and problems rather than in terms of the specific content of thoughts” (Nolen-Hoeksema et al., 2008). Rumination can be considered positive, negative or neutral in affective valence (Feldman et al., 2008). High trait positive affect protects against depressive symptoms through cognitive responses such as

positive rumination. Positive rumination, with subcomponents such as self-focused positive rumination and emotion-focused positive rumination, refers to responding to positive events and mood states with a cognitive focus on positive content, which represents an adaptive cognitive process and predicts fewer depressive symptoms (Feldman et al., 2008). On the other hand, depressive/negative rumination is an important vulnerability factor for experiencing depressive symptoms. Using rumination as a strategy to regulate negative emotions tends to exacerbate distress (Lyubomirsky et al., 2003). It could also have a consequence for someone to understand negative emotions as threats, therefore, start feeling overwhelmed and unable to overcome these emotions, increasing an individual's vulnerability to negative emotions such as depressed mood (Ouellet et al., 2019). Especially brooding rumination, which is the tendency to focus on negative aspects of oneself or negative interpretations of one's life, is a well-known risk and key factor of depression in midlife (Whitmer & Gotlib, 2013). Reflection is viewed as less problematic as a coping strategy. According to a meta-analysis by Olatunji et al. (2013), which was based on cross-sectional research, brooding presented a stronger association with depression symptoms than reflection. Finally, as Dickson et al. (2012) and Lyubomirsky et al. (1993) found in their research, negative rumination can act as an avoidance function, worsening the symptoms of depression through related strategies such as emotional or behavioural avoidance.

When negative ruminators (people who ruminate a lot) face uncertainty, rumination is likely to prevent them from actively coping with uncertainty leading them sometimes to more passive or avoidance behaviours, resulting in persistent feelings of uncertainty and depressed mood. Moreover, loneliness and isolation are common feelings among people who ruminate negatively since their social support is decreased because of the continued pessimistic thoughts (Spasojevic et al., 2004), leading them to more uncertain situations and feelings regarding the future, ending up feeling more distress and negative mood. Accordingly, it is expected in the present study that high levels of rumination would strengthen the associations between IU and symptoms of depression. In contrast, based on the above literature, individuals with a positive coping strategy (positive rumination) are likely to actively seek information or find solutions to manage and reduce the uncertainty and problems they face. These preventive strategies can reduce their level of intolerance of uncertainty, thus reducing the

association between IU and emotional distress. Therefore, it is now expected that a positive rumination would reduce the correlations between IU and symptoms of depression.

A moderator is considered a variable that influences the strength of the relation between a predictor and an outcome (Frazier, Tix, & Barron, 2004). The focus of the present study is the role of emotional regulation as a moderator between IU and depression, a relationship that has been reported by a number of studies (Compare et al., 2014; Chahar Mahali et al., 2020) arguing that emotional regulation is a crucial trans-diagnostic process (Aldao et al., 2016). The present study investigates the effect of both positive emotional regulation and negative emotional regulation on the relationship between IU and depression. Based on the discussion above, it is possible that the occurrence of ER (positive or negative) is the mechanism that affects the relationship between IU and depression. To test these, the following moderator models will be examined: (i) IU as a predictor of depression, moderated by positive ER (positive rumination) (hypothesis 1) (ii) IU as a predictor of depression, moderated by negative ER (negative rumination) (hypothesis 2). The assumption regarding the relations and interaction between the variables are: On the one hand, depression and its relation with IU are going to present lower levels of severity when the ER is positive, while on the other hand, depression's interaction with IU is predicted to be more severe when individuals present negative ER is negative. It is highly important to study these mechanisms further, since they are very important tools, considering the psychological diagnosis and interventions, especially in Cognitive Behavioural Treatment, which is an up-to-date intervention that scientifically has been proved very effective for many clinical cases and uses transdiagnostic (rumination, intolerance of uncertainty etc) as a main tool for the treatment of different kind of mental disorders and their comorbidity.

METHODS

Procedure and participants

A descriptive cross-sectional design was used in this study. All participants were bachelor's students from a public university in the Netherlands, Utrecht University (UU). They were recruited through the UU participant's website since it was conducted during the Covid-19 period, and they received course credits for participation. The completion of self-reported ques-

tionnaires was conducted online. Ethics approval was obtained before recruitment. All participants were informed about the study and provided consent. The data was part of a broad research plan, but in this specific study, only a part of the data was used.

Measures

Intolerance of Uncertainty Scale (IUS-12)

The first questionnaire selected for the research is the Intolerance of Uncertainty Scale (IUS-12) which consists of 12 closed-ended statements for the individual's response to unpredictable and unexpected situations (Carleton et al., 2007). In each sentence, the answers follow the same five-point Likert scale: Not at all characteristic of me (1), A little characteristic of me (2), Somewhat characteristic of me (3), Very characteristic of me (4), Entirely characteristic of me (5). The questionnaire consists of two factors related to prospective anxiety (7 sentences) (e.g., unforeseen events upset me greatly) and inhibitory anxiety (5 sentences) (e.g., when I'm uncertain I can function very well). A higher overall score on each of these factors indicates a greater inability to manage uncertain situations. Cronbach's α for the questionnaire were in the good to the excellent range: Prospective anxiety .893 and Inhibitory anxiety .876

Beck Depression Scale (BDI)

The second questionnaire of the research is the Beck Depression Scale (BDI) which includes 21 statements concerning the occurrence of depression in various aspects of daily life (Beck et al., 1988). The answers to each sentence are different as they relate to different areas of life such as discouragement about the future, feelings of failure, dissatisfaction, guilt, self-disappointment, self-blame, suicide and outburst of crying. The same questionnaire also includes statements about annoyance, lack of interest in other people, inability to make decisions, and lack of self-confidence about appearance. Finally, statements are made regarding the inability to perform tasks, sleep, appetite and health. In each of the above statements, there are 4 possible answers with a score from 0 to 3. The highest overall score on this scale indicates the existence of depression. An example question is "0-I do not feel sad" "1- I feel sad", "2-I am sad all the time and I can't snap out of it", "3- I am so sad and unhappy that I can't stand it". Cronbach's α in the present study, $\alpha = .901$.

Responses to Positive Affect” (RPA)

The third scale “Responses to Positive Affect” (RPA) deals with behaviours when something positive happens. The RPA scale consists of three underlying factors: (a) dampening; (b) emotion-focused positive rumination; and (c) self-focused positive rumination (Feldman et al., 2008). In the present study, the dampening factor was eliminated, since it is a maladaptive emotional strategy describing the suppression of positive affect, while the aim of the study is the positive emotional regulation. The questionnaire includes 17 statements regarding the positive mood of individuals (Feldman et al., 2008) (e.g self-focused positive rumination “Think “I am getting everything done” and emotion-focused positive rumination (e.g. „Think about how you feel up to doing everything”). Each of these answers follows the same four-point Likert scale: Almost never (1), Sometimes (2), Often (3), Almost always (4). For the analysis of the study, a total score was calculated from the sum of "Emotion-focus rumination" and "Self-focus rumination” (RPA-total) scores. A higher total score on these factors indicates a more positive attitude of individuals. The internal reliability (Cronbach’s α) in the present study ranges from .790 to .799, indicating acceptable internal consistency reliability

Ruminative Response Scale (RRS)

Finally, the questionnaire Ruminative Response Scale (RRS) was used, which refers to the habit of individuals to re-examining stressful situations (Treyner et al., 2003). The questionnaire consists of 22 sentences [e.g., Think about how passive and unmotivated you feel, Think about how you don’t feel up to doing anything] in which there are the same 4 answers: Almost never (1), Sometimes (2), Often (3), Almost always (4), The proposals are divided into 3 factors (Depression, Brooding, and Reflection). However, only two were selected to be studied in the present study: reflection and brooding. A higher total score on these factors indicates more rumination. The internal reliability (Cronbach’s α) in the present study ranges from .760 to .766, indicating acceptable internal consistency reliability

Description of analysis methods

In order to answer the research questions, the multiple linear regression (Field, 2009, pp. 225-240) was used with the help of the statistical package SPSS 23. First, an attempt is made to find out if depression (total score of BDI as dependent variable) can be associated with intolerance of uncertain situations (total scores of “inhibitory anxiety” and “prospective anxiety” as independent variables). Then one of the factors of the RPA and RSS questionnaires is added to the model to determine if it is also important for the prediction of the dependent variable. Each linear regression examines both the significance of the model as a whole (if at least one independent variable is important for predicting the dependent) and the significance of the independent variable. If the p-value of each test is less than .05, the model (or independent variable) is important for predicting depression.

It is worth noting that multiple regression contains certain conditions for its results to be acceptable (Field, 2009, pp. 220). Specifically, the dependent variable should be quantitative while qualitative or quantitative variables can be used as independent variables, the independent variables should be characterized by non-zero variance and the independent variables should not be characterized by a perfect linear relationship (multicollinearity). The multicollinearity test was performed via the VIF value which in each case appeared to be close to 1 or at most 2. These values indicate that there is no significant correlation between the independent variables of each model. Furthermore, the model should be characterized by homoscedasticity which was tested with the use of a scatterplot. Finally, the residuals of the model should be characterized by independence and normal distribution.

Then it was tested whether there is a significant relationship between this factor and the other independent variables of the model ("Inhibitory Anxiety" and "Prospective Anxiety"). For this purpose, the Pearson correlation coefficient is applied each time (Field, 2009, pp. 175-181).

Then, all scores converted to z-scored before used. Regression analyses were used to test if the relationship between IU and depression is moderated by positive rumination (RPA) (hypothesis 1) and/or if the relationship between IU and depression is moderated by negative rumination (RRS) (hypothesis 2). The zscores of the dependent variables of each regression were calculated. The aim was to determine whether the product of the zscore of each factor of

the IUS questionnaire with the zscore of RPA and RRS questionnaires (or their total score) is important for predicting the dependent variable (BDI). If the product of zscores is important for the prediction of the dependent variable and the two initial variables were significantly related to each other then it can be considered that the independent variable of emotional regulation (RPA / RRS) is the moderator of the model. It is worth noting that the reason that the product of zscores was chosen instead of the product of the initial values of the variables is because in this way the multicollinearity is reduced.

Results

The participants initially enrolled in the study were 493 in total. Of those, 35 participants were excluded due to gender missing values (7,1%). Therefore the sample consisted of 94 men (20,5%), 363 women (79,3%) and 1 different (0,2%) who range from 18 to 58 years with a mean age of 22 years old (SD 3.21). In the following analysis, participants with missing data in any variable (i.e scales RPA, RRS, BDI and IUS-12) were excluded, ending up in a final sample of 441 participants. The means score of each scale is presented in table 1.

Table 1

Mean scores and Standard Deviation from scales

	M	SD
<i>Intolerance of Uncertainty (IUS-12)</i>		
Prospective anxiety	17.56	6.25
Inhibitory anxiety	10.59	4.47
<i>Beck Depression Scale (BDI)</i>		
Total score	9.78	8.59
<i>Responses to Positive Affect (RPA)</i>		
Total score	24.29	5.28
<i>Ruminative Response Scale (RRS)</i>		
Total score	20.90	5.38

Effect of positive emotional regulation on the relationship between depression and Intolerance of Uncertainty

The total score of positive emotional regulation on the relationship between depression and intolerance of uncertainty was studied. In this case, the factors "Emotion-focus rumination" and "Self-focus rumination" were added resulting in the overall score of positive emotional regulation (RPA-total). Initially, the overall score of positive emotional regulation was added to the original depression prediction model which contained only prospective anxiety and inhibitory anxiety as independent variables. As it turned out, the new model is likely to predict depression ($F(3,437)=109,749$, $p<.001$) and even interprets 43% of its total variability. In particular, positive emotional regulation (RPA-total) is important in predicting depression ($t(440)=-5.430$, $p<.001$).

The possible significant correlation of positive emotional regulation with each of the factors of Intolerance of Uncertainty was then studied. In particular, the Pearson correlation coefficient showed that there is a significant negative correlation between positive emotional regulation with prospective anxiety ($r=-.227$, $p<.001$) and inhibitory anxiety ($r=-.255$, $p<.001$). Then, the RPA-total variable was studied as a possible moderator in the relationship between depression and IU.

For this purpose, the variables that express the interaction of the positive emotional regulation with each of the factors of IU (prospective anxiety, inhibitory anxiety) were calculated. From the 2nd model (see Table 2) it seems that a significant prediction of depression can be made again ($F(5,435)=72.636$, $p<.001$) and in fact the model interprets 45.5% of the variability of the dependent variable. From the new variables, it seems that the only important for the interaction of depression is the one that expresses the interaction of the positive emotional regulation with inhibitory anxiety ($t(440)=-2.545$, $p=.011$). Therefore, positive emotional regulation actually acts as a moderator in the relationship between depression and IU but only through inhibitory anxiety.

Finally, the depression prediction model was recalculated with independent variables only those that were considered important for the prediction of depression in the 2nd model

(see table 2). The new model is important for predicting depression ($F(4,436)=90.645$, $p<.001$) and even interprets 45.4% of its variability.

The interaction of prospective anxiety and positive rumination can be seen in Figure 1 while the interaction of inhibitory anxiety and positive rumination can be seen in Figure 2.

Table 2

Linear Regressions for the Prediction of Depression Taking into Account the Effect of the Positive Emotional Regulation

Model	Independent variables	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
1(1)	Constant	4.818	1.908		2.525	.012
	Prospective anxiety	.205	.063	.155	3.232	.001
	Inhibitory anxiety	.850	.089	.458	9.515	<.001
	RPA-total	-.322	.059	-.204	-5.430	<.001
2(2)	Constant	4.435	1.891		2.345	.019
	Prospective anxiety	.233	.063	.175	3.723	<.001
	Inhibitory anxiety	.784	.089	.423	8.796	<.001
	RPA-total	-.311	.059	-.196	-5.315	<.001
	zprospective*zRPA	-.341	.386	-.044	-.884	.377
	zinhibitory*zRPA	-.946	.372	-.128	-2.545	.011

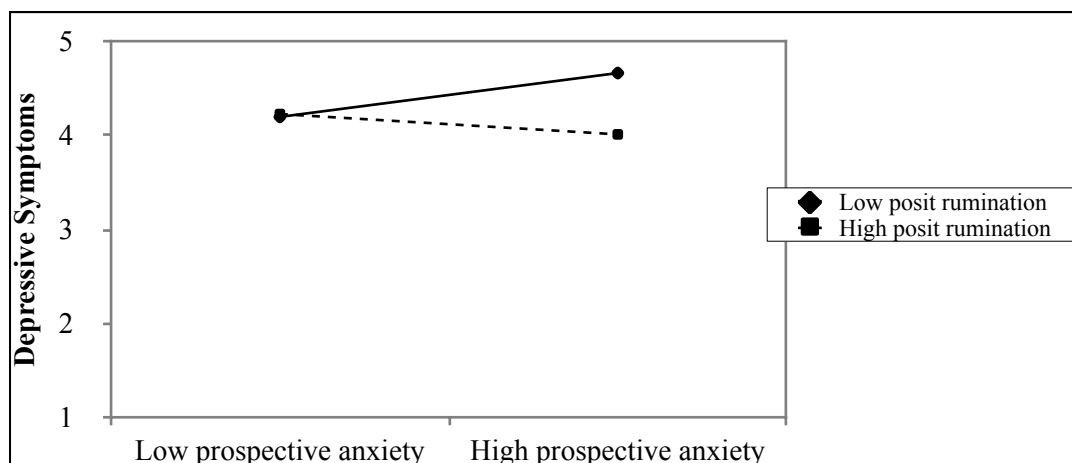


Figure 1

Graphical depiction of the moderation results with Positive Rumination as a moderator with prospective anxiety.

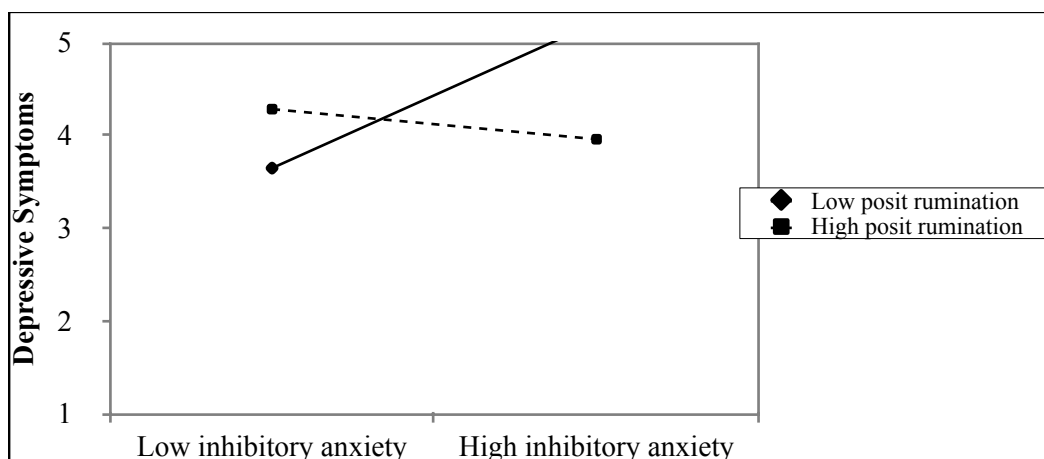


Figure 2

Graphical depiction of the moderation results with Positive Rumination as a moderator with inhibitory anxiety.

The effect of negative emotional regulation on the relationship between depression and Intolerance of Uncertainty

The latest tests study the effect of negative emotional regulation on the relationship between depression and Intolerance of Uncertainty. The total score of the negative emotional regulation results from the addition of the individual scores to the factors "reflection" and "brooding".

The first model in Table 3 is used to predict depression through IU and Negative Emotional Regulation (RRS-total). As can be seen, the model is likely for predicting depression ($F(5,435)=63,446, p<.001$) and even interprets 42.2% of its variability.

The possible significant relationship between negative emotional regulation and IU factors was then studied. As it can be seen, the overall score on the negative emotional regulation

shows a significant positive correlation with both prospective anxiety ($r=.486$, $p<.001$) and inhibitory anxiety ($r=.561$, $p<.001$). Therefore, it is possible that negative emotional regulation acts as a moderator in the relationship between Intolerance of Uncertainty and depression.

Then, the variables that express the interaction of the negative emotional regulation with each of the factors of the Inhibitory of Anxiety were calculated. As it is shown in Table 3, the second model is also important for predicting the dependent variable ($F(5,435)=63,446$, $p<.001$) and even interprets 42.2% of its variability. However, none of the new variables are important for predicting depression. Therefore, negative emotional regulation cannot be a moderator in the relationship between depression and IU.

Table 3

Linear Regressions for the Prediction of Depression Taking into Account the Negative Emotional Regulation.

Model	Independent variables	<i>B</i>	<i>SE</i>	β	<i>t</i>	<i>p</i>
1(1)	Constant	-7.914	1.259		-6.284	<.001
	Prospective anxiety	.180	.065	.135	2.758	.006
	Inhibitory anxiety	.768	.096	.414	7.985	<.001
	RRS-total	.297	.069	.193	4.295	<.001
2(2)	Constant	-7.866	1.257		-6.259	<.001
	Prospective anxiety	.195	.066	.147	2.936	.003
	Inhibitory anxiety	.722	.100	.389	7.192	<.001
	RRS-total	.289	.069	.188	4.176	<.001
	zprospective*zRRS	.076	.395	.009	.191	.848
	zinhibitory*zRRS	.563	.380	.074	1.481	.139

(1) $F(3,437)=103.707$, $p<.001$, $R^2=.416$

(2) $F(5,435)=63.446$, $p<.001$, $R^2=.422$

Discussion

The purpose of this study was to gain a better understanding of the effect of positive and negative emotional regulation on the relationship between Intolerance of Uncertainty and depression. The results support that intolerance of uncertainty is positively associated with depression and this finding is in line with many researchers who suggest that IU constitutes a vulnerability factor for depression (McEvoy & Mahoney, 2012; Toro Tobar et al., 2020; Yook et al., 2010). Moreover, the results provide some useful conclusions about the effect of positive and negative emotional regulation on the relationship between depression and Intolerance of Uncertainty. At first glance, positive emotional regulation is likely to predict depression and even acts as a moderator through "inhibitory anxiety", which was according to hypothesis 1 but on the other hand, negative emotional regulation does not seem to be a moderator in predicting depression through Intolerance of Uncertainty, in contrast to hypothesis 2.

According to the findings of the present research study, overall positive emotional regulation seems to moderate the relationship between one of the factors of IU (inhibitory anxiety) and depression, negatively affecting their relationship and therefore playing a protective role against depression for individuals with high inhibitory anxiety. Inhibitory anxiety predicts avoidance behaviour, which is also a central characteristic of depression. According to Bottesi et al. (2019) and Nekić and Mamić (2019), inhibitory anxiety represents the behavioural dimension of IU (avoidance of situations when faced with uncertainty). Since a close relationship exists between behaviour (avoidance) and emotions (depression), a possible explanation for the moderating role of positive rumination in the relationship between IU and depression could be the breaking of the vicious circle of inactivity and depressive feeling(s).

As a moderator, positive rumination, which is an adaptive coping strategy characterised by a focus on positive personality traits and positive mood (Feldman et al.,

2008), may lead people to more adaptive behaviour (behavioural activation) even when they present with inhibitory anxiety. The latter relates to inactivity in the face of uncertainty (McEvoy & Mahoney 2012), but probably when it is combined with positive emotional regulation the inactivity alternates into action. Behavioural activation focuses on a) planning activities in order to motivate patients to approach activities they avoid and b) analysing the functioning of cognitive processes (e.g., rumination) that function as a form of avoidance (Veale, 2008). In this way, behavioural activation forces individuals to behave more positively, such as increasing daily positive affective experiences and raising the frequency of positive events leading to reduced depressive symptoms. However, overall positive emotional regulation did not seem to moderate the relationship between prospective anxiety (IU), and depression, and that may be because prospective anxiety represents the cognitive dimension of IU (desire for predictability, information seeking) (Bottesi et al., 2019) which are more challenging and complex components and procedures of a disorder to be modified or reduced from just a variable. The aforementioned results may have clinical implications through psychotherapeutic interventions for depression, which may be improved by incorporating adaptive emotion regulation (ER) strategies and enhancing positive emotions, especially in people who score high levels of Intolerance of Uncertainty. Additionally, clinical practitioners should focus on alleviating negative emotions and enhancing positive emotions, especially among the depressive population.

The findings did not confirm hypothesis 2 of the present research study, which was that negative emotional regulation positively moderates the relationship between IU and depression. Although in the present study negative emotional regulation presented significant correlations with IU and depression separately, in accordance with previous studies where it was associated with a higher risk for depression (Ito et al., 2006; Whitmer & Gotlib, 2013), a moderating role of negative emotional regulation in the relationship between IU and depression was not confirmed. This means that the strength of the relationship between IU and depression is not becoming stronger when negative rumination is present. IU is related to worry and refers to future-oriented content with individuals struggling to handle uncertainty about future events. Rumination is a more past-oriented procedure, that is common in depression (Papageorgiou & Wells, 2001) that may progress to future-oriented content over time (McLaughlin, Borkovec, & Sibrava, 2007). Both constitute processes of repetitive negative

thinking known to contribute to psychopathology (Jong-Meyer et al., 2009). The relationship between IU and depression may be explained by the mediation of certainty about negative future outcomes (hopelessness-related cognitions) as suggested by previous research (Miranda et al., 2008). Therefore a possible explanation for the lack of a moderating effect of negative rumination in the relationship between IU and depression in this research study could be that future- but not past-oriented processes are mainly responsible for the pathogenesis of depression when IU is present. Besides, it should be noted that the study was conducted shortly after the outbreak of the COVID-19 pandemic, which led people to high levels of uncertainty about the future (Parlapani et al., 2020). During this period people might have been more worried because of the unresolved health safety goals rather than ruminating about self-identity problems, resulting in high levels of future-oriented rather than past-oriented thinking processes.

Further research should, of course, take into consideration various weaknesses of the present research study. More specifically, there was no investigation of the effect of various demographic factors on the participating undergraduate students, such as socioeconomic level and gender. For example, the socio-economic level has recently been argued to be associated with IU, during the time of the COVID-19 pandemic (Kardaş, 2021; Smith et al., 2020). Additionally, in regards to negative rumination, previous studies have shown that there are significant gender differences, with women having higher levels of negative rumination, compared to men (Burwell & Shirk, 2007; Whitley, 2021) and this might affect the results of this study since most of the individuals were women. Therefore, a future research study should investigate both gender (including more men and other sexes) and socio-economic differences, regarding the possible moderating role of emotional regulation in the relationship between IU and depression. Additionally, the same hypotheses could be tested during a less uncertain and stressful time period regarding health issues (outside Covid -19 period), in order to test if negative rumination affects the relationship between IU and depression, when the reduction of future-oriented worries may lead to increased rumination about past self-identity problems. One must also be cautious that further research is clearly needed among people who have been diagnosed as clinically depressed and not only among a sample of college students. That would be helpful since the clinical sample presents different characteristics such as the use of medication or participation in psychological intervention,

which may affect the results because of their familiarising with e.g. emotional coping strategies. Finally, the cross-sectional research design of the study may limit our capacity to examine the moderating role of negative emotional regulation in the relationship between IU and depression, since the development of high IU and rumination about negative life events may temporarily follow the presence of depressive symptoms (Andersen & Schwartz, 1992). Hence, a future study could benefit from the use of a longitudinal design.

Conclusions

In conclusion, the findings of the present research study suggest a moderating role for positive emotional regulation in the relationship between the inhibitory anxiety component of the IU and depression, though not for the prospective anxiety component. However, no such moderating role was confirmed for negative emotional regulation, regarding the relationship between either the inhibitory or the prospective anxiety components of the IU and depression, despite the fact that negative emotional regulation seems to be uniquely associated with both IU and depression. For this reason, further research is needed to further investigate both the role of positive emotional regulation as a moderator (and more specifically the difference between inhibitory/behavioural and prospective/cognitive components of IU in that moderating function), as well as for the unique association of negative emotional regulation with both IU and depression, including anxiety as a variable as well. Finally, future research could take into consideration the role of emotional regulation in the comorbidity of depression and anxiety disorders, since the prospective component of IU has been found to be associated with such comorbidity by previous studies (McEvoy & Mahoney, 2012). The value of the present study, as well as any further research on this subject, is significant on the grounds of trying to fill a research gap of the moderating role of emotional regulation on the relationship between IU and depression in a population with a high prevalence of depression. For this reason, the finding of positive emotional regulation affecting depression through the inhibitory anxiety component of IU could be a valuable finding in focusing cognitive behavioural therapy interventions on the behavioural–inhibitory component of IU. Further research should provide even more potentially valuable findings with therapeutic applications regarding the moderating role of emotional regulation and its focus.

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