The Relationship between Self-esteem and the Cognitive, Behavioural and Physiological Component of Students' Presentation Anxiety

Bachelor Thesis

Thomas Lange

s2179679

University of Twente

Faculty of Behavioural, Management and Social Sciences

1st supervisor: Martha Kreuzberg

2nd supervisor: Dr. Hanneke Scholten

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Abstract

Previous research found negative associations between anxiety in general and self-esteem. Different components of anxiety were investigated. However, how presentation anxiety as a specific form of social anxiety and its components are associated with self-esteem has yet to be investigated. Therefore, the present study investigated how students' presentation anxiety is associated with their level of self-esteem and how this association differs per component (cognitive, behavioural, physiological). Negative associations, especially for the cognitive component of presentation anxiety and self-esteem, were hypothesized. Furthermore, a mediating role of self-esteem between students' experience - in terms of years studied and age - and presentation anxiety was hypothesized and investigated. Participants' (n = 121) presentation anxiety was measured with the Public Speaking Anxiety Scale. Their level of self-esteem was assessed through the Rosenberg Self-esteem Scale. Hierarchical multiple linear regression analyses yielded moderate negative associations between self-esteem and the behavioural, the physiological and the cognitive component of presentation anxiety. Mediation analysis revealed that self-esteem does not mediate the effect of experience in terms of years studied and age on presentation anxiety. It was recommended that future interventions should make use of the joint cognitive aspect of self-esteem and presentation anxiety through mindfulness interventions which were shown to have positive effects on both self-esteem and presentation anxiety.

Keywords: public speaking anxiety, self-esteem, cognitive component, behavioural component, physiological component

The Relationship between Self-esteem and the Cognitive, Behavioural and Physiological Component of Students' Presentation Anxiety

The current research investigates students' presentation anxiety and its association with self-esteem. Furthermore, the role of presentation anxiety's different components - cognitive, behavioural, and physiological - are examined and the extent to which they are associated with students' levels of self-esteem is discussed to gain new insights into these relationships and to provide possible recommendations for dealing with presentation anxiety and for enhancing self-esteem. Moreover, it is investigated whether self-esteem mediates the influence of students' experience, in terms of years studied and age, on presentation anxiety.

Presentation anxiety

Presentation anxiety is a problem that many high school students face, and which often continues to play a role later in their studies at university. In a broader sense presentation anxiety may be classified as one form of speech anxiety, also called public-speaking anxiety. The online APA dictionary of Psychology defines public speaking anxiety as a „fear of giving a speech or presentation in public because of the expectation of being negatively evaluated or humiliated by others. This is a common fear, associated with social phobia" (n.d.).

According to Ebrahimi et al. (2019), the fear of public speaking is the single most commonly feared situation in the population. Estimates of the prevalence of public speaking anxiety vary and seem to be higher in groups such as students, for whom presenting in front of others plays a bigger role. For instance, Marinho et al. (2017) found 63.9% of college students to be affected by public speaking anxiety, whereas only 33% of U.S. citizens reported it (Ruscio et al., 2008). Moreover, it was found that being female and rarely participating in public speaking increases the risk of experiencing public speaking anxiety (Marinho et al., 2017).

Public speaking anxiety is accompanied by different symptoms, such as feeling negatively evaluated by others, physical symptoms, decreased concentration, and problems speaking clearly (Brandick et al., 2021). Not only the short-term side effects are a problem, but in more severe cases especially the longer-term ones are. For instance, it has been shown that public speaking anxiety is associated with less educational success, unemployment, and lower income (Schneier et al., 1994). Fear of public speaking is not limited to the immediate period before the act of speaking or during the act, but in some individuals may extend for days or weeks before the event, thus reducing their quality of life (Behnke et al. 1974).

Considering these findings, it makes sense to investigate a group of people which is required to develop presentation skills during their career, namely university students. To present and communicate scientific findings and thus engage professionally in the academic field is important and an increase in anxiety might hinder students to do so effectively. Moreover, Raja (2017) found that a majority of students reported to experience this form of anxiety. In addition, during the Covid-19 pandemic, many students had limited social contact, which is important to consider since social isolation can promote the onset of social anxieties like presentation anxiety (Cohen, 2004).

The ways in which public speaking anxiety can be experienced differ and can therefore be divided into different components. Based on Lang's (1971) three component model of anxiety, Bartholomay and Holihan (2016) developed a scale to measure the cognitive, behavioural and physiological components in regard to public speaking anxiety. The cognitive component pertains to (negative) thought processes, the behavioural component describes observable behaviour (e.g., trembling voice) and the physiological component is expressed through bodily symptoms such as sweating (Lang, 1979). Depending on each individual person, these three components can occur to varying degrees. According to Lang (1979) low levels of anxiety tend to rather occur within the cognitive dimension and not so much within the behavioural and physiological dimension. This is because the mind and its' cognitions are able to reflect small nuances of emotional arousal to which the autonomic nervous system is not responsive enough at such low levels. Thus, physiological and behavioural expressions, which are more strongly influenced by the autonomic nervous system, are diminished in such cases.

More severe forms of public speaking anxiety may even be a risk factor for social phobias' common ramifications such as substance abuse, depression and attempted suicide (Schneier et al., 1992). However, mild anxiety in anticipation of a presentation does not necessarily come with those consequences or lead to a poorer speech performance. On the contrary, mild levels of anxiety may sometimes be conducive to preparing well for a presentation and taking the topic seriously (Kuai et al., 2021). On a continuum from mild to extreme forms of anxiety, the more severe forms can interfere with students' quality of presenting, not only based on self-observation but also by outside observer ratings (Cheng et al., 2017). However, it appears that students who suffer from speech anxiety underestimate the quality of their speech as they rate themselves even lower in performance than external observers (Rapee & Lim, 1992), indicating a diminished sense of one's own capabilities. Considering these findings and the fact that the overarching concept of social anxiety in

general is associated with a negative perception of oneself (Rapee & Heimberg, 1997), it gives rise to investigate the role of students' self-esteem in this context.

Self-esteem

One factor that might play a role in how much students experience presentation anxiety might be self-esteem. Self-esteem can be defined as „the degree to which the qualities and characteristics contained in one's self-concept are perceived to be positive. It reflects a person's physical self-image, view of his or her accomplishments and capabilities, and values and perceived success in living up to them, as well as the ways in which others view and respond to that person […]" (Online APA Dictionary, n.d.).

High self-esteem is associated with several benefits such as enhanced initiative, happiness, pleasant feelings and making a better impression on others, whereas low self-esteem is associated with the absence of those benefits and incidences of depression (Baumeister et al., 2003). However, it was also found that high levels of self-esteem are associated with narcissism, which in turn can lead to aggression if a person's view of him- or herself is threatened or disputed by others (Baumeister et al., 2000). Moreover, it was found that high self-esteem is positively associated with academic success (Hyseni Duraku & Hoxha, 2018) and increases over the lifespan, especially in adolescence but also in young adulthood (Erol & Orth, 2011). In line with this, Nordstrom et al. (2014) found that relationships between college students' social anxiety and academic, social, and institutional adjustment were mediated by self-esteem. Since presentation anxiety is a subtype of social anxiety (Blöte et al., 2009) these findings may also have implications for students' presentation anxiety.

Furthermore, with regard to the physiological component of anxiety it was shown that high levels of self-esteem can serve as an anxiety-buffering function in threatening situations (Greenberg et al., 1992). The aforementioned authors found this to be true especially regarding anxiety's physiological arousal, which was reduced in participants with higher self-esteem. It may also be the case that there is an association between the cognitive component of anxiety and self-esteem as it has been found that positive cognitions correlate with high self-esteem (Danielsson & Bengtsson, 2016) and could therefore counteract anxiety. Furthermore, Rosenberg (1962) found that low levels of self-esteem are associated with anxiety-related behaviour such as hand trembling and fingernail biting, proposing a link to the behavioural component.

Experience in terms of years studied and age

In addition to the aforementioned links between self-esteem and anxiety there is also reason to assume that experience might have an influence on both. Experience can be defined as "the fact or state of having been affected by or gained knowledge through direct observation or participation" (Merriam-Webster, n.d.). Since the risk of suffering from public speaking anxiety is minimized if one speaks more frequently in public (Marinho et al., 2017), the question arises whether students with increasing age and number of years studied also have less presentation anxiety due to recurring presentations over the years. Additionally, it was found that experience also has an influence on their self-esteem. Self-esteem increases over the course of life and particularly so during adolescence but also in young adulthood (Erol & Orth, 2011). Moreover, Krauss and Orth (2021) found work experience to predict self-esteem, which suggests that this might also be the case for students' studying experience. Thus, the influence of students' experience in terms of years studied and age on presentation anxiety could be partially explained through an increase in self-esteem over the years.

Joint cognitive aspect of self-esteem and presentation anxiety's cognitive component

All these findings suggest self-esteem, social anxiety, and its components to be closely associated with one another. This gives reason to suspect that self-esteem may also play a role in the emergence and experience of students' presentation anxiety, since it is a specific form of social anxiety. It is however not clear what the specific role of the cognitive, physiological, and behavioural components of presentation anxiety regarding self-esteem is. Which component is more strongly associated with self-esteem still has to be investigated. Although research points towards a negative association between self-esteem and the three components for generalised anxiety (Greenberg et al., 1992; Danielsson & Bengtsson, 2016; Rosenberg, 1962), it is conceivable that the cognitive component could show a stronger association with self-esteem. Since self-esteem pertains to personal thoughts, beliefs and judgements, which are all forms of cognition (Online APA Dictionary, n.d.; Blaskovich et al., 1991), it might be assumed that the cognitive component of presentation anxiety is more strongly connected to self-esteem than the physiological and behavioural component.

To the researcher's knowledge there has not been a study conducted that investigated how these specific different components of presentation anxiety may be associated with self-esteem and how much they differ in strength. If any differences in the associations between the different components of presentation anxiety and self-esteem can be found, this would mean that future interventions could focus more precisely on specific components that are

more likely to be related to self-esteem. It may thus be possible to develop more targeted interventions to improve both self-esteem as well as presentation anxiety.

Design and Hypotheses

The current study therefore seeks to investigate how students' presentation anxiety is associated with their level of self-esteem. Furthermore, it will be analysed if there can be any differences found in the associations of student's levels of self-esteem and the cognitive, behavioural, and physiological components of their presentation anxiety. Lastly, it will be investigated whether self-esteem can explain the influence of students' experience in terms of years studied and age on presentation anxiety. This leads to the research questions "How is students' presentation anxiety associated with their level of self-esteem and are there any differences in this association with regards to the cognitive, behavioural, and physiological components of anxiety?" and "Does self-esteem mediate the relationship between students' experience - in terms of years studied and age - and presentation anxiety?" From these research questions the following hypotheses are derived:

Hypothesis 1: Students' presentation anxiety and its components are negatively associated with their level of self-esteem, while controlling for students' experience in terms of years studied and age.

Hypothesis 2: Associations between the level of self-esteem and the components of presentation anxiety are stronger for the cognitive than for physiological and behavioural component, while controlling for students' experience in terms of years studied and age.

Hypothesis 3: The relationship between students' experience and presentation anxiety is mediated by self-esteem.

Methods

Participants

A total of 121 people between the ages of 17 and 31 ($M_{\text{Age}} = 21.53, SD_{\text{Age}} = 2.10$) took part in the study (Table 1). To partake in the study, participants had to be students and good English skills were required. Students were recruited via convenience sampling and the University of Twente's Test Subject Pool System (SONA), which allows them to earn credits in return by participating in research. Snowball sampling was also used to recruit participants from other universities. They didn't receive any compensation in return.

Table 1

Sample demographics (n = 121)

Variable	**Category**	***n***	**%**
Gender	Female	87	71.9
	Male	34	28.1
	Non-binary	-	-
Age	17	1	0.8
	18	4	3.3
	19	10	8.3
	20	19	15.7
	21	34	28.1
	22	27	22.3
	23	13	10.7
	24	1	0.8
	25	5	4.1
	26	4	3.3
	27	1	0.8
	28	1	0.8
	29	-	-
	30	-	-
	31	1	0.8
Years studied	< 1	23	19.0
	1 – 2	31	25.6
	2 – 3	33	27.3
	3 – 4	22	18.2
	4 – 5	4	3.3
	> 5	8	6.6
Nationality	German	71	58.7
	Dutch	34	28.1
	Other	16	13.2

Design and Procedure

A quantitative cross-sectional survey research design was used in this study. Data was obtained from April 1st until May 1st, 2022, through a survey which was created with Qualtrics. It was assured that all ethical guidelines and obligations were fulfilled during the study by gaining ethical approval. After the study received ethical approval from the Ethics Committee of the Faculty of Behavioural, Management and Social Sciences (BMS) (application no. 220389), it was published on the SONA platform and sent to potential participants through social media and direct messaging, using messenger apps or e-mail. Participants who studied at the University of Twente and took part in the study via SONA received 0.25 credit points in return. Before taking part in the survey, participants were presented an informed consent (Appendix A) which they were asked to agree on if they approved of it before being able to continue with the survey. Within the informed consent they were given information about the nature, purpose, and procedure of the study, as well as the right to withdraw from the study at any given time. Contact details of the researchers were also provided. Next, demographic and educational questions were asked (Appendix B).

Subsequently, participants filled out a modified version of the Public Speaking Anxiety Scale (Bartholomay & Holihan, 2016) to assess their levels of presentation anxiety and the Rosenberg Self-Esteem Scale (Rosenberg, 2015) to measure their levels of self-esteem. The average response time was 15 to 20 minutes. Since the survey was part of a larger survey conducted by several researchers, participants also answered questions about other factors related to presentation anxiety, which were not used for the current study.

Materials

Demographics

To collect the demographic data of the participants, a total of 9 questions were asked at the beginning of the survey (Appendix B). In order to be sure that the final data set would contain only data from the target group - students - participants were asked if they were students. To investigate students' level of experience they were asked to state their age and number of years spent in higher educational studies. Furthermore, their gender, nationality, and type of college were determined.

Presentation anxiety

A modified version of the Public Speaking Anxiety Scale (PSAS) from Bartholomay and Houlihan (2016) was used to assess students' levels of presentation anxiety (Appendix C). The PSAS measures individuals' levels of public speaking anxiety and the three different components of it (cognitive, behavioural and physiological) on three subscales and 17 items

in total. Answers can be given on a 5-point Likert scale ranging from *"not at all"* to *"extremely"*. The minimum score is 17 and the maximum score is 85, with higher scores indicating a higher level of anxiety. The only change made to the original version is that the word "speech" in some items was changed to the word "presentation". This change was kept minimal in order to not compromise the original psychometric properties of the scale. The cognitive subscale includes the items 1-8 (e.g., item 3: *"I am nervous that I will embarrass myself in front of the audience"*). The items 9, 12, 15 and 17 relate to the behavioural subscale (e.g., item 12: *"I fidget before speaking"*). The physiological subscale comprises of the items 10, 11, 13, 14, and 16 (e.g., item 10: *"I feel sick before speaking in front of a group"*). Reverse-coding was applied to items 6, 7, 8, 16 and 17, meaning answering with *"extremely"* corresponds to low levels of anxiety in those cases.

A reliability analysis was conducted using Cronbach's alpha and revealed an excellent internal consistency of the overall PSAS with $\alpha = .93$. Furthermore, the internal consistencies of the three subscales were also found to be high with $\alpha = .87$ for the cognitive, $\alpha = .72$ for the behavioural, and $\alpha = .87$ for the physiological one. Moreover, Bartholomay & Houlihan (2016) found a high convergent validity ($r = .835–.845$) when compared with other speech anxiety scales and a good convergent validity ($r = .350–.511$) when compared to other anxiety measuring scales.

Self-esteem

To measure students' individual level of self-esteem the Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 2015) was used (Appendix D). It comprises 10 items that measure self-esteem on a 4-point Likert scale ranging from *"strongly agree"* to *"strongly disagree"* (e.g. "*I feel that I'm a person of worth.*"). Reverse-coding was applied to five of the items, meaning answering with "strongly disagree" indicates a high level of self-esteem (e.g. "*At times I think I am no good at all.*") in those cases. Scores on the scale can range from 0 to 30, with higher scores corresponding to a higher level of self-esteem. A reliability analysis was conducted using Cronbach's alpha and revealed an excellent internal consistency of the RSES with $\alpha = .90$. Blascovich et al. (1991) and Schmitt & Allik (2005) also found it to be a highly reliable and valid scale, even cross-culturally.

Experience in terms of years studied and age

Students' experience in terms of years studied and age was measured with two items from the demographic questions that were asked at the beginning of the survey (Appendix B). The number of years studied was measured with the question "*How many years have you*

been a student for as of now? (This is not limited to your current study, please fill in the total amount of years you have been enrolled in a higher educational study)". Answer options ranged from "*Less than 1 year*" to "*More than 5 years*". Students' age was measured with the question "*How old are you?*" which was answered as an open question with no precast age categories.

Data Analysis

All of the collected data were exported from Qualtrics and imported into the Statistical Package for the Social Sciences (IBM SPSS Statistics 27) in which any data that was not useable was deleted. Exclusion criteria were not being a student and not having filled out the survey completely up to and including the last item of the RSES. The sample was checked for possible outliers.

A total of 155 participants signed up for the study. 7 participants were excluded because they stated not to be a student currently. Another 27 participants were also excluded because they didn't fill out the survey completely up to and including the last item of the RSES. Thus, the final data set comprised 121 participants.

Reverse coding for the respective items of each scale was applied before outcome variables for each scale were created. To determine the strength of the associations between the different scale measurements, they were first standardised using z-scores. A significance level of $p = .05$ was applied.

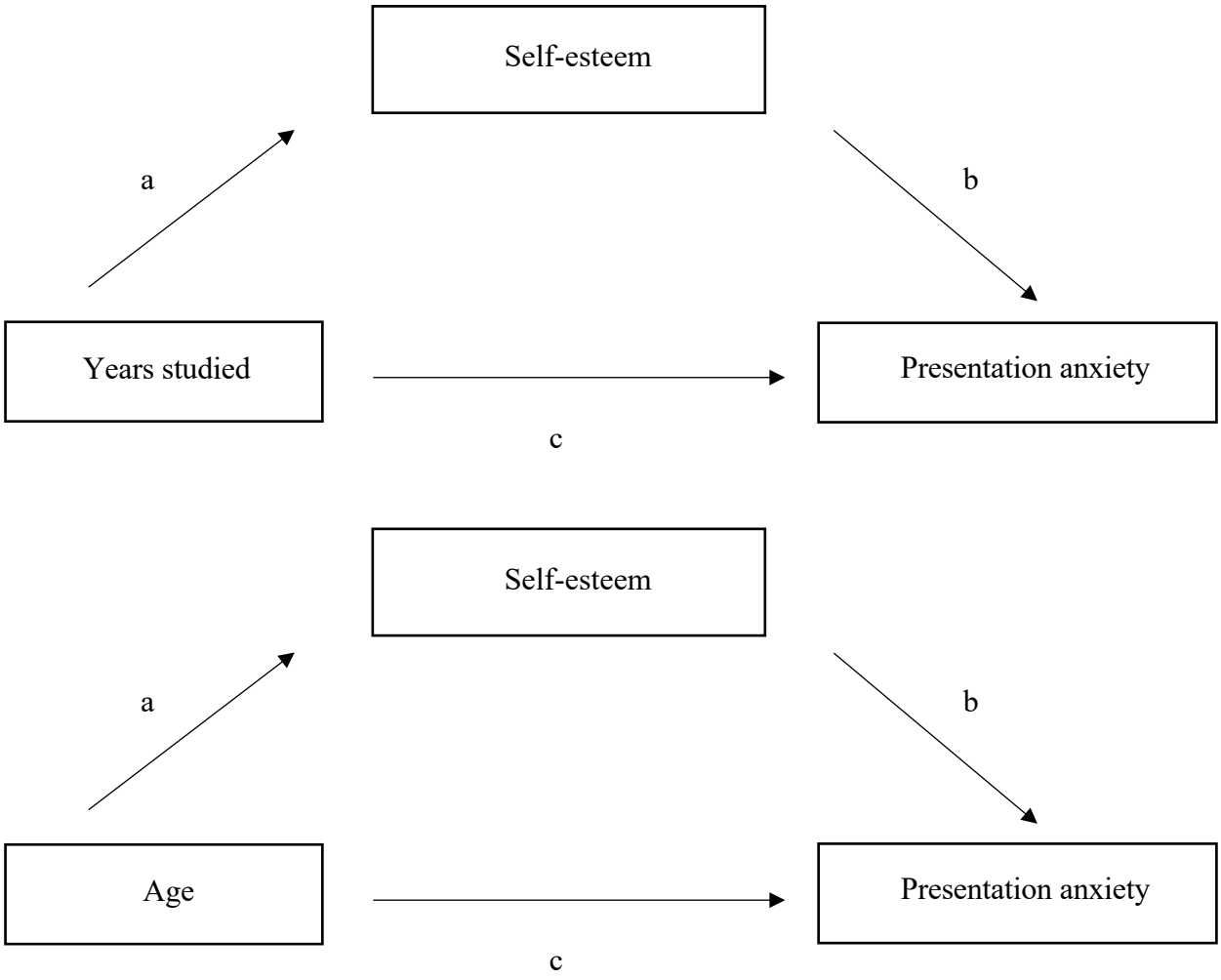
Subsequently, descriptive statistics were used to explore the data regarding demographic variables, levels of presentation anxiety, its' three components and levels of self-esteem. Next, the data was checked for linearity, independence, homoscedasticity and normality to conduct further analyses, which were all met. To determine the association between levels of self-esteem, presentation anxiety and its' three components, a Pearson correlational analysis was conducted. The same was done for assessing the association between students' experience in terms of years studied and age, levels of self-esteem and presentation anxiety.

To test hypothesis 1 and 2, four hierarchical multiple linear regression analyses were conducted. The first block of each analyses included years studied and age as control variables, while presentation anxiety or one of its three components was added to the second block. Lastly, to test hypothesis 3, two mediation analyses were conducted with either years studied or age as the predictor variable and self-esteem and presentation anxiety as the mediator and outcome variable, respectively (Figure 1). This was done with the PROCESS macro tool v. 4.1 for SPSS (Hayes, 2022). The non-parametric method of bootstrapping with

5000 resamples was used to test for direct and indirect effects. Significant mediation effects exist if the 95 % confidence intervals of the indirect effects do not include the value zero.

Figure 1

Mediation analyses of the effects of years studied and age on presentation anxiety through the mediator self-esteem



Results

Descriptive statistics

Presentation anxiety

A total score of the 17 items of the PSAS was calculated for each of the 121 participants, theoretically ranging on a scale from 17 to 85, with higher scores indicating a higher level of anxiety. Actual scores ranged from 24 to 77 (M = 49.07, SD = 13.91). Bartholomay and Houlihan (2016) suggest a cut-off score of 64 for the presence of elevated

levels of anxiety and a cut-off score of 73 for the presence of significant and impairing anxiety. According to these cut-off scores 20 participants (16.53 %) showed elevated levels of anxiety and 3 participants (2.48 %) displayed significant and impairing anxiety. The cognitive subscale could range from 8 to 40 and actual scores ranged from 10 to 36 (M = 22.43, SD = 6.65). The behavioural subscale could range from 4 to 20 and actual scores ranged from 4 to 19 (M = 10.95, SD = 3.64). The physiological subscale could range from 5 to 25 and actual scores ranged from 7 to 25 (M = 15.69, SD = 4.77).

Self-esteem

For each of the 121 individuals, a total score of the RSES's 10 items was calculated, theoretically ranging from 0 to 30, with higher scores suggesting a higher level of self-esteem. The outcome scores ranged from 1 to 30 (M = 18.83, SD = 5.42).

Experience in terms of years studied and age

The number of years studied ranged from less than a year to more than 5 years, with most of the students studying for either between 1 and 2 years (25.6 %) or 2 and 3 years (27.3 %). Students' age ranged from 17 to 31 years (M_{Age} = 21.53, SD_{Age} = 2.10).

Pearson correlational analyses

Pearson Correlations of the RSES scores with the overall PSAS scores, the cognitive, behavioural and physiological subscales were all significant (Table 2). This indicates that presentation anxiety decreases with higher levels of self-esteem. The correlation of the number of years studied and the PSAS scores was also significant. No significant correlations were found between the RSES scores and the number of years studied, the RSES scores and students' age, and the PSAS scores and age.

Table 2

Pearson correlations of presentation anxiety, its components, experience and self-esteem

		Self-esteem (RSES score)	Presentation anxiety (PSAS score)
Presentation anxiety	PSAS score	-.48**	
	Cognitive component	-.49**	
	Behavioural component	-.42**	
	Physiological component	-.39**	
Experience	Years studied	.17	-.22*
	Age	.13	-.14
Self-esteem	RSES score		-.48**

Note. "**" means that correlation is significant at the .001 level (2-tailed). "*" means that correlation is significant on the .05 level (2-tailed).

Hierarchical multiple linear regression analyses

Hypothesis 1

A hierarchical multiple linear regression analysis was conducted to test hypothesis 1, stating that students' presentation anxiety and its components are negatively associated with their level of self-esteem, while controlling for experience in terms of years studied and age. In the first block of the analysis, the control variables age and years studied were analysed. They accounted for 5.00 % of the variation in students' presentation anxiety, while the model was not significant $F(2, 118) = 2.97$, $p = .055$. When including the predictor variable self-esteem in the second block, an additional 20.00 % of the variation was accounted for and the change of R^2 was significant ($F(3, 117) = 12.77$, $p < .001$). While controlling for age and years studied, the regression coefficient $\beta = -1.16$ (95% C.I. [-1.57, -0.75], $p < .001$) of self-esteem suggests that one additional unit of self-esteem leads to a decrease of presentation anxiety by approximately 1.16 units. The standardised regression coefficient was $\beta = -.45$ ($SE = .08$, $p < .001$). Hypothesis 1 was therefore accepted.

Hypothesis 2

Three hierarchical multiple linear regression analyses were conducted to test hypothesis 2, stating that associations between the level of self-esteem and the components of presentation anxiety are stronger for the cognitive component than for the behavioural and

physiological component, while controlling for students' experience in terms of years studied and age. Each analysis included a different component of presentation anxiety as the outcome variable.

The behavioural component. In the first block of the analysis, the control variables age and years studied were analysed. They accounted for 6.00 % of the variation in the behavioural component of students' presentation anxiety. The model was significant, $F(2, 118) = 44.64$, $p = .033$. When including the predictor variable self-esteem in the second block, an additional 15.00 % of the variation was accounted for and the change of R^2 was significant ($F(3, 117) = 9.85$, $p < .001$). While controlling for age and years studied, the regression coefficient $\beta = -.26$ (95% C.I. [-0.37, -0.15], $p < .001$) of self-esteem suggests that one additional unit of self-esteem leads to a decrease of the behavioural component of presentation anxiety by approximately 0.26 units. The standardised regression coefficient was $\beta = -.39$ ($SE = .08$, $p < .001$).

The physiological component. In the first block of the analysis, the control variables age and years studied were analysed. They accounted for 2.00 % of the variation in the physiological component of students' presentation anxiety, while the model was not significant ($F(2, 118) = 1.47$, $p = .234$). When including the predictor variable self-esteem in the second block, an additional 14.00 % of the variation was accounted for and the change of R^2 was significant $F(3, 117) = 7.60$, $p < .001$. While controlling for age and years studied, the regression coefficient $\beta = -.33$ (95% C.I. [-0.48, -0.18], $p < .001$) of self-esteem suggests that one additional unit of self-esteem leads to a decrease of the physiological component of presentation anxiety by approximately 0.33 units. The standardised regression coefficient was $\beta = -.38$ ($SE = .08$, $p < .001$).

The cognitive component. In the first block of the analysis, the control variables age and years studied were analysed. They accounted for 5.00 % of the variation in the cognitive component of students' presentation anxiety. The model was significant ($F(2, 118) = 3.16$, $p = .046$). When including the predictor variable self-esteem in the second block, an additional 21.00 % of the variation was accounted for and the change of R^2 was significant $F(3, 117) = 13.75$, $p < .001$. While controlling for age and years studied, the regression coefficient $\beta = -.57$ (95% C.I. [-0.77, -0.37], $p < .001$) of self-esteem suggests that one additional unit of self-esteem leads to a decrease of the cognitive component of presentation anxiety by approximately 0.57 units. The standardised regression coefficient was $\beta = -.47$ ($SE = .08$, $p < .001$).

All three hierarchical multiple linear regression models thus revealed significant negative associations of the components of presentation anxiety and self-esteem, while controlling for age and years studied. In addition to the previously conducted Pearson correlation analysis, the larger standardised regression coefficient of the cognitive component also shows that the cognitive component of presentation anxiety is more strongly associated with self-esteem than the other two are. Hypothesis 2 was therefore accepted.

Mediation analyses

Hypothesis 3

Two mediation analyses were conducted to test hypothesis 3. The outcome of the mediation analyses is shown in Table 3. No significant effects of the predictors years studied ($p = .064$) and age ($p = .155$) on the mediator self-esteem were found on the *a*-paths. Only the *b*-paths showed significant effects of the mediator self-esteem on the outcome variable presentation anxiety in both analyses, $p < .001$. Direct effects were not significant for the effects of years studied and age on the outcome variable presentation anxiety, $p = .083$ and $p = .355$, respectively. Total effects on the *c*-paths were significant for the effect of years studied on presentation anxiety ($p = .016$) but not for the effect of age on presentation anxiety ($p = .136$). Bootstrap confidence intervals of the indirect effects both comprised the value zero. No indirect effects could thus be found. Hence, hypothesis 3, stating that the relationship between students' experience and presentation anxiety is mediated by self-esteem, was rejected.

Table 3

Mediation analyses of the influence of the mediator Self-esteem on the effect of students' experience (in terms of years studied and age) on presentation anxiety

Predictor	Mediator	*a*	*b*	*c* (Total Effect)	Direct Effect	*a x b* (Indirect Effect) (95% C.I.) [a]
Years studied	Self-esteem	0.66	-1.16**	-2.20*	-1.43	-0.77 (-1.72, 0.06)
Age	Self-esteem	0.34	-1.20**	-0.90	-0.50	-0.40 (-1.06, 0.10)

Note. ** $p < .001$. * $p < .05$. [a] Bootstrap confidence intervals are bias corrected (5000 resamples).

Discussion

The aim of this study was to investigate students' presentation anxiety, its cognitive, behavioural and physiological components and their relationship with self-esteem. Furthermore, it was investigated whether self-esteem mediates the effect of experience in terms of years studied and age on students' presentation anxiety. Previous studies found self-esteem to be associated with anxiety in general (Greenberg et al., 1992; Rosenberg, 1962; Sowislo & Orth, 2013) and public speaking anxiety (McCroskey et al., 1977), but no research has been conducted yet to investigate the role of self-esteem in anxieties' different components. Therefore, this study serves as a first attempt to investigate this issue by examining it in the specific context of students' presentation anxiety.

Moreover, the present study was conducted during spring 2022, a time when many of the Covid-19 measurements were abandoned and many lectures and tutorials could be held on campus again. The Covid-19 pandemic was and still is a serious threat to the physical health of the world population, but it has also been found that it negatively affected people's mental health (Pfefferbaum & North, 2020), at least temporarily. In addition, Maia and Dias (2020) found significantly higher levels of anxiety in students during the pandemic compared to pre-pandemic times. Therefore, the current study also serves to examine to what extent

students' mental health in terms of self-esteem and presentation anxiety may have been affected by the pandemic.

Summary of results

Support for hypothesis 1 was found as presentation anxiety and its components were all found to be moderately negatively associated with self-esteem. This is consistent with previous findings who found self-esteem to be associated with less physiological arousal (Greenberg et al., 1992), positive cognitions (Danielsson & Bengtsson, 2016) and less anxiety-related behaviour like hand trembling (Rosenberg, 1962). For students who suffer from presentation anxiety, this insight is important. The findings suggest that an increase in self-esteem could minimise presentation anxiety in any case, regardless of whether the anxiety manifests itself in cognitive, behavioural, or physiological symptoms.

Hypothesis 2 could also be supported. Even though all three components of presentation anxiety showed a negative moderate association with self-esteem, the association of self-esteem and the cognitive component was the strongest of the three. This found difference in strength provides new insights on the influence of self-esteem on the different components of presentation anxiety. Since self-esteem pertains to personal thoughts, beliefs and judgements about oneself and how others might view oneself (Online APA Dictionary, n.d.; Blaskovich et al., 1991), which are all cognitive functions, a particular stronger association of the cognitive component and self-esteem was expected.

A mediation effect of self-esteem for the relationship between students' experience and their presentation anxiety could not be found and therefore hypothesis 3 was rejected. However, on the basis of previous findings, a mediation effect was expected since a link between self-esteem and anxiety (Greenberg et al., 1992; Danielsson & Bengtsson, 2016; Rosenberg, 1962), between experience and self-esteem (Erol & Orth, 2011; Krauss & Orth, 2021) and between experience and anxiety (Marinho et al., 2017) was found. Not only did the data analyses yield no mediation effect but also no significant direct effect of experience on presentation anxiety was found. One explanation for a lack of this effect could be the variables with which experience was measured, namely years studied and age. While it can be assumed that over the course of the years the number of presentations held by students increases, the actual number of held presentations could be a more precise measure of experience. This would be in line with Marinho et al. (2017) who found public speaking anxiety to be diminished in those students who participate more often in activities involving speaking to groups of people.

Even though no mediation effect could be found with age and number of years studied as constituents of experience, the results show a small total effect of years studied on presentation anxiety, which was negative. Eventually, three insights may be concluded. First, findings of experience in terms of years worked in a job which are linked to self-esteem (Krauss & Orth, 2021) may not be transferred to years studied and self-esteem. Secondly, a possible mediation effect of experience on presentation anxiety through self-esteem may be found if experience is measured with different variables (e.g., number of activities involving speaking to groups of people (Marinho et al., 2017)). Thirdly, nonetheless, presentation anxiety decreases to a small extent over the course of the study, regardless of the level of self-esteem.

Limitations, strengths and recommendations

Among the limitations of the current study is the fact that it mainly comprises female participants. The findings can thus not necessarily be generalised to students with other genders, especially so because research found females to be more often affected by public speaking anxiety (Marinho et al., 2017). Furthermore, most participants were Psychology students who entered the study via SONA. It was not specified which subjects the remaining participants studied. Therefore, it is conceivable that taking the study subject into account could yield different results, mainly because type and number of presentations differ per study subject. Another limitation of the study is the ecological validity of the measured presentation anxiety since self-report measures were used to assess participants' levels of self-esteem and presentation anxiety. While both the RSES and the PSAS have good psychometric properties (Rosenberg, 2015; Bartholomay & Houlihan, 2016), the physiological and behavioural component of presentation anxiety may yield different results if measured with measuring equipment and observed by outside observers. Lastly, since only university students were surveyed, the results cannot be generalized to students with a different education level.

A strength of this study is the time period in which it was conduct since it gives us new insights into students' post pandemic levels of self-esteem and presentation anxiety. The data was collected during April 2022, a time shortly after most of the Covid-19 measurements were already abandoned. Curfews or restrictions of how many people could meet at a time were no longer applied. Moreover, studying on campus was also possible again to a large extend. While the pandemic influenced people's overall wellbeing (OECD, 2021), it is not yet clear what the lasting effects of the pandemic will be. The results of the current study however revealed no elevated or decreased but normally distributed levels of

self-esteem and anxiety to present. This suggests that the pandemic had at least no lasting effects on these two parameters.

Based on the found limitations the following recommendations for future research are given: Future research should be aware of the difficulties of assessing presentation anxiety and should develop better suited measurements of experience, for instance by assessing the number of activities which involve speaking in front of a group of people. Measuring experience is also aggravated by the fact that often several weeks or months lie between students' presentations. During this time gained experience could be lost. It can thus not necessarily be implied that an increasing number of presentations without considering time intervals between presentations could mean an increase in experience. Therefore, a larger-scale study should take this into account and implement more precise measures of experience.

Moreover, future research should be aware of the limitations of assessing presentation anxiety and self-esteem through self-report measures. Despite having good psychometric properties, the PSAS and the RSES are also subject to the participants' own subjectivity. For presentation anxieties' cognitive component and self-esteem this does not necessarily pose a problem, since the content of the thought processes underlying them can only be observed and reported by the participant him- or herself directly anyway. Presentation anxieties' behavioural and physiological components, on the other hand, could be measured much more accurately by outside observers and measuring devices such as smart watches (Jat & Grønli, 2022). Moreover, fluctuations of self-esteem and presentation anxiety should be considered over time by measuring them repeatedly at different time points. To get a clearer view of the issue, it might thus be advisable for future research to additionally measure fluctuations of self-esteem and presentation anxiety through ecological momentary assessment (Csikszentmihalyi & Larson, 2014), measure time intervals between presentations and assess participants' behaviour during a presentation by outside observers. Physiological arousal in the form of blood pressure or heart rate could be measured through wearables (Kario et al., 2020).

Another implication for future research that arises from the circumstances surrounding the Covid-19 pandemic is to investigate the role of online versus on campus presentations and which role self-esteem and presentation anxiety play in them. The past two years required a shift from traditional on-site studying to studying in an online environment. Many presentations also had to take place online. Whether this spatial separation from the

audience is rather beneficial or detrimental regarding presentation anxiety should therefore be examined more closely.

Implications

The main finding of this study, that self-esteem is especially associated with the cognitive component of presentation anxiety, implies practical advice for future interventions. It is recommended that interventions which seek to improve self-esteem and minimise students' presentation anxiety address the thought patterns first. One suitable way to do this would be mindfulness interventions such as meditation. Research found that mindfulness predicts high levels of self-esteem and low levels of social anxiety (Rasmussen & Pidgeon, 2011). Moreover, Kumar et al. (2017) found mindfulness to decrease public speaking anxiety and increase self-esteem. They could also find a mediating effect of self-esteem between mindfulness and public speaking anxiety. If an improvement in the cognitive component can be achieved, it may even be the case that this in turn has positive synergistic effects on the other two components.

Conclusion

In conclusion, the present study supports previous findings of the relationship between self-esteem and anxiety and transferred this to the specific presentation anxiety of university students. Negative association between self-esteem and presentation anxiety's cognitive, behavioural and physiological components were found. Self-esteem was not found to mediate the effect of experience in terms of years studied and age on presentation anxiety. Since the association between self-esteem and the cognitive component of presentation anxiety was the strongest, future interventions should make use of the joint cognitive aspect of self-esteem and presentation anxiety.

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Appendices

Appendix A

Informed Consent

Project title and Investigators

You are being invited to participate in a research study titled “Presentation anxiety among students”. This study is being done by Jenny Diephaus, Thomas Lange, Renske van den Brink, Boutaina Chami from the Faculty of Behavioural, Management and Social Sciences at the University of Twente.

Purpose

This study investigates students' presentation anxiety, personality, coping, self-esteem, experience, self-efficacy, locus of control and achievement goals. The data will be used for the bachelor thesis of each researcher.

Procedure

When participating in our study, you will first ask to fill in your demographic information and then continue to answer some questions relating to presentation anxiety. Please answer as honest as possible. The study will take you approximately 15-20 minutes to complete.

Participant rights

Your participation in this study is entirely voluntary and you can withdraw at any time.

Risk and benefits

We believe there are no known risks associated with this research study; however, as with any online related activity the risk of a breach is always possible. To the best of our ability your answers in this study will remain confidential. We will minimize any risks by treating any responses anonymously, as it is not possible to trace back the answers to you. Therefore, your identity will stay hidden throughout the whole research process.

Consent and authorization

To continue with this study, you need to indicate that you understood and agree with the aforementioned information and give informed consent for participation. Clicking 'I agree and consent to participating in this study' implies that you have been informed sufficiently

about the nature and method of this research and that you agree to participate in it

Study contact details for further information:

Student-researchers:

Jenny Diephaus j.diephaus@student.utwente.nl

Thomas Lange t.lange@student.utwente.nl

Boutaina Chami b.chami@student.utwente.nl

Renske van den Brink r.s.m.vandenbrink@student.utwente.nl

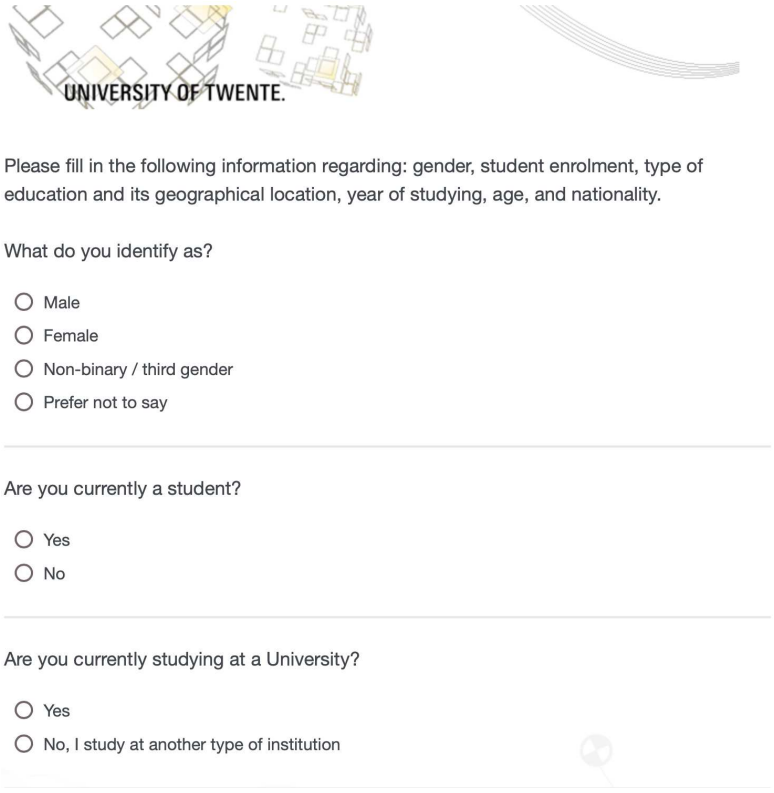
Supervisor:

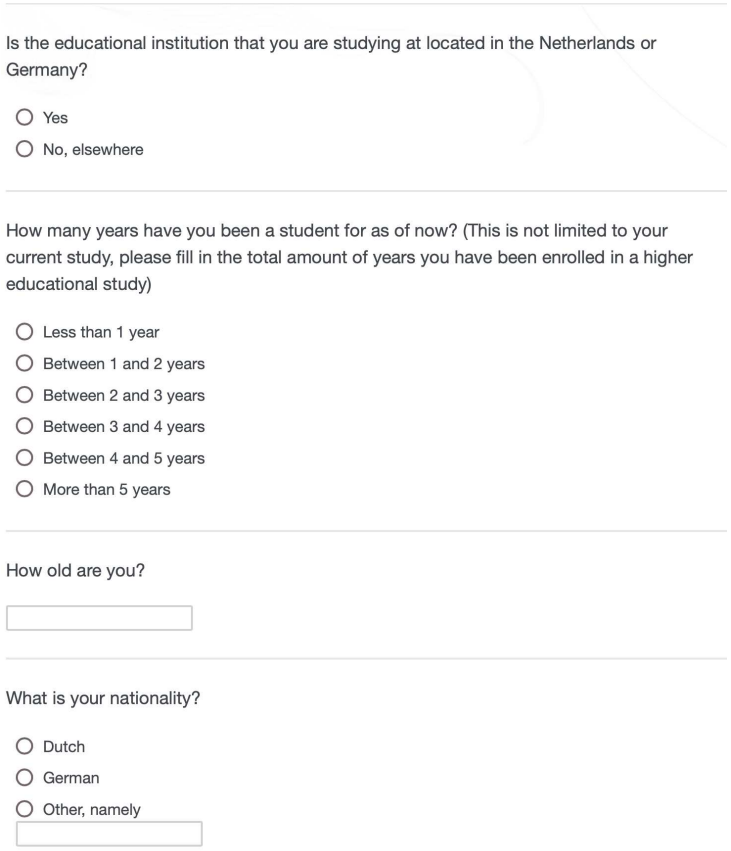
Martha Kreuzberg m.s.kreuzberg@utwente.nl

If you accept the aforementioned terms, and wish to proceed to the survey, please click on "'I agree and consent to participating in this study". Then click on the arrow to go to the next page.

Appendix B

Demographic and educational questions





Appendix C

Modified version of the Public Speaking Anxiety Scale (PSAS) (Bartholomay & Holihan, 2016):

1. Giving a presentation is terrifying
2. I am afraid that I will be at a loss for words while speaking
3. I am nervous that I will embarrass myself in front of the audience
4. If I make a mistake in my presentation, I am unable to re-focus
5. I am worried that my audience will think I am a bad speaker
6. I am focused on what I am saying during my presentation *
7. I am confident when I give a presentation *
8. I feel satisfied after giving a presentation *
9. My hands shake when I give a presentation
10. I feel sick before speaking in front of a group
11. I feel tense before giving a presentation
12. I fidget before speaking
13. My heart pounds when I give a presentation

14. I sweat during my presentation
15. My voice trembles when I give a presentation
16. I feel relaxed while giving a presentation *
17. I do not have problems making eye contact with my audience*

Appendix D

Rosenberg Self-Esteem Scale (RSES) (Rosenberg, 2015):

1. On the whole, I am satisfied with myself.
2. At times I think I am no good at all. *
3. I feel that I have a number of good qualities.
4. I am able to do things as well as most other people.
5. I feel I do not have much to be proud of. *
6. I certainly feel useless at times. *
7. I feel that I'm a person of worth.
8. I wish I could have more respect for myself. *
9. All in all, I am inclined to think that I am a failure. *
10. I take a positive attitude toward myself.