

<http://revped.ise.ro>

Print ISSN 0034-8678; Online ISSN: 2559 - 639X

THE RELATIONSHIP BETWEEN STATE ANXIETY, SOCIAL ANXIETY AND COGNITIVE BIASES IN STUDENTS: A MEDIATION MODEL

Relația dintre anxietatea ca stare, anxietatea socială și distorsiunile cognitive în rândul studenților: un model de mediere

Alina C. CHIVU, Teodora VLAD

Journal of Pedagogy, 2023 (2), 121 - 139

<https://doi.org/10.26755/RevPed/2023.2/121>

The online version of this article can be found at: <https://revped.ise.ro/category/2023/>



This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.
To view a copy of this license, visit <http://creativecommons.org/licenses/by-nc-sa/4.0/> or send a letter to Creative Commons, PO Box 1866, Mountain View, CA 94042, USA.

Published by:

**CENTRUL NAȚIONAL DE POLITICI ȘI EVALUARE ÎN EDUCAȚIE
UNITATEA DE CERCETARE ÎN EDUCAȚIE**

<http://www.ise.ro/>
<https://rocnee.eu/>

Further information about *Revista de Pedagogie* – *Journal of Pedagogy* can be found at:
Editorial Policy: <http://revped.ise.ro/editorial-policy/>

THE RELATIONSHIP BETWEEN STATE ANXIETY, SOCIAL ANXIETY AND COGNITIVE BIASES IN STUDENTS: A MEDIATION MODEL

Alina C. Chivu*

Teodora Vlad**

University of Bucharest,
Laboratory of Cognitive Clinical Sciences,
Bucharest, Romania

alina.cristina.chivu@drd.unibuc.ro, vlad.s.teodora.119@s.fpse.unibuc.ro

Abstract

State anxiety, as well as social anxiety, are portrayed as common phenomena experienced by students. However, the mechanisms which lead to their development are not yet fully known. Student mental health has become a global public health issue, thus understanding its potential underlying factors is particularly relevant. As anxiety is closely connected to the way students interpret information, cognitive biases are thought to play a key role in the development and maintenance of both state and social anxiety. Therefore, the first objective of this study was to examine the relationships between cognitive biases of interpretation, state anxiety, and social anxiety. The second objective was to test a mediation model, more specifically, to test whether the relationship between state anxiety and social anxiety can be explained by cognitive biases of interpretation.

127 students ($M = 21.8$, $SD = 3.15$, 84.3% women) enrolled at the University of Bucharest completed two online scales measuring state and social anxiety, over two months, between January and February 2021.

Additionally, they completed the Scrambled Sentences Test, a computerized task that assesses cognitive biases of interpretation. Results indicated a positive association between all variables, more precisely, a significant positive correlation between social anxiety and cognitive biases of interpretation ($r = .512$, $p < .001$), social anxiety and

* Member of the Laboratory of Cognitive Clinical Sciences, University of Bucharest; Doctoral Research Assistant, Faculty of Psychology and Educational Sciences, University of Bucharest, Bucharest, Romania.

** Member of the Laboratory of Cognitive Clinical Sciences, University of Bucharest; MSc in Health Psychology, Faculty of Psychology and Educational Sciences, University of Bucharest, Bucharest, Romania.

state anxiety ($r = .482, p < .001$), and a significant positive correlation between cognitive biases of interpretation and state anxiety ($r = .348, p < .001$). The mediation analysis indicated that cognitive biases partly explain the relationship between state anxiety and social anxiety. These preliminary findings have significant theoretical and practical significance regarding the importance of student mental health.

Keywords: cognitive biases of interpretation, mediation model, social anxiety, state anxiety.

Rezumat

Atât anxietatea ca stare, cât și anxietatea socială, sunt considerate fenomene experimentate frecvent de către studenți. Cu toate acestea, mecanismele care duc la dezvoltarea lor nu sunt încă pe deplin cunoscute. Sănătatea mentală a studenților a devenit o problemă globală de sănătate publică, motiv pentru care înțelegerea factorilor care o influențează este, în mod particular, relevantă. Cum anxietatea este strâns legată de modul în care studenții interpretează informația, distorsiunile cognitive ar putea avea un rol important în dezvoltarea și menținerea anxietății ca stare, dar și a anxietății sociale. Astfel, primul obiectiv al acestui studiu a fost de a examina relațiile dintre distorsiunile cognitive de interpretare, anxietatea ca stare și anxietatea socială. Cel de-al doilea obiectiv a constatat în testarea unui model de mediere, mai exact, de a verifica în ce măsură relația dintre anxietatea ca stare și anxietatea socială poate fi explicată de distorsiunile cognitive de interpretare. Un număr de 127 de studenți ($M = 21.8$, $AS = 3.15$, 84.3% femei) din cadrul Universității din București au participat la acest studiu și au răspuns la două scale online care măsoară anxietatea ca stare și anxietatea socială, pe o perioadă de două luni, între ianuarie și februarie 2021. În plus, aceștia au completat testul Sarcina cu propoziții fragmentate, o sarcină computerizată care evaluează distorsiunile cognitive de interpretare. Rezultatele au indicat o asocierie pozitivă între toate variabilele, mai exact, o corelație pozitivă semnificativă între anxietatea socială și distorsiunile cognitive de interpretare ($r = .512, p < .001$), între anxietatea socială și anxietatea ca stare ($r = .482, p < .001$) și o corelație pozitivă semnificativă între distorsiunile cognitive de interpretare și anxietatea ca stare ($r = .348, p < .001$). Analiza de mediere a indicat faptul că distorsiunile cognitive explică parțial relația dintre anxietatea ca stare și anxietatea socială. Aceste rezultate preliminare au o semnificație teoretică și practică deosebită, având în vedere importanța sănătății mentale a studenților.

Cuvinte-cheie: anxietate ca stare, anxietate socială, distorsiuni cognitive de interpretare, model de mediere.

1. Introduction

1.1. Social anxiety in students

Social anxiety (SA) is typically defined as a series of thoughts, behaviours, and physiological reactions that arise as consequences of a striking fear of evaluation or judgement imposed by others, in social situations (Schlenker & Leary, 1982). Although social anxiety is frequently conceptualized using the classification criteria for social anxiety disorder (SAD), it is important to note that certain individuals often experience social anxiety as a subclinical manifestation, with no severe impairments in their daily functioning (Morrison & Heimberg, 2013). Thus, this paper will specifically refer to SAD, as it is a common phenomenon among adults and youth alike, students being no strangers to social anxiety-specific manifestations (Russell & Shaw, 2009). Although the prevalence of social anxiety among students is fairly unclear to this date, certain scholars argue that registered rates are relatively high, especially among college students (Ahmad et al., 2017).

Evidence so far points towards certain factors that lead to the development of social anxiety. Among these, cognitive factors seem to play a key role. More specifically, the perception of one's social skills (*i.e., people viewing themselves as less socially competent than others*) is thought to be one of the main sources of distress for people with SA (Lucock & Salkovskis, 1988). Furthermore, people with social anxiety tend to have higher than average expectations concerning their social competence and are more likely to adhere to the irrational assumption that others' beliefs about them are undoubtedly true (Purdon et al., 2001). College students are faced with supplementary challenges that could potentially lead to an increase in their social anxiety: they often come across new environments, where they are expected to fit into various social networks, which might interfere with their pre-existing social vulnerabilities (Campbell et al., 2016).

Recent studies generally agree with the fact that students with social anxiety often center their actions and behaviours around their social fears or worries (Book & Randall, 2002). Therefore, they tend to avoid certain social situations perceived as threatening, especially social-evaluative situations. Consequently, the avoidance may impact their academic achievements, their peer-to-peer

interactions, or their emotional well-being (Villarosa-Hurlocker & Madson, 2020). Moreover, students with social anxiety are reported to perform poorer on their scholar tasks, since they usually encounter difficulties with their memory, learning, and concentration skills (Russell & Topham, 2012).

A substantial amount of recent research points towards the importance of assessing and understanding the realms of mental health among students. Scholars draw attention to the fact that student mental health is a global public health issue (Schwartz & Kay, 2009). The study of mental health in the academic setting is, therefore, of particular importance. As a consequence, our paper will attempt to broaden the current knowledge regarding student social anxiety.

1.2. Cognitive mechanisms in social anxiety

Considerable evidence in the field highlights the existence of a notable link between social anxiety and cognitive bias. More specifically, current meta-analyses pinpoint the existence of a relationship between social anxiety and interpretation bias, with large effect sizes (Chen et al., 2020). This specific link seems to be a causal one (Morrison & Heimberg, 2013). Further exploring the theoretical relationship between the two aforementioned variables is, therefore, relevant.

Interpretation bias generally refers to a tendency to interpret socially ambiguous stimuli as menacing (Franklin et al., 2005). Amir et al. (2012) emphasize that social stimuli are ambiguous in nature and are prone to be interpreted in a distorted manner even by individuals with low anxiety levels. Thus, considerable attention shall be provided for understanding the way individuals with social anxiety differ, in their interpretation bias, from the general population. Evidence in the field highlights that individuals with social anxiety tend to misinterpret negative and positive social stimuli alike. Specifically, they react more intensely to negatively-valenced situations, but they also tend to minimize or deny others' positive reactions towards them (Morrison & Heimberg, 2013).

Interpretation bias is thought to serve as a means of avoiding potentially threatening situations: individuals with social anxiety typically perceive social threat in neutral contexts, with the intent of avoiding consequences such as

judgement, rejection, shame, or humiliation (Constans et al., 1999). The main theme of their interpretive bias is, therefore, the interaction with other people. More specifically, individuals with social anxiety find it dangerous to engage in social contexts, since they perceive their peers as potentially judgmental (Chen et al., 2020). Within the academic context, interpretation bias might arise from a variety of social situations: from an ambiguous reaction (*i.e., one of the peers is yawning*) that an individual with SA perceives when delivering a speech, to performing group tasks, or even studying in public places (*i.e., school libraries*), students with social anxiety might be prone to misinterpreting a considerable number of otherwise neutral clues (Loscalzo & Giannini, 2022). These findings draw attention to the fact that students face specific challenges that could impact their mental health in the long term.

Interpretation bias might arise from pre-existing negative cognitions about one's social competence (Amir et al., 2012). Pre-existing self-focused beliefs also increase state anxiety in social environments perceived as threatening (Schulz et al., 2008). State anxiety (*i.e., the specific psychophysiological reactions one experiences when faced with a threatening stimulus*; Leal et al., 2017) seems to be higher in people who experience social anxiety, compared to the general population, as a consequence of misinterpreting positive or negative social stimuli (Weeks et al., 2013).

These findings have led certain scholars to investigate the mechanisms through which social anxiety, state anxiety, and cognitive biases are interrelated. For example, Chen et al. (2019) have proposed a model where interpretation bias serves as a mediator between trait social anxiety and state anxiety responses, such as bodily sensations, self-report state anxiety, and perceived probability of peer negative evaluation. Beard and Amir (2010) have probed the same model, by measuring state and social anxiety in response to an impromptu speech task. Their findings support the assumption that interpretation bias is one of the factors that explain the interaction between social and state anxiety. Given that there is notable empirical support for this mediation model, our endeavour to quantify interpretation bias, social and state anxiety in a student sample aligns with previous theoretical frameworks. Although both previous studies have drawn upon student samples, our study will not attempt to infer general conclusions, but rather to specifically focus on understanding the student's state and social anxiety.

1.3. Social anxiety intervention for students

Intervention protocols for social anxiety disorder are well-established within the literature in the field. Less is known, however, about its subclinical counterpart. On a theoretical level, interventions for social anxiety broadly comprise cognitive restructuring techniques, that help the individuals reframe the way they perceive their social environment, their social self-worth, or surrounding social-evaluative stimuli, in general (Heimberg, 2002). Cognitive-behavioral therapy-based interventions are the most frequently used for social anxiety, though other forms of treatment could also be implemented (Mayo-Wilson et al., 2014).

What is of striking interest are cognitive bias modification (CBM) interventions used for social anxiety. Cognitive bias modification aims to alter various cognitive biases that influence the way people perceive and interpret surrounding stimuli (Martinelli et al., 2022). Recent meta-analytic evidence pinpoints that applying CBM techniques that aim to modify the way people interpret stimuli (*i.e.*, *CBM for interpretation*) could potentially lead to a decrease in social anxiety levels (Yeung & Sharpe, 2019).

Other psychological interventions aim to reduce social anxiety. Among those, Cognitive behavioral therapy (CBT) and Cognitive Bias Modification for Interpretation (CBM-I) seem to be particularly useful (Morrison & Heimberg, 2013), as we have previously stated. However, to our knowledge, no synthesis studies have drawn upon specific interventions for student social anxiety. We will further describe certain interventions aimed at reducing social anxiety in students, though non-exhaustively.

McCall et al. (2018) have proposed a web-based CBT program for college students with social anxiety. Their intervention, called *Overcome Social Anxiety*, uses cognitive restructuring and behavioral experiments that help challenge some of the most common social anxiety-specific thoughts (*i.e.*, “*I can’t speak to authority figures*”; p. 3) and prompts the student to overcome their avoidance behaviours and to engage in social activities. Ștefan et al. (2018), on the other hand, have focused on a mindfulness-based approach, that aims at reducing stress in college students at risk of developing social anxiety-specific symptoms. Their protocol included the implementation of mindfulness-based stress reduction within six group sessions and aimed

to train participants to focus on the present moment, to observe their thoughts without reacting to them, and to gain a more understanding attitude towards themselves. Both interventions showed promising results in their trials. Less is known about the implementation of CBM-I for college students.

Limited information available posits that CBM-I is moderately supported in efficacy for the youth (Reuland & Teachman, 2014), though certain CBM-I interventions seem to decrease both interpretation bias and social anxiety in adolescents (Khaleghi et al., 2017). More evidence is needed to clarify the specific contribution that interventions aimed at student mental health could bring in reducing social anxiety and what are the specific mechanisms that can be targeted in a therapy process to increase effectiveness.

1.4. The present study

Given that student mental health is a stand-alone, important issue that raises significant concerns (Brown, 2018), we will discuss the association between the variables considered above, within the specific context of university students. Therefore, this study has the following objectives: (a) the first objective of this research is to investigate the relationship between state anxiety, social anxiety, and cognitive biases of interpretation and (b) we aim to investigate a mediation model, more particularly, to investigate whether cognitive biases of interpretation may account for the association between state anxiety and social anxiety.

2. Methods

2.1. Participants

Online invites to take part in this study were sent through social platforms to students from the University of Bucharest. Data from 127 students, ages between 19 and 42 years old ($M = 21.8$, $SD = 3.15$, 84.3% women), who responded to the invite and met the inclusion criteria were analysed. All students with the age of at least 18 years old enrolled in a Romanian university were included. There were no other selection criteria.

2.2. Variables and measures

State anxiety. The State-Trait Anxiety Interview Inventory (STAI-6; Marteau & Bekker, 1992) was used to measure state anxiety. This scale consists of six items that can be used to measure both state and trait anxiety. In the present study, the specific instructions were used to indicate state anxiety. Participants' responses range from 1 (not at all) to 4 (very much), and three of the scale items are reversed items. The STAI-6 has been used successfully in other studies with the Romanian population and showed good internal consistency of the scale (Podina & Vîslă, 2014; Vîslă et al., 2013). In this study, the internal consistency of the scale measured with Cronbach's alpha coefficient was .89.

Social Anxiety. This variable was assessed using The Liebowitz's Social Anxiety Scale (LSAS; Fresco et al., 2001; Liebowitz, 1987). The scale includes 24 items for each of the two dimensions, "*fear or anxiety*" and "*avoidance*" (48 items in total). Items are rated on a Likert scale ranging from 0 (not at all/never) to 3 (severe/usually). A total score greater than or equal to 30 on this scale distinguishes the presence of social anxiety from the absence of a disorder, while a score between 60-90 indicates the presence of high social anxiety. Good internal consistency has been reported for the LSAS-SR in previous studies of the Romanian population (Podina & Vîslă, 2014; Vîslă et al., 2013). In this study, internal consistency is good, with a Cronbach's alpha coefficient of .95.

Negative interpretation bias. An adapted version of the computerized Scrambled Sentences Task (SST, Wenzlaff & Bates, 1998) was used to assess cognitive bias. This task has been successfully used in various studies to assess cognitive bias (Bowler et al., 2012; Holmes et al., 2009). This study employed a version adapted from the SST task used by Rude et al. (2002). The SST task was administered through Google Forms. For this purpose, participants were given a series of randomly arranged words and the task of arranging these words to form a correct sentence. Within each sequence of words, there were two words with opposite meanings. They were allowed to choose only one of the two words. The choice of a particular category of words from this sequence expresses the participant's tendency towards a particular type of bias. The keywords were either positive or

negative. 13 items were presented to participants in a single block. The words sequences that were offered to the participants to decode included: “*people be terribly tolerable near is*” or “*meet is to unpleasantly pleasant people with me*”. STT interpretation was performed as in other studies (Podina et al., 2020), and the final score is represented as a percentage. In this study, STT items involved social situations.

2.3. Procedure

Before the completion of the scales, all questionnaires were translated into Romanian by two translators, using the dyad method. Initially, the items were first translated from English into Romanian and then from Romanian back into English to see how similar they were to the original English items. The SST scenarios were developed based on the existing literature. Once the scales were finalized, all scales were inserted into Google Forms and disseminated to the students. They also had to fill in a consent form and answer several questions about their demographic characteristics. Student responses were collected between January and February 2021.

2.4. Statistical approach

The present research design is a non-experimental, correlational design. Two statistical programs were used for data analysis in this study: IBM SPSS Statistics, version 23.0, and Jamovi, version 2.4.1. SPSS was used for descriptive statistics and the correlation analysis, while Jamovi was used for the mediation analysis. In this regard, the following variables are defined: state anxiety as an independent variable, social anxiety as a dependent variable, and cognitive bias of interpretation as a mediator. Figure no. 1 illustrates the mediation model.

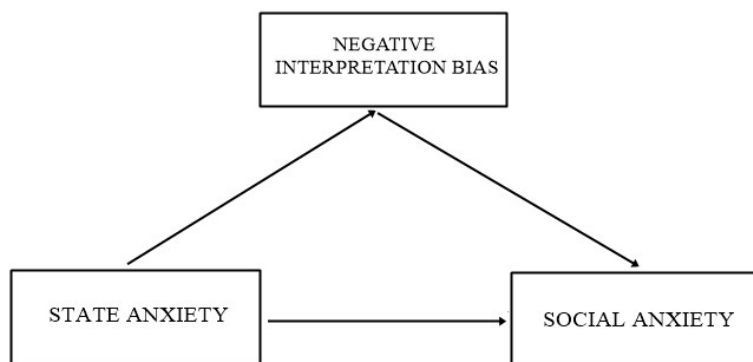


Figure no. 1. *The mediation model*

3. Results

For this study, we analysed data from 127 participants. Of these, 107 were women (84.3%), 121 (95.3 %) completed high school, and 23 (18.1 %) were employed. Table no. 1 presents the demographics of the participants. Further, Table no. 2 illustrates the descriptive statistics for the studied variables.

Table no. 1. *Participants demographics data*

Demographic characteristics	Results
Gender	
Male	20 (15.7 %)
Female	107 (84.3 %)
Education completed	
Highschool	121 (95.3 %)
University	5 (3.9 %)
Master	1 (.8 %)
Academic status	
Undergraduate studies	126 (99.2 %)
Master studies	1 (.8 %)
Professional status	
Employed	23 (18.1 %)
Unemployed	104 (81.9 %)

Table no. 2. *Descriptive statistics for study variables*

Measures	N	Min.	Max.	M	SD
STAI	127	6	23	13.44	4.06
LSAS	127	5	119	47.94	25.40
SST %	127	.00	1.00	.36	.22

Notes. *M* = mean; *SD* = standard deviation; *Min.* = minimum, *Max.* = maximum; *STAI* = *The State-Trait Anxiety Interview Inventory*; *LSAS* = *The Liebowitz Social Anxiety Scale*; *SST %* = *Scrambled Sentences Task (Percent)*

The first aim of this study was to investigate the relationships between the following variables: state anxiety, social anxiety, and negative cognitive bias of interpretation. The results indicated that there are significant positive correlations between all variables as follows: a weak significant positive correlation between state anxiety and negative interpretation bias ($r = .348$, $p < .000$), a moderate positive correlation between state anxiety and social anxiety ($r = .482$, $p < .000$). Results also indicate a positive moderate correlation between negative interpretation bias and social anxiety ($r = .512$, $p < .000$). Table no. 3 illustrates the correlation results.

Table no. 3. *Pearson Correlation among variables*

Variables	1	2.	3
1. State anxiety	—	.482**	.348**
2. Social anxiety	.482**	—	.512**
3. Negative interpretation bias	.348**	.512**	—

Notes. ** $p < .01$.

The second aim of this study was to test a mediation model. To this end, state anxiety was considered as an independent variable, social anxiety as a dependent variable, and cognitive bias of interpretation as a mediator. Results showed that the effect of state anxiety on the cognitive bias of interpretation was $a = .01$ ($t = 4.18$, $p < .001$), while the effect of the cognitive bias of interpretation on social anxiety was $b = .4490$ ($t = 5.21$, $p < .001$). The

indirect effect of state anxiety on social anxiety through the cognitive bias of interpretation represents the product of indicators a and b . Results indicate a positive indirect effect of $a*b = .85$ ($t = 3.26, p = .001$). The direct effect of state anxiety on social anxiety was $c' = 2.16$, ($t = 4.59, p < .001$), and the total effect was $c = 3.01$ ($t = 6.20, p < .001$). Thus, the results obtained show that the relationship between the two variables is partially mediated by the cognitive bias of interpretation, given that the direct effect is statistically significant. Figure no. 2 illustrates the estimation plots of effects, showing that the effects differ from zero, therefore there is a mediation effect.

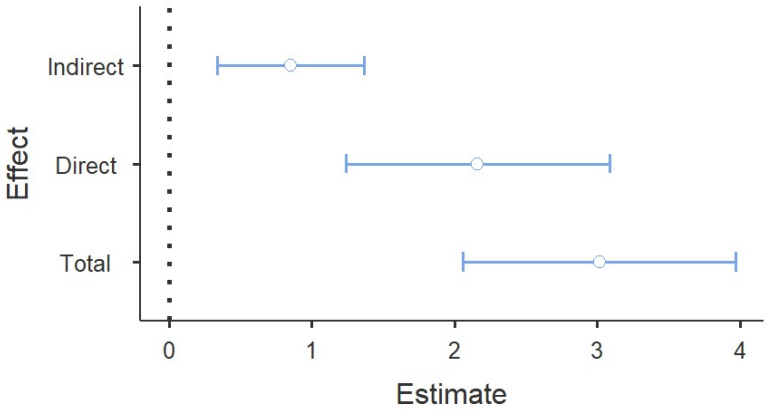


Figure no. 2. Estimation plots of effects

4. Discussion and conclusions

The main objective of this research was to examine the relationships between state anxiety, social anxiety, and cognitive biases of interpretation. The second objective was to investigate a mediation model, more particularly, to determine whether cognitive biases of interpretation could explain the relationship between state anxiety and social anxiety.

As for the first objective, the findings revealed a significant positive relationship between all of the variables. More precisely, a significant but weak positive correlation between state anxiety and negative interpretation

bias, respectively, a significant and moderate positive correlation between state anxiety and social anxiety. Also, a positive moderate correlation between social anxiety and negative interpretation bias was obtained. Considering the second objective, the results of our study illustrate the partial mediation role of cognitive interpretation biases concerning the relationship between state anxiety and social anxiety.

Interpretation bias refers to the interpretation of environmental information that is ambiguous, in a negative way (Spokas et al., 2004). In anxiety disorders, the theme of these interpretations varies according to the type of anxiety. In the present study, social biases were examined, specifically the extent to which social scenarios are interpreted by participants. The results obtained are consistent with the literature that supports the association between this maladaptive interpretation in individuals and social anxiety symptoms (Stopa & Clark, 2000). In an experimental study conducted by Brosan et al. (2009), it was also found that, by using techniques to alter cognitive biases in anxious individuals, it is possible to reduce interpretation biases, leading to a reduction in both state and trait anxiety. Consistent with these findings, other studies that have focused on reducing interpretation biases have shown a significant reduction in socially anxious symptomatology (Hoppit et al., 2014). These results indicate the impact that negative interpretation bias has on anxiety symptomatology.

The association between our two theorized variables, specifically the relationship between anxiety and social anxiety is partially explained by the mediator, namely negative bias of interpretation. This may be due to the fact that at the core of an anxious symptomatology there also lay certain other factors, that play a role in its emergence. However, our results are consistent with cognitive theories according to which cognitive interpretation biases may play a relevant role in this relationship (Chen et al., 2013). Some studies have shown that people with an anxiety disorder have a higher level of negative biases of interpretation compared to individuals without an anxiety disorder (Beck & Haigh, 2014; Clark & Wells, 1995). Given the results obtained, specifically that mediation is partial, our findings indicate that other factors that would be worth investigating in future research could fully explain the relationship.

There are several implications of this study. The findings concur with other studies that highlight the relationship between interpretation bias and anxiety. From a theoretical perspective, our results tend to contribute to explaining the relationship between anxiety and social anxiety. Social anxiety is a disorder with a high prevalence (Furmark, 2002), and efforts to better capture it may result in the identification of the mechanisms by which we can intervene to reduce it.

Social anxiety is very common among students, according to several studies (Ahmad et al., 2017), and it is often conveyed as a series of maladaptive behaviors, such as avoiding social or evaluation-based situations, which might interfere with academic assessments. As a result, a clinical implication of this research is that by addressing the processes that contribute to anxiety, school counselors or psychotherapists who provide counseling to students might benefit from improved grounds to proceed with their interventions. Therefore, in therapy sessions in which students present with anxiety symptoms, professionals can focus on cognitive biases to reduce symptoms as well as associated maladaptive behaviors. Moreover, this aspect can also be considered when proposing psychological interventions for students.

Several limitations can be attributed to this research, despite the reported results. Firstly, the population is predominantly female (84.3 %), and an equivalent sample in terms of gender would be indicated. Secondly, the instruments that we used are self-assessment scales so adding more objective assessment methods would be preferable in future studies. A third limitation is related to the social anxiety variable. Specifically, no cut-off was applied to delimit clinical social anxiety scores, and it would be recommended to consider this in future research. Fourthly, the instrument for the assessment of cognitive bias was the SST, although there are some other instruments or adaptations of computerized tasks in the literature that assess cognitive biases while also taking into account reaction times. Future research could address this limitation by including one such instrument for capturing interpretation biases more accurately. Fifthly, this study considered interpretation bias as a mediator, however, the results showed that it can only partially explain the relationship between state anxiety and social anxiety. Thus, future research may investigate a more complex model of mediation, in which other variables, potentially responsible for the existing relationship, are explored.

Lastly, another limitation of this study is the lack of a particular focus on anxiety in the context of specific student context. Future studies could explore this aspect. For example, a replication of this study with a cognitive interpretation bias assessment task of cognitive interpretive biases tailored to students' difficulties could be a direction in this regard.

In terms of functionality, social anxiety is responsible for a variety of difficulties. Students, like other populations, are equally affected by these consequences. The current study aimed to investigate the association between cognitive interpretation biases, state anxiety, as well as social anxiety. According to the mediation model that we explored, the relationship between anxiety and social anxiety may be impacted by negative interpretations of environmental stimuli, but this variable cannot fully explain that relationship. That being stated, the ramifications of this research have useful implications. Future studies should focus on examining the relationship in other populations and on investigating a potentially more complex mediation model.

References

- Ahmad, R. J., Bayan, H., Faque, T., & Seidi, P. (2017). Prevalence of social anxiety in students of college of education—university of Garmian. *Researchers World*, 8(3), 78-82.
- Amir, N., & Taylor, C. T. (2012). Interpretation training in individuals with generalized social anxiety disorder: A randomized controlled trial. *Journal of Consulting and Clinical Psychology*, 80(3), 497-511. <https://doi.org/10.1037/a0026928>
- Beard, C., & Amir, N. (2010). Negative Interpretation Bias Mediates the Effect of Social Anxiety on State Anxiety. *Cognitive Therapy and Research*, 34, 292-296. <https://doi.org/10.1007/s10608-009-9258-6>
- Beck, A. T., & Haigh, E. A. (2014). Advances in cognitive theory and therapy: The generic cognitive model. *Annual Review of Clinical Psychology*, 10, 1-24. <https://doi.org/10.1146/annurev-clinpsy-032813-153734>
- Book, S. W., & Randall, C. L. (2002). Social Anxiety Disorder and Alcohol Use. *Alcohol Research & Health*, 26(2), 130-135.
- Bowler, J. O., Mackintosh, B., Dunn, B. D., Mathews, A., Dalgleish, T., & Hoppitt, L. (2012). A comparison of cognitive bias modification for interpretation and computerized cognitive behavior therapy: Effects on anxiety, depression, attentional control, and interpretive bias. *Journal of Consulting and Clinical Psychology*, 80(6), 1021-1033. <https://doi.org/10.1037/a0029932>

- Brosan, L., Hoppitt, L., Shelfer, L., Sillence, A., & Mackintosh, B. (2011). Cognitive bias modification for attention and interpretation reduces trait and state anxiety in anxious patients referred to an out-patient service: Results from a pilot study. *Journal of Behavior Therapy and Experimental Psychiatry*, 42(3), 258-264. <https://doi.org/10.1016/j.jbtep.2010.12.006>
- Brown, J. S. (2018). Student mental health: some answers and more questions. *Journal of Mental Health*, 27(3), 193-196. <https://doi.org/10.1080/09638237.2018.1470319>
- Campbell, C. G., Bierman, K. L., & Molenaar, P. C. (2016). Individual Day-to-Day Process of Social Anxiety in Vulnerable College Students. *Applied Developmental Science*, 20(1), 1-15. <https://doi.org/10.1080/10888691.2015.1026594>
- Chen, J., Milne, K., Dayman, J., & Kemps, E. (2019). Interpretation bias and social anxiety: does interpretation bias mediate the relationship between trait social anxiety and state anxiety responses?. *Cognition and Emotion*, 33(4), 630-645. <https://doi.org/10.1080/02699931.2018.1476323>
- Chen, J., Short, M., & Kemps, E. (2020). Interpretation bias in social anxiety: A systematic review and meta-analysis. *Journal of Affective Disorders*, 276, 1119-1130. <https://doi.org/10.1016/j.jad.2020.07.121>
- Chen, J., Wang, Z., Wu, Y., Cai, Y., Shen, Y., Wang, L., & Shi, S. (2013). Differential attentional bias in generalized anxiety disorder and panic disorder. *Neuropsychiatric Disease and Treatment*, 9, 73-80.
- Clark, D. M., & Wells, A. (1995). A cognitive model of social phobia. In R. G. Heimberg, M. R. Liebowitz, D. A. Hope, & F. R. Schneier (Eds.), *Social phobia: Diagnosis, assessment, and treatment* (pp. 69-93). The Guilford Press.
- Constans, J. I., Penn, D. L., Ihen, G. H., & Hope, D. A. (1999). Interpretive biases for ambiguous stimuli in social anxiety. *Behaviour Research and Therapy*, 37(7), 643-651. [https://doi.org/10.1016/s0005-7967\(98\)00180-6](https://doi.org/10.1016/s0005-7967(98)00180-6)
- Franklin, M. E., Huppert, J., Langner, R., Leiberg, S., & Foa, E. B. (2005). Interpretation Bias: A Comparison of Treated Social Phobics, Untreated Social Phobics, and Controls. *Cognitive Therapy and Research*, 29, 289-300. <https://doi.org/10.1007/s10608-005-2412-8>
- Fresco, D. M., Coles, M. E., Heimberg, R. G., Liebowitz, M. R., Hami, S., Stein, M. B., & Goetz, D. (2001). The Liebowitz Social Anxiety Scale: A comparison of the psychometric properties of self-report and clinician-administered formats. *Psychological Medicine*, 31(6), 1025-1035.
- Furmark, T. (2002). Social phobia: overview of community surveys. *Acta Psychiatrica Scandinavica*, 105(2), 84-93. <https://doi.org/10.1034/j.1600-0447.2002.1r103.x>
- Heimberg, R. G. (2002). Cognitive-behavioral therapy for social anxiety disorder: current status and future directions. *Biological Psychiatry*, 51(1), 101-108. [https://doi.org/10.1016/s0006-3223\(01\)01183-0](https://doi.org/10.1016/s0006-3223(01)01183-0)

- Holmes, E. A., Lang, T. J., & Shah, D. M. (2009). Developing interpretation bias modification as a “cognitive vaccine” for depressed mood: Imagining positive events makes you feel better than thinking about them verbally. *Journal of Abnormal Psychology*, 118(1), 76-88. <https://doi.org/10.1037/a0012590>
- Hoppitt, L., Illingworth, J. L., MacLeod, C., Hampshire, A., Dunn, B. D., & Mackintosh, B. (2014). Modifying social anxiety related to a real-life stressor using online Cognitive Bias Modification for interpretation. *Behaviour Research and Therapy*, 52, 45-52. <https://doi.org/10.1016/j.brat.2013.10.008>
- Khaleghi, N., Amiri, M., & Taheri, E. (2017). Effectiveness of group reality therapy on symptoms of social anxiety, interpretation bias and interpersonal relationships in adolescents. *Journal of Fundamentals of Mental Health*, 19(2), 77-83.
- Leal, P. C., Goes, T. C., da Silva, L. C. F., & Teixeira-Silva, F. (2017). Trait vs. state anxiety in different threatening situations. *Trends in Psychiatry and Psychotherapy*, 39(3), 147-157. <https://doi.org/10.1590/2237-6089-2016-0044>
- Liebowitz, M. R. (1987). Social phobia. *Modern Problems of Pharmacopsychiatry*, 22, 141-173.
- Loscalzo, Y., & Giannini, M. (2022). Studyholism and Study Engagement in Adolescence: The Role of Social Anxiety and Interpretation Bias as Antecedents. *International Journal of Environmental Research and Public Health*, 19(9), 1-18. <https://doi.org/10.3390/ijerph19095261>
- Lucock, M. P., & Salkovskis, P. M. (1988). Cognitive factors in social anxiety and its treatment. *Behaviour Research and Therapy*, 26(4), 297-302. [https://doi.org/10.1016/0005-7967\(88\)90081-2](https://doi.org/10.1016/0005-7967(88)90081-2)
- Marteau, T. M., & Bekker, H. (1992). The development of a six item short form of the state scale of the Spielberger State—Trait Anxiety Inventory (STAI). *British Journal of Clinical Psychology*, 31(3), 301-306. <https://doi.org/10.1111/j.2044-8260.1992.tb00997.x>
- Martinelli, A., Grüll, J., & Baum, C. (2022). Attention and interpretation cognitive bias change: A systematic review and meta-analysis of bias modification paradigms. *Behaviour Research and Therapy*, 157, 1-20. <https://doi.org/10.1016/j.brat.2022.104180>
- Mayo-Wilson, E., Dias, S., Mavranzouli, I., Kew, K., Clark, D. M., Ades, A. E., & Pilling, S. (2014). Psychological and pharmacological interventions for social anxiety disorder in adults: a systematic review and network meta-analysis. *The Lancet Psychiatry*, 1(5), 368-376. [https://doi.org/10.1016/s2215-0366\(14\)70329-3](https://doi.org/10.1016/s2215-0366(14)70329-3)
- McCall, H. C., Richardson, C. G., Helgadottir, F. D., & Chen, F. S. (2018). Evaluating a Web-Based Social Anxiety Intervention Among University Students: Randomized Controlled Trial. *Journal of Medical Internet Research*, 20(3), 1-12. <https://doi.org/10.2196/jmir.8630>

- Morrison, A. S., & Heimberg, R. G. (2013). Social anxiety and social anxiety disorder. *Annual Review of Clinical Psychology*, 9, 249-274.
<https://doi.org/10.1146/annurev-clinpsy-050212-185631>
- Podina, I. R., Cosmoiu, A., Rusu, P., & Chivu, A. (2020). Positive thinking is not adaptive thinking: A cognitive-behavioral take on Interpretation Bias Modification for social anxiety. *Journal of Rational-Emotive & Cognitive-Behavior Therapy*, 38, 424-444.
- Podina, I. R., & Vișlă, A. (2014). Being socially anxious is not enough. Response expectancy mediates the effect of social anxiety on state anxiety in response to a social-evaluative threat. *Journal of Evidence-Based Psychotherapies*, 14(1), 85-94.
- Purdon, C., Antony, M., Monteiro, S., & Swinson, R. P. (2001). Social anxiety in college students. *Journal of anxiety disorders*, 15(3), 203-215.
[https://doi.org/10.1016/s0887-6185\(01\)00059-7](https://doi.org/10.1016/s0887-6185(01)00059-7)
- Reuland, M. M., & Teachman, B. A. (2014). Interpretation bias modification for youth and their parents: A novel treatment for early adolescent social anxiety. *Journal of Anxiety Disorders*, 28(8), 851-864.
<https://doi.org/10.1016/j.janxdis.2014.09.011>
- Rude, S. S., Wenzlaff, R. M., Gibbs, B., Vane, J., & Whitney, T. (2002). Negative processing biases predict subsequent depressive symptoms. *Cognition and Emotion*, 16(3), 423-440. <https://doi.org/10.1080/02699930143000554>
- Russell, G., & Shaw, S. (2009). A study to investigate the prevalence of social anxiety in a sample of higher education students in the United Kingdom. *Journal of Mental Health*, 18(3), 198-206. <https://doi.org/10.1080/09638230802522494>
- Russell, G., & Topham, P. (2012). The impact of social anxiety on student learning and well-being in higher education. *Journal of Mental Health*, 21(4), 375-385. <https://doi.org/10.3109/09638237.2012.694505>
- Schlenker, B. R., & Leary, M. R. (1982). Social anxiety and self-presentation: A conceptualization model. *Psychological Bulletin*, 92(3), 641-669.
<https://doi.org/10.1037/0033-2909.92.3.641>
- Schulz, S. M., Alpers, G. W., & Hofmann, S. G. (2008). Negative self-focused cognitions mediate the effect of trait social anxiety on state anxiety. *Behaviour research and therapy*, 46(4), 438-449. <https://doi.org/10.1016/j.brat.2008.01.008>
- Schwartz, V., & Kay, J. (2009). The Crisis in College and University Mental Health. *Psychiatric Times*, 26(10), 32-32.
- Spokas, M. E., Rodebaugh, T. L., & Heimberg, R. G. (2004). Cognitive biases in social phobia. *Psychiatry*, 3(5), 51-55. <https://doi.org/10.1383/psyt.3.5.51.33964>
- Stopa, L., & Clark, D. M. (2000). Social phobia and interpretation of social events. *Behaviour Research and Therapy*, 38(3), 273-283.
[https://doi.org/10.1016/S0005-7967\(99\)00043-1](https://doi.org/10.1016/S0005-7967(99)00043-1)

- Ștefan, C. A., Căpraru, C., & Szilágyi, M. (2018). Investigating Effects and Mechanisms of a Mindfulness-Based Stress Reduction Intervention in a Sample of College Students at Risk for Social Anxiety. *Mindfulness*, 9, 1509-1521. <https://doi.org/10.1007/s12671-018-0899-y>
- Villarosa-Hurlocker, M. C., & Madson, M. B. (2020). A latent profile analysis of social anxiety and alcohol use among college students. *Addictive Behaviors*, 104, 1-8. <https://doi.org/10.1016/j.addbeh.2019.106284>
- Vișlă, A., Cristea, I. A., Tatar, A. S., & David, D. O. (2013). Core beliefs, automatic thoughts and response expectancies in predicting public speaking anxiety. *Personality and Individual Differences*, 55, 856-859.
- Weeks, J. W., Howell, A. N., & Goldin, P. R. (2013). Gaze avoidance in social anxiety disorder. *Depression and anxiety*, 30(8), 749-756. <https://doi.org/10.1002/da.22146>
- Wenzlaff, R. M., & Bates, D. E. (1998). Unmasking a cognitive vulnerability to depression: how lapses in mental control reveal depressive thinking. *Journal of Personality and Social Psychology*, 75(6), 1559–1571. <https://doi.org/10.1037/0022-3514.75.6.1559>
- Yeung, E. S., & Sharpe, L. (2019). Cognitive Bias Modification for Social Anxiety: The Differential Impact of Modifying Attentional and/or Interpretation Bias. *Cognitive Therapy and Research*, 43, 781-791. <https://doi.org/10.1007/s10608-019-10012-3>

The online version of this article can be found at:
<http://revped.ise.ro/category/2023-en/>



This work is licensed under the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

*To view a copy of this license, visit
<http://creativecommons.org/licenses/by-nc-sa/4.0/>
or send a letter to Creative Commons,
PO Box 1866, Mountain View, CA 94042, USA.*

Versiunea online a acestui articol poate fi găsită la:
<http://revped.ise.ro/category/2023-ro/>



Această lucrare este licențiată sub Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License.

*Pentru a vedea o copie a acestei licențe, vizitați
<http://creativecommons.org/licenses/by-nc-sa/4.0/>
sau trimiteți o scrisoare către Creative Commons,
PO Box 1866, Mountain View, CA 94042, SUA.*