Intolerance of Uncertainty and Social Anxiety: The Possible Mediating Effect of Coping

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Abstract

Social anxiety disorder (SAD) is a prevalent disorder in adolescents. It manifests itself in avoidance of social situations, difficulties forming relationships and an overall increased impairment in social functioning. In adulthood, individuals with SAD report an overall poorer quality of life. Intolerance of uncertainty (IU) and coping strategies have been associated with SAD in recent literature. However, information on this subject is scarce in adolescents. This study investigates the relationship between IU and traits of social anxiety (SA) in adolescents, incorporating age as a moderating variable and adaptive and maladaptive coping strategies as a mediating variable. Data on SA traits, IU and coping strategies was collected within a larger study from a non-clinical sample using questionnaires. This study included 233 participants (M_{age} = 18.6, SD = 3.3) of which 81% were female. Results of this study show a positive relationship between IU and SA traits. This positive relationship weakens with age during adolescence. Additionally, maladaptive coping strategies mediate the relationship between SA and IU, strengthening this relationship. These findings indicate IU, age and coping are important factors to be considered in relation to the development and maintenance of SAD. Future research should continue on this subject to provide additional practical implications for the prevention and treatment of SAD.

Layman's Abstract

Social anxiety disorder (SAD) is a common disorder among young people. SAD can be described as an intense fear of being negatively by others. Because of this fear, people with SAD tend to avoid social situations and experience difficulties in forming relationship with others. In adulthood, this results in a more negative evaluation of life in general. Research in adults has shown that a people who evaluate uncertainty as negative, known as intolerance of uncertainty (IU), can be of influence on an person's level of SAD traits. Additionally, the way a person copes with stress, a coping strategy, is also of influence. Coping strategies can either be adaptive or maladaptive. Adaptive strategies are beneficial to our mental health while maladaptive strategies are linked to mental illnesses. It is still unknown how IU and coping strategies are related to SAD in young people. The aim of this thesis was to study how IU and social anxiety (SA) traits are related to each other and how age and coping affect this relationship. This study included 233 participants with an average age of 18.6 years, 81% being female. Questionnaires were used to collect information. The results show higher levels of IU were linked to higher levels of SA traits. When people age, however, the link between IU and SA traits gets weaker. Furthermore, the influence of IU on the level of SA traits increases when a person also uses maladaptive coping strategies. Overall, the findings of this study show that IU, age and coping are important factors to be considered in relation to SAD. Future research should explore these relationships further in order to contribute to the prevention and treatment of SAD.

Intolerance of Uncertainty and Social Anxiety in Adolescence: The Possible Mediating

Effect of Coping

Social anxiety (SA) is common among adolescents with a prevalence between 8 and 15% (Koyuncu et al., 2019) and is characterized by an intense fear of negative evaluation by others (Kessler et al., 2005; Tak et al., 2020). In recent years, research has focused on understanding and managing SA and SA disorders (SAD). Two key factors in this are intolerance of uncertainty (IU) and coping strategies. IU refers to negative beliefs about uncertainty, leading to emotional and behavioural reactions in uncertain situations (Buhr & Dugas, 2009). High levels of IU have been linked to greater social anxiety (Boelen & Reijntjes, 2009; Carleton et al., 2010; Counsell et al., 2017). Additionally, the way individuals cope with uncertainty can influence the severity of SA in adults with SAD (Li et al., 2020; Yao et al., 2022; Wang et al., 2023). However, research on the relationship between IU and SA traits in adolescence is limited, despite its importance given the onset age for SAD. Furthermore, the role of coping as a mediator in this relationship is still unknown. This study aims to bridge these gaps by investigating the relationship between SA traits, intolerance of uncertainty, and the potential mediating effect of coping strategies.

Adolescence is known for its transition from childhood to adulthood, which is accompanied by many physical, psychological and social changes (Sawyer et al., 2018). Socially, it is a period known for seeking your own identity. Adolescents detach themselves from their caregivers as their focus is shifted to their peers. Adolescents become more self-aware, causing their feelings of insecurity to increase and to become more vulnerable to their peers' social evaluation of them (Tieleman, 2015). The combination of an increase in feelings of insecurity, self-awareness and awareness of others' evaluation, makes it a socially vulnerable period. Consequently, social anxiety (SA) symptoms can arise in this vulnerable period and develop into social anxiety disorder (SAD). Research even states that 90% of the origin of SAD lies in adolescence (Kessler et al., 2005). In literature, social anxiety is defined as an intense fear of being negatively evaluated by others (Tak et al., 2020). The most common worries of people with SAD are appearing anxious, boring or stupid (Stein & Stein, 2008). The intense fear and worries manifest itself in avoidance of social situations, difficulties forming relationships and an overall increased impairment in social functioning (Lochner et al., 2003; Dryman et al., 2016). Because of this, adolescents with SAD are also more likely to fail a grade or even drop out of high school (Van Ameringen et al., 2003; Vilaplana-Perez et al., 2019). In adulthood, people with SAD are more likely to be single and live alone, experience higher rates of unemployment and are reported to have an overall poorer quality of life (Simon et al., 2002; Dryman et al., 2016). SAD has also been stated to be a risk factor for comorbid disorders such as other anxiety disorders, depression and alcohol use disorder (Asher & Aderka, 2018). To decrease the lifetime prevalence of

SAD, treatment is necessary. The most common treatment for SAD is Cognitive Behaviour Therapy (CBT) as research has shown it to be the most effective treatment (Mayo-Wilson et al., 2014). However, Evans et al. (2021) suggest that CBT might not be the optimal treatment for SAD in adolescence. Their systematic review and meta-analysis found that adolescents with SAD, who had gotten CBT treatment, were significantly less likely to recover than adolescents with any other anxiety disorder. The recovery rate for other anxiety disorders was 54% compared to 35% in SAD. It is still unknown why such a large difference in effectiveness of CBT is present in SAD. It does, however, stress the need for further research on this subject to offer more practical implications for clinical practices.

Recent research on SAD has focussed on the role of cognitive factors concerning its development and maintenance. Cognitive factors that have gained considerable attention in relation to SAD are intolerance of uncertainty (IU) and coping strategies. IU is defined as a dispositional characteristic that results in negative beliefs about uncertainty which manifests in a tendency to react negatively on an emotional, cognitive and behavioural level to uncertain situations (Buhr & Dugas, 2009). In social anxiety, it is assumed that IU plays a critical role in its development and maintenance. A logical assumption, as people are faced with insecurities before, during and after social interactions. While research in adolescents seems to be lacking, research in adults has shown that high levels of IU predict more social anxiety symptoms (Boelen & Reijntjes, 2009; Carleton et al., 2010; Counsell et al., 2017). Individuals with a higher IU have the tendency to interpret positive social situations negatively. In a social situation, more attention is paid to negative social cues and in cases of socially ambiguous cues, people with high IU are far more likely to interpret them negatively. Consequently, this negative interpretation bias causes people with high IU to more often appraise a social interaction as negative, while people with low IU might appraise the same interaction as positive. The negative interpretation bias that comes with high IU impedes the social learning processes which facilitates the development and maintenance of social anxiety symptoms (Nishikawa et al., 2022; Pepperdine et al., 2018). Additionally, IU has also been found to influence an individual's use of coping strategies. Coping is often defined as a mechanism consisting of behavioural and cognitive aspects to manage and reduce the impact of internal and external threats (Lazaurs & Folkman, 1984). As individuals with high IU are more likely to experience discomfort and distress in uncertain social situations, they try to reduce these feelings quickly by coping with the situation in a certain way. Individuals with high IU often choose to cope in a way that provides relief of distress in the short term, but perpetuate the feelings of distress and anxiety in the long term (Rettie & Daniels, 2021). These types of coping strategies are labelled maladaptive strategies. Research shows that individuals with SAD and high IU are both more likely to adopt maladaptive coping strategies as a means to quickly reduce feelings of uncertainty instead of adaptive coping strategies (Tomisato et al.,

2022; Kocovski et al., 2005). Coping strategies that are labelled as maladaptive are rumination, catastrophizing, self-blame and blaming others. These maladaptive strategies are characterised by the fact that they are non-active ways of coping and do not involve any conscious action directed to reducing the source of the distress. Rumination is described as a way of responding to distress that involves repetitively thinking about the distress, its possible causes and consequences (Nolen-Hoeksema, 1991). Research has found in preadolescents and adults that individuals with SAD are more likely to ruminate and catastrophize when faced with socially stressful situations compared to individuals without SAD (Kocovski et al., 2005; Legerstee et al., 2009; Rodríguez-Menchón et al., 2021). Rumination and catastrophizing can be seen before (anticipatory rumination) or after (post-event rumination) a socially stressful situation. According to Vassilopoulos (2004, 2008), adolescents and adults with SAD have been found to engage in elevated levels of both types of rumination compared to non-SAD individuals. Additionally, Li et al. (202) found rumination to have a mediating role in the relationship between IU and SAD, strengthening the association between IU and SAD. Other maladaptive coping strategies are self-blame and other blame. In these strategies negative events are attributed to oneself or others (Feliu-Soler et al., 2017). Self-blame has repeatedly been proven to be a frequently used coping strategy by adolescents and adults with SAD (Garnefski et al., 2001; Garnefski et al., 2002; Martin & Dahlen, 2005). Finally, even though other blame has been identified as a maladaptive strategy as it has been related to poorer emotional well-being, in the case of social anxiety, other-blame is usually not found to be more elevated or decreased in individuals with SAD (Garnefski et al., 2001).

Coping strategies can also be adaptive. Adaptive coping is known to have a beneficial effect on mental health, whereas maladaptive coping is more associated with psychopathology, like SAD (Valenas & Szentagotai-Tatar, 2015; Aldao & Nolen-Hoeksema, 2012). Among the adaptive strategies are problem solving, acceptance, cognitive restructuring and positive reappraisal. Problem-solving responses involve conscious actions to change the situation that decrease or eliminate the stressor (Billings & Moos, 1981). This can include actions like planning or brainstorming about possible solutions. The problem-solving strategy has been associated with decreased social anxiety levels in adults and adolescents (Romano et al., 2019; Sackl-Pammer et al., 2019). Cognitive restructuring and positive reappraisal have also been associated with decreased social anxiety in adults. Cognitive restructuring refers to reframing unrealistic negative thoughts whereas positive reappraisal refers to reframing realistic negative thoughts (Nowlan et al., 2015). Both can be seen as conscious efforts to change the way a situation is interpreted. Lastly, acceptance of the situation and emotions related to the situation have been found to decrease levels of social anxiety in late adolescents and adults (Campbell-Sills et al., 2006).

The fact that the use maladaptive coping is associated with higher IU and high levels of SA, while the use of adaptive coping strategies is associated with lower IU and lower levels of SA, raises the question of how coping strategies might affect the relationship between IU and SA. Wang et al. (2023) found both adaptive and maladaptive coping to mediate the relationship between IU and SAD. Adaptive coping was associated with having a negative impact on anxiety levels, while maladaptive coping positively affected anxiety levels. Yao et al. (2022) also found maladaptive coping to positively influence anxiety levels. However, the latter study has only focussed on anxiety in general, not SA specifically. Apart from these studies, the mediating effect of coping in the relationship between IU and SA specifically, remains relatively unknown.

The Present Study

The purpose of the present study is to gain a better understanding of the relationship between social anxiety and intolerance of uncertainty in adolescence, the effect of age and the possible mediating effect of coping. As social anxiety influences a considerable number of the population, it is important to fill the current gap in literature and increase our understanding of its' development. Exploring the relationship between IU and SAD could provide implications for prevention, early diagnosis, and treatment of social anxiety disorder. Consequently, it could possibly lead to a decrease in the lifetime prevalence of SAD, reduce long-term socio-economic effects associated with SAD and help improve quality of life. From this point on, this study will refer to SA traits instead of SAD due to the fact that this study focusses on SA traits in the general population, without a clinical diagnosis. The following hypotheses are tested in this study. 1. It is expected that the relationship between IU and SA traits will be positive. 2. As the effect of age on the relationship between IU and SA traits is unknown in adolescence, there are no specific directional hypotheses in this study regarding the relation between IU and SA traits. This relation will be explored. 3. Furthermore, it is expected that coping will have a mediating effect in the relationship between IU and SA traits. Specifically, adaptive coping is expected to weaken the relationship, whereas maladaptive coping is expected to have a strengthening effect on the relationship. Figure 1 gives a visual representation of the hypotheses.

Figure 1

A Visual Representation of the Hypotheses
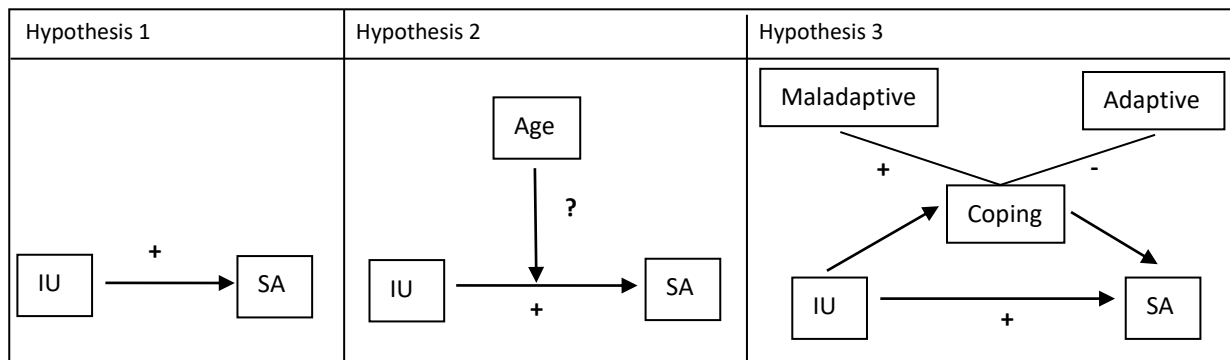
Note. SA = Social Anxiety, IU = Intolerance of Uncertainty.

Method

Procedure and participants

This research uses data that has been collected for a larger study by Leiden University between 2018 and 2021. The Research Ethics Committee Psychology of Leiden University had approved this larger study (CEP19-1101-533; CEP19-1101-534). The larger study aimed to investigate social learning processes on a spectrum of trait social anxiety in adolescence. In total 255 adolescents participated in this study. Of these participants, 22 did not fully complete their participation in the study. This resulted in a definitive 233 respondents for this study. The participants at the time were aged between 12 and 26 years (M= 18.6; SD= 3.3), 186 were female and 47 were male.

Measures

Data on social anxiety, intolerance of uncertainty and coping was collected by the larger study with the use of questionnaires. Social anxiety symptoms were measured using two different questionnaires. Respondents aged 18 or higher filled out the Dutch translation of the Liebowitz Social Anxiety Scale (LSAS). The questionnaire, developed by Liebowitz (1987), is clinically used to measure the degree of social fear and avoidance. The questionnaire consists of 24 items, each representing a social situation. Participants were asked how anxious or fearful they felt in that situation and how often they avoided that situation. Participants did this using two four-point Likert scales, one scale to measure fear (0= none, 1= mild, 2= moderate, 3= severe) and another one to measure avoidance (0= never, 1= occasionally, 2=often, 3= usually). All item scores add up to a total social anxiety score. A total score lower than 10 indicates no social anxiety symptoms. A cut of score of 50 is used to indicate moderate to severe symptoms of social anxiety. The psychometric properties of the Dutch version of the LSAS are unknown. The original LSAS version has been found to be a reliable and valid instrument based on test-retest reliability, internal consistency, and convergent and discriminant

validity (Baker et al., 2001; Heimberg et al., 1999). Respondents aged under 18 filled out the Social Anxiety Scale for Adolescents (SAS-A; La Greca & Lopez, 1998). The SAS-A consist of 18 items of self-statements and 4 filler items. Items were rated on a five-point Likert scale, ranging from 1 to 5 (1=not at all, 5 = all the time). The questionnaire has three subscales: Fear of negative evaluation (FNE), social avoidance and stress in new situations (SAD-NEW) and social avoidance and distress -general (SAD-General). SAS-A was found to be a reliable and valid instrument (La Greca et al., 2014).

Intolerance of Uncertainty was measured using the Intolerance of Uncertainty Scale-12 (IUS-12). The IUS-12 is a shortened version of the Intolerance of Uncertainty Scale (IUS). The IUS, developed by Freeston et al. (1994), assesses the emotional, cognitive, and behavioural reactions to uncertain situations, implications of being uncertain and attempts to control the future using 27 items. The IUS-12 is a shortened version of the IUS and consists of 12 items. Participants rated each item on a five-point Likert scale (range 1= 'not at all characteristic of me' to 5= 'Entirely characteristic of me'). A total score was calculated ranging from 12 to 60. A higher score indicates less tolerance of uncertainty. The psychometric properties of the IUS-12 are good. The original English version of the IUS-12 has generally been found to have good internal consistency, good test-retest reliability, and good construct validity (Wilson et al., 2020; Carleton et al., 2007). The psychometric properties of the Dutch version are scarce. However, Dekkers et al. (2017) researched its' psychometric properties in a non-clinical sample and found good internal consistency (α= .850) and convergent validity.

Coping was measured for both age groups using the short version of the Cognitive Emotion Regulation Questionnaire (CERQ-s; Garnefski & Kraaij, 2006). The CERQ-s is a questionnaire consisting of 18 items regarding cognitions after experiencing a negative event or situation. The questionnaire distinguishes nine scales, each reflecting a different cognitive coping strategy. Four of the nine scales are seen as maladaptive and have been related to symptoms of psychopathology, namely rumination, catastrophizing, blaming yourself and blaming others. The other scales, acceptance, refocussing on more positive things, focus on planning, positive reappraisal and changing perspective, are considered adaptive and healthy coping (Thompson et al., 2010). Each scale consists of two items. Each item provides a thought a person might have in a situation. The participants are asked to answer if this applies to them using a five-point Likert scale (range 1= 'never' to 5='(almost) always'). A total score is calculated for each scale by adding the points given. A higher score on a scale indicates more frequent use of that specific coping strategy. Psychometric properties of the CERQ-s are overall sufficient with good reliability and validity measured (Garnefski & Kraaij, 2006).

Statistical Analyses

The first hypothesis states it is expected that the relationship between IU and SA traits will be positive. This will be explored using a simple regression analysis. Before conducting the analyses, I

will test if the data complies with the assumptions of regression analyses. First of all, data should be distributed normally. This will be checked using a normal Q-Q plot. The data circles will have to follow the normality line for this assumption to be met. Second, the data needs to be homoscedastic. A scatterplot will show if this assumption is met. The data points should not show an obvious pattern. If the assumptions of normality and homoscedasticity are met, linearity can also be assumed. When all assumptions have been tested, the simple regression analyses can be computed. The correlation coefficient r will show the correlation between IU and SA traits. The reported R^2 will indicate the variance in SA traits that is explained by IU. The regression model tested will be considered significant at $p < .05$. A positive relationship between IU and SA traits is proven when B is a positive value and p < .05.

The second hypothesis, which explores the moderating effect of age on the relationship between IU and SA traits (see figure 1), will be explored with the use of regression analysis. The data will show the interaction effect of IU and age on SA traits. Age can be judged a moderator when this effect is significant $p < .05$. The assumptions of linearity, normality, homoscedasticity, absence of multicollinearity and uncorrelatedness of residuals will be tested. This will be done using a scatterplot and a Q-Q plot similar to above. In addition, VIF-values and the Durbin-Watson statistic will be assessed. VIF-values should be below 10 for multicollinearity to be absent. The Durbin-Watson statistic should have a value above one and below 3 for unrelatedness of residuals.

The third hypothesis, which assumes coping to be a mediator in the relationship between IU and SA traits, will be tested using a mediation analysis with the use of the SPSS Process Macro Extension. The assumptions will be assessed similar to those described at hypothesis 2. The mediation analysis will be performed at least two times. First, adaptive coping will be tested as a mediator in the relationship between IU and SA. The second analysis, maladaptive is inserted as a mediator. Before these analyses are computed, explorative factor analysis will be used to assess if the scales can be grouped in 'maladaptive' and 'adaptive' or if the mediation analysis needs to be computed for each scale individually. Factor analysis will be computed if KMO value is higher than 0.6 and Barlett's test reports p < .05. Mediation analyses will show what part of the relationship between IU and SA traits can be explained by the mediators.

The mediation analyses provide data on the total effect of IU on SA traits without a mediator present (1), the effect of IU on SA traits when the mediator is added to the model but is kept constant, the direct effect (2) and the indirect effect of IU on SA, which is the effect of IU on SA through the mediators (3). Figure 2 visualizes this process. The indirect effects show what part of the relationship between IU and SA traits can be explained by the mediators. The Bootstrapped Confidence Interval (BCI) is provided by the Process Macro extension of SPSS instead of a p-value and will indicate the

significance of the indirect effect (indirect a * indirect effect b). When the BCI does not include the value 0, it indicates that the indirect effect is significant. In this case the hypothesis will be accepted.

Figure 2

A Visual of the Provided Data by the Mediation Analysis
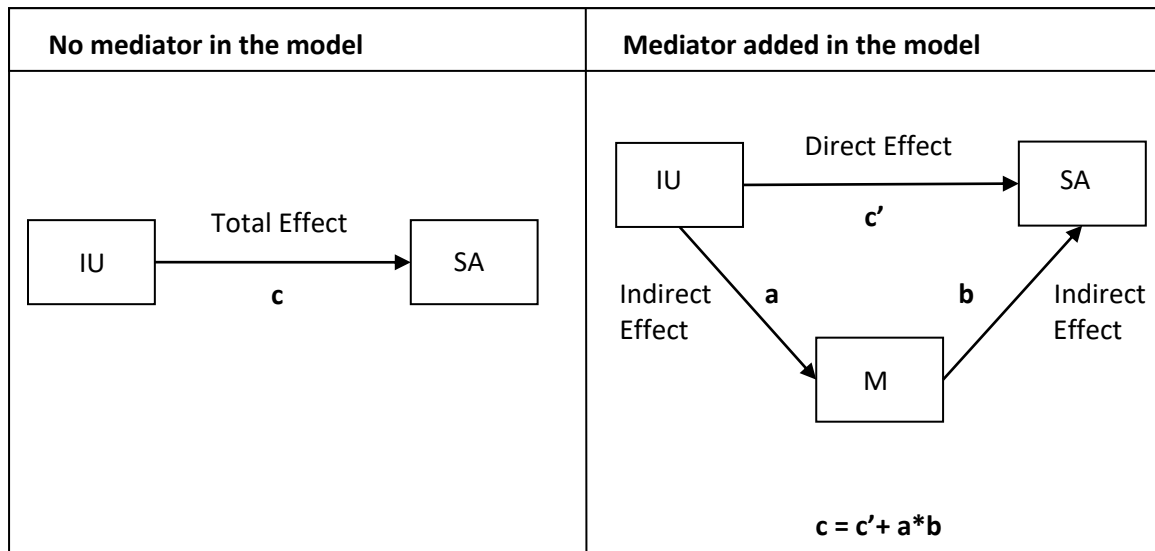
Note. SA = Social Anxiety, IU = Intolerance of Uncertainty, M = Mediator (which is either adaptive or maladaptive coping strategies). a = Indirect Effect 1, b = Indirect Effect 2, c' = Direct Effect, c = Total Effect.

Results

The mean age of the sample was 18.54 (SD = 3.33). Additionally, 81% of the sample was female (188) and 19% male (45). Table 1 reports the descriptive statistics of all research variables. SA, ranging from 0 to 3, is reported to be 0.94 in this sample. Secondly, IU is reported to be 2.67, with a range between 1 and 5. Maladaptive and adaptive coping strategies scores range from 2 to 10. All variable means are relatively low, which can be expected in a non-clinical sample. The Cronbach's Alpha of all scales indicate an acceptable to good internal consistency (Table 1).

Table 1

Mean, Standard Deviations and Cronbach's Alpha for All Variables (N=233)

	SA	IU	Maladaptive coping strategies	Adaptive coping strategies
Mean	0.94	2.67	4.98	6.50
SD	0.49	0.68	1.27	1.30
α	0.87*/ 0.94**	0.85	0.75	0.76

Note. SA = Social Anxiety traits, IU = Intolerance of Uncertainty

* Cronbach's Alpha of SAS-A

** Cronbach's Alpha of LSAS

Intolerance of uncertainty and social anxiety traits

A simple regression analysis was used to test the hypothesis that IU was positively correlated with SA traits. Preliminary analyses were conducted to test the assumptions of normality, homoscedasticity and linearity and found no violations. IU scores explain 11.2% of variation in SA trait levels, $R^2 = .112$, $F(1, 231) = 29.189$, $p < .001$. IU is positively associated with SA trait levels (B = .241, $p < .001$).

The moderating effect of age

To explore the moderating effect of age in the relationship between IU and SA traits, a moderation analysis has been conducted. Preliminary analyses supported the assumptions of linearity, normality and homoscedasticity. Additionally, multicollinearity was absent and residuals proved to be uncorrelated (Age, VIF = 1.011; IU, VIF = 1.011; Durbin-Watson value = 1.652).

Moderation analyses shows about 13% of SA trait variation can be explained by IU and age ($R^2 = 0.129$). The model shows a significant positive effect of IU on SA (B = .251, p< .001). The effect of the interaction between IU and age on SA traits is negative and significant (B = -.074, p = .035).

Factor analysis of coping scales

Factor analysis is computed before the mediation analyses. KMO and Barlett's test show we can proceed with the exploratory factor analysis (KMO = .671; Barlett = p < .001). Table 2 shows that, in case of the coping scales, 3 main component can be distinguished. These 3 components together explain 60,2% of the variance. A visual representation (Figure 2) shows the first two components are much stronger than the third.

Table 2

Variance explained by components

Components	Total variance explained	% of variance explained	Cumulative %
1	2.238	24.865	24.865
2	2.079	23.098	47.963
3	1.100	12.226	60.189

Note. Components with a lower 'total variance explained' value than 1 are omitted from this table as they indicate no significant amount of variance is explained by those components.

Figure 2

Visual Representation of the Explained Variance of Each Component
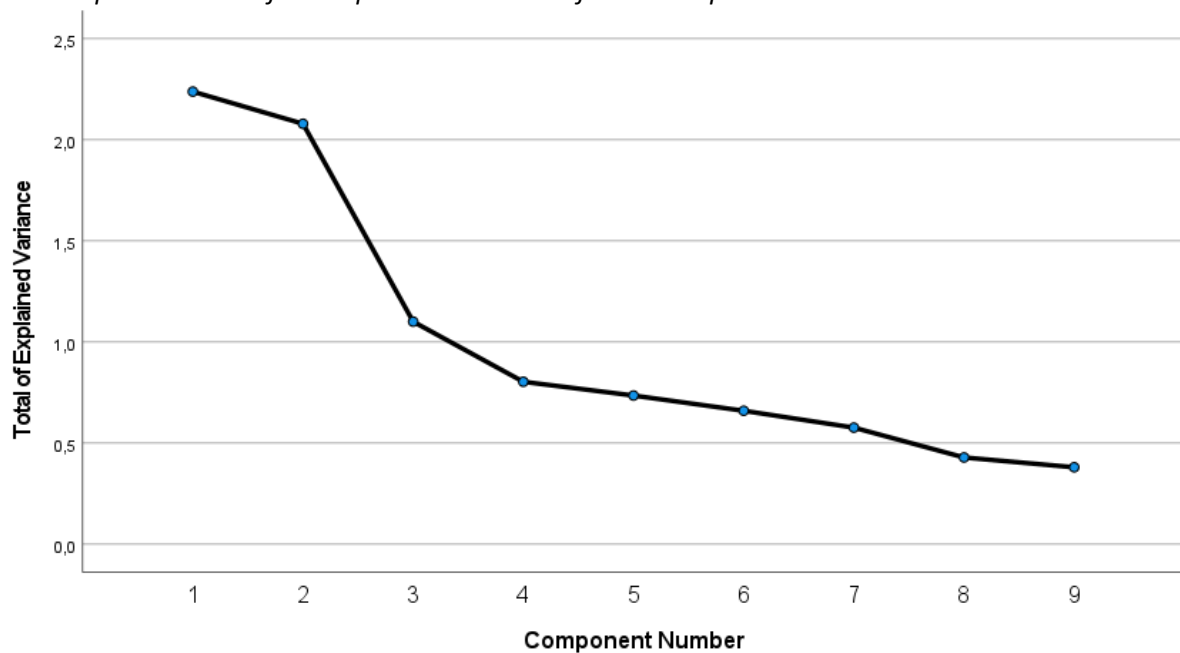
When revising the pattern matrix (Table 3), it is seen that the coping scale 'blaming others' only loads on component 3, while all others mainly load on component 1 and 2. This indicates that the scale 'blaming others' measures something differently than the other maladaptive coping strategies. The factor analysis is computed again, this time the number of components is fixed on 2 (Table 4).

Table 3

Pattern matrix with 3 Components

Coping strategies	Components		
	1	2	3
Acceptance		.690	
Refocussing on Positive Things	.666		
Positive Reappraisal		.751	
Changing Perspective		.552	-.315
Focus on Planning		.814	
Self-blame	-.690		-.341
Rumination	-.760		
Catastrophizing	-.742		
Blaming Others			.880

Table 4

Pattern Matrix with 2 Components

Coping strategies	Components	
	1	2
Acceptance	.673	
Refocussing on Positive Things	.300	-.603
Positive Reappraisal	.770	
Changing Perspective	.570	
Focus on Planning	.807	
Self-blame		.598
Rumination		.806
Catastrophizing		.784
Blaming Others		

The new pattern matrix shows that the adaptive coping scales 'acceptance', 'refocussing', 'planning', 'reappraisal' and 'perspective taking' all load positively on component 1. This indicates that these

strategies all measure the same construct, in this case, adaptive coping. It can also be seen that the maladaptive coping scales 'self-blame', 'rumination' and 'catastrophizing' load positively on component 2, measuring the construct of maladaptive coping. Additionally, one adaptive coping scale, specifically 'refocussing', also loads negatively on component 2. However, this can be explained by the fact that the use of the strategy of refocussing rules out the use of maladaptive coping styles as it is impossible for someone to ruminate on a subject, while simultaneously refocus on other things. The factor analysis shows a clear pattern of adaptive versus maladaptive components. Notably, the maladaptive scale 'blaming others' does not load on both component 1 and 2. Therefore, a mediation analysis will be done three times. The mediation analysis is conducted with adaptive coping, maladaptive coping and 'blaming others' separately.

Mediation analysis of adaptive coping

Regression analyses without adaptive coping strategies as a mediator indicates that the total effect of IU on SA is B = .241, p < .001. When adaptive coping strategies is added as a mediator in the model, a negative association is seen between IU and the use of adaptive coping strategies (B = -.301, p = .017, indirect effect a). Furthermore, the analysis show that adaptive coping strategies also have a negative association with SA traits (B = -.046, p =.048, indirect effect b). Lastly, the mediation model shows that the direct effect of IU on SA traits, the effect when the use of adaptive coping strategies remains unchanged, is B = .227, p < .001. The mediator explains .014 (indirect effect a * indirect effect b) of the total effect of .241 which is not significant as the bootstrapped confidence interval contains the value 0 (-.0011 through .0374). This indicates no mediation effect of adaptive coping strategies in the relationship between IU and SA. Figure 4 provides a visualization of these results.

Figure 4

Visualization of the Mediation Results with Adaptive Coping As a Mediator
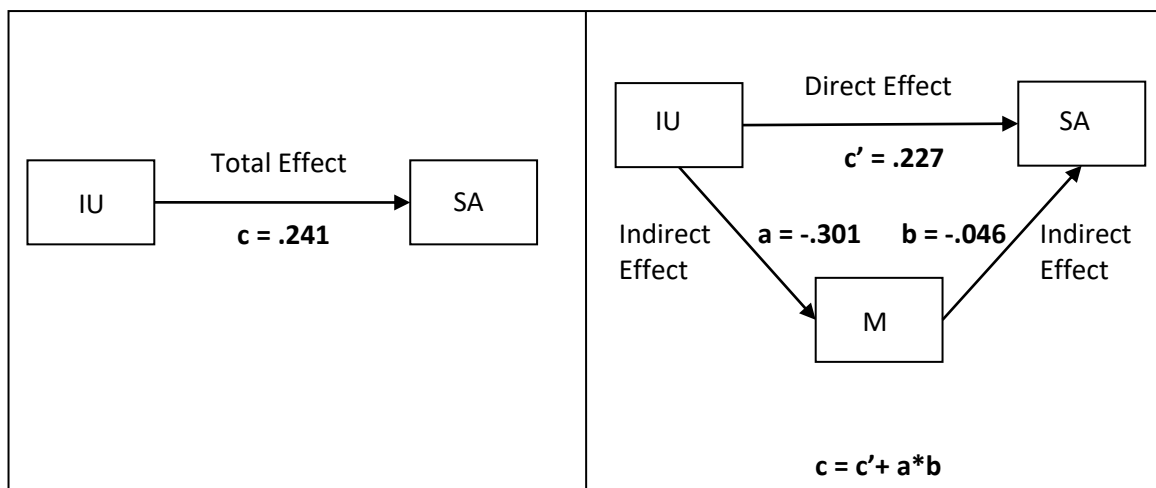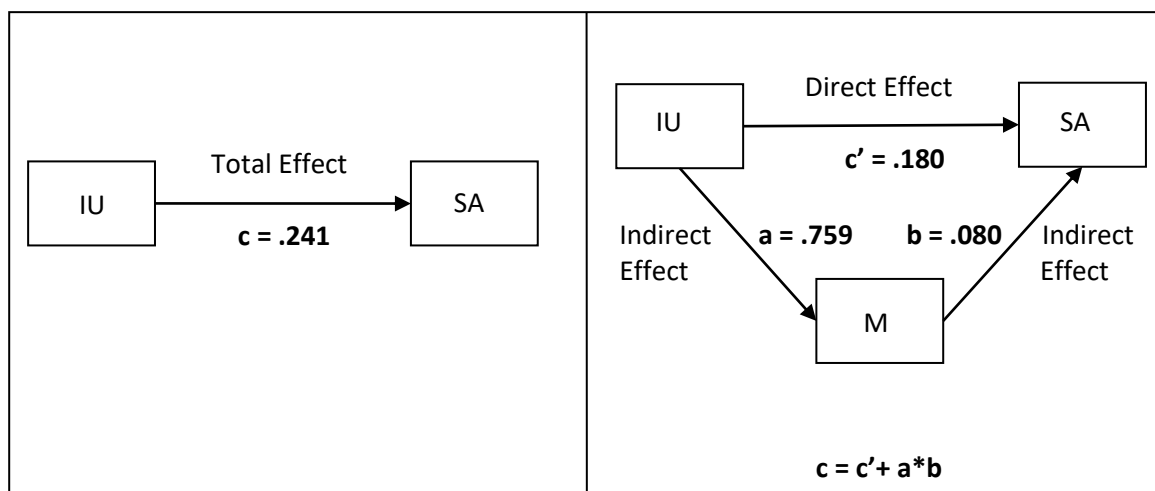

   Note. SA = Social Anxiety, IU = Intolerance of Uncertainty, M = Adaptive Coping Strategies
   (Mediator). a = Indirect Effect 1, b = Indirect Effect 2, c' = Direct Effect, c = Total Effect.

Mediation analysis of maladaptive coping

Regression analyses without maladaptive coping strategies as a mediator indicates that the total effect of IU on SA is B = .241, p < .001. When maladaptive coping strategies is added as a mediator in the model, a positive association is seen between IU and the use of maladaptive coping strategies (B = .759, p < .001, indirect effect a). Furthermore, the analysis show that maladaptive coping strategies also have a positive association with SA (B = .080, p < .001, indirect effect b). Lastly, the mediation model shows that the direct effect of IU on SA, meaning the effect when the use of maladaptive coping strategies remains unchanged, is B = .180, p < .001. The mediator explains .061 (indirect effect a * indirect effect b) of the total effect of .241 which is significant as the bootstrapped confidence interval does not contain the value 0 (.0249 through .1055). This indicates that maladaptive coping strategies have a mediating effect on the relationship between IU and SA. Figure 5 provides a visualization of these results.

Figure 5

Visualization of the Mediation Results with Maladaptive Coping As a Mediator

Note. SA = Social Anxiety, IU = Intolerance of Uncertainty, M = Maladaptive Coping Strategies
(Mediator). a = Indirect Effect 1, b = Indirect Effect 2, c' = Direct Effect, c = Total Effect.

Mediation analysis of 'blaming others'

Regression analyses without 'blaming others' as a mediator indicates that the total effect of IU on SA is B = .241, p < .001. When the coping strategy 'blaming others' is added as a mediator in the model, a positive association is seen between IU and the use of adaptive coping strategies (B = .116, p < .115, indirect effect a). Furthermore, the analysis shows that maladaptive coping strategies also have a

positive association with SA (B = .015, p < .706, indirect effect b). Lastly, the mediation model shows that the direct effect of IU on SA, meaning the effect when the use of maladaptive coping strategies remains unchanged, is B = .239, p < .001. The mediator explains .0018 of the total effect of .241 which is not significant as the bootstrapped confidence interval contains the value 0 (-.0098 through .0145). This indicates that the coping strategy 'blaming others' does not have a mediating effect on the relationship between IU and SA.

Discussion

Social Anxiety Disorder is reported to have 90% of its origin in adolescence (Kessler et al., 2005). This highlights the need for prevention and early intervention in this developmental period. Cognitive factors that have gained considerable attention in relation to SAD are intolerance of uncertainty and coping strategies. Current research on the subject has mainly been focussed on adults. Additionally, a gap in current literature exists concerning the influence of coping as a mediator in relation to social anxiety traits. Therefore, this study aimed to investigate the relationship between social anxiety traits and intolerance of uncertainty in adolescence, the effect of age in this relationship and the possible mediating effect of coping.

Firstly, it was expected that the relationship between IU and SA traits would be positive, indicating that higher levels of IU would lead to more SA traits. The results of this study are in line with our expectations. Earlier research has established this relationship in adult samples or in other anxiety disorders (Boelen & Reijntjes, 2009; Carleton et al., 2010; Counsell et al., 2017). This study is one of the first that provides evidence that IU and SA traits specifically, are also positively related in adolescents. This positive relationship being found not only in adults but also in adolescence can be explained due to the fact that many aspects of IU, such as the ability to think of different outcomes of a social situation, have largely been established in adolescence. This makes adolescents gradually more aware of the fact that social situations can have multiple outcomes, including negative ones. Consequently, this makes the uncertainty of social situations visible to them and appeals to their tolerance of such uncertainties. Our findings implicate that IU should be considered an important factor in treatment of SAD in adolescents. This implication is also in line with recent developments in literature. Herbert & Dugas (2019) have already developed a cognitive behavioural model aimed at IU in relation to generalized anxiety disorder (GAD), with which treatment can be focussed on aspects of IU specifically. The results of this study suggest that such treatment, aimed specifically at IU, might have significant effects in the treatment of SAD as well.

Secondly, this study explored the effect of age in the relationship between IU and SA traits without expectations. A significant negative effect of age on the relationship between IU and SA was found. This indicates that the association between IU and SA traits decreases during adolescence. A

possible explanation for these results could be because SA traits are already very prominent in early adolescence. Stein (2006) found that in 90% of SAD patients, SAD had onset by the age 23. However, in 50% of these SAD patients, SAD has already onset by the age of 13. Suggesting SA traits are already prominent in early adolescence. Additionally, a study of Ma et al. (2022) found adolescents to become more tolerant of uncertainty with age. Indicating that IU might be also already prominent in early adolescence as well. The results implicate that early prevention and treatment could be important in minimalizing SA traits. Furthermore, the results suggest that incorporating IU in SAD treatment may be specifically important in early adolescence.

Lastly, it was expected that adaptive coping strategies were to weaken the relationship between IU and SA traits and maladaptive coping strategies were expected to strengthen this relationship. Results show that adaptive coping did not mediate the relationship between IU and SA traits. Nonetheless, the use of adaptive coping strategies were found to be associated with lower IU and SA traits. The latter was expected as it is consistent with earlier findings. Studies (Campbell-Sills et al., 2006; Romano et al., 2019; Sackl-Pammer et al., 2019, Wang et al., 2023) repeatedly show that the use of adaptive coping strategies helps reduce stress in uncertain situations and has a negative impact on the level SA traits. Furthermore, it was not expected that adaptive coping strategies would not be identified as a mediator in this study. It is unclear if this unexpected result can be attributed to limitations in this study or if the expectation was wrong due to the scarcity of literature on the subject the expectation was based on. When comparing this study to others, it stands out that the study sample of Yao et al. (2022) consisted of a much larger sample with a higher level of anxiety traits in a non-clinical sample. It is possible our sample showed too little SA traits for adaptive coping to mediate the relationship between IU and SA traits. Additionally, this study's sample contains a definite gender skewness of men (19%) versus women (81%). Research (Al-Bahrani et al., 2013; Matud, 2004) suggests there are gender differences in coping strategies in which women tend to use more maladaptive coping strategies than men. It is possible that due to the over-representativity of women in this study, less use of adaptive coping strategies was reported, making the mediating effect of adaptive coping strategies not visible.

Coming back to our hypothesis, maladaptive coping strategies did mediate the relationship between IU and SA traits, having a strengthening effect. Due to results of the factor analysis concerning the maladaptive coping strategies, the mediation analysis of 'blaming others' was done separately and found no mediating effect. These results are as expected, as the maladaptive coping strategy 'blaming others' has not been found to be more elevated or decreased in individuals with SAD in earlier research (Garnefski et al., 2001). In contrast, the other maladaptive coping strategies do contribute to elevated levels of SA traits (Garnefski et al., 2001; Garnefski et al., 2002; Kocovski et al., 2005; Legerstee et al., 2009; Martin & Dahlen, 2005; Rodríguez-Menchón et al., 2021), which is

supported by this study. Maladaptive coping strategies are positively related to IU and SA traits and also mediate this relationship. Whereas adaptive coping strategies are negatively related to IU and SA traits and have not been found to mediate this relationship. Our findings indicate that coping with IU, using maladaptive coping strategies, significantly increases the level of SA traits while the opposite effect of adaptive coping does not seem to make a significant difference. Implicating that actively working on decreasing the use of maladaptive coping strategies could reduce the level of SA traits. In clinical aspects this inclines an incorporation of coping strategies in prevention and treatment programs. For example, screenings on maladaptive coping strategies and educative practices for parents and school staff to help reduce the use of maladaptive coping strategies in adolescents.

Strengths and Limitations

This study has several strengths. Firstly, this study contributes to current literature on the relationship between IU and SA, being one of the first to include both adaptive and maladaptive coping strategies as mediators in this relationship. This adds to a greater understanding of the development of SAD and the important role of IU and coping in this. Secondly, this study has used a sample that varied more widely within adolescence than earlier research. Additionally, this offered the opportunity to explore the effects of age in the relationship between IU and SA within adolescence. By exploring this, this study has added new implications on the importance of age in prevention and treatment of social anxiety. Lastly, all questionnaires used in this study have continuously been deemed reliable and valid measurements. This ensures that the data of this study is solid an easily replicable.

Naturally, this study also has its limitations. Since the sample is relatively small in comparison to the 1049 participants in the study of Yao et al. (2022), the representativeness of the results can be questioned. Furthermore, males are underrepresented in this sample, making up less than a fifth of the total respondents in this study. The sample being non-clinical and reporting relatively low SA traits also adds to question the representativeness of the results. Secondly, all instruments in this study are self-report questionnaires. While self-report measurements are a quick and cost-effective way of collecting data, it also comes with some risks. Participants are expected to report on their own thoughts and behaviour. This requires a certain level of self-reflection. It can be questioned to what extent this sample was able to do that. Research shows that self-reflection is a skill that is still developing in adolescence (White et al., 2015). Thirdly, the data used in this study was collected as part of a larger study. This larger study also asked participants to undergo in-person examinations in the research lab. People with higher SA traits would be less willing to participate in this as it requires them to engage in (uncertain) social situations. Therefore, the sample of this study might have

presented lower SA traits than can be expected in a non-clinical sample. Lastly, two different questionnaires have been used in this study due to wide age variety in our sample. Different questionnaires had to be used for ages under and above eighteen. In order to correctly perform the statistical analyses, the Likert-scale of the SAS-A had to be adjusted to a 3-point scale. This could have influenced the accuracy of the results. The accuracy would most likely improve if one questionnaire would be used for all adolescent ages or if both questionnaires used would consist of the same Likert-scales. For example, the self-report questionnaire the Multidimensional Anxiety Scale for Children (MASC) (March, 1997), which consists of a four-point Likert-scale like the LSAS and measures SA in adolescents aged under 18.

Future Directions

The outcomes of this study have some important implications for future research. First off, more research about the relationship between IU and SA is needed in order to give practical implications for clinical practices. It is advised to examine this relationship further with the use of a larger and clinical sample to confirm the findings of this study. Investigating the moderating role of age and the mediating role of coping in this relationship is also recommended. Especially since the role of adaptive coping strategies in the relationship between IU and SAD remains relatively unknown. Moreover, research investigating each coping strategy separately in relation to IU and SA, might provide more specific insights in which coping strategies are most important in relation to the development and maintenance of SAD. Furthermore, in depth research of IU could lead to information on how to influence SA traits through IU. Studies could investigate determining factors of IU levels in adolescence and the age at which IU is most impressionable. This could provide additional guidelines for effective interventions and treatments, and indicate at what age this would be most effective.

Conclusion

The aim of this study was to investigate the relationship between IU and SA in adolescents, the moderating role of age and the mediating role of coping in this relationship. This study found IU to positively affect the level of SA traits. This relationship was found to weaken with age. Maladaptive coping strategies, excluding the strategy 'Blaming Others', were found to mediate the relationship between IU and SA traits. The use of maladaptive coping strategies seems to indirectly elevate SA trait levels. These findings implicate that IU should be considered an important factor in treatment of SAD in adolescents. Early prevention and treatment aimed at lowering IU may be vital in minimalizing SA traits. Adding to this, decreasing the use of maladaptive coping strategies could contribute to a reduction of SA traits. Future research investigating the relationship between IU and SA, including

age and coping, is recommended with the use of a larger, clinical sample. Additionally, more in depth research in the construct of IU could provide new implications for effective interventions and treatments in SAD. In conclusion, the findings of this study show a definite relationship between IU and SA traits, and shows that investigating age and coping strategies in this relationship contributes to a better understanding of the development and maintenance of SAD. Hopefully, research on this subject continues in order to provide more practical implications.

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