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The mediating effect of Loneliness between Psychological Attachment and Social anxiety

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Abstract

The feeling of loneliness has been increasing worldwide and can be influenced by multiple factors, such as psychological attachment (Lim et al., 2020; Ernst & Cacioppo, 1999). In particular, the attachment domains avoidance and anxiety, were found to have a positive relationship with feelings of loneliness, while secure attachment does not. Loneliness was found to elicit negative consequences, such as social anxiety, due to limited social relationships caused by loneliness (Lim et al., 2016; Suri et al., 2019; Erozkhan, 2011; Manning et al., 2017). Previous research did not study the influence of loneliness on the relationship between attachment and social anxiety, despite the fact that loneliness is rooted in the attachment process and negatively impacts social anxiety severely (Ernst & Cacioppo, 1999). Therefore, this study hypothesized that loneliness mediates the relationship between attachment and social anxiety, which was investigated for secure attachment, anxious, and avoidant attachment domains. The sample comprised 94 respondents, 69 female, 22 male, and three non-binary participants between the ages 18 and 34. The outcomes revealed that loneliness was found to mediate the relationship between avoidant and anxious attachment domains and social anxiety, but not for secure attachment. The implications of this study are that clinical interventions should consider the interplay of attachment, loneliness, and social anxiety. Thus, treatment should focus on all three factors rather than addressing isolated issues to best assist patients.

Keywords: psychological attachment, social anxiety, loneliness

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The mediating effect of Loneliness between Psychological Attachment and Social anxiety

Worldwide, feelings of loneliness have been increasing, with 33% of adults found to experience feelings of loneliness in 2021 (Statista Research Department, 2022). It was often associated only with the elderly, although studies showed that loneliness is also a problem among young adults, teenagers, and even children (Margalit, 2010). Due to the increasing cases of loneliness in all age groups, loneliness has received more attention over the last few years and is increasingly understood as the next critical health issue (Lim et al., 2020).

Loneliness can be influenced and triggered by multiple aspects, such as a significant life event or moving away from home (Lim et al., 2020). Another aspect that strongly influences loneliness is psychological attachment, more precisely, insecure attachment (Ernst & Cacioppo, 1999). While secure attachment has been shown to be negatively related to loneliness, insecure attachment and feeling of loneliness are positively related (Suri et al., 2019). Insecure attachment is described by levels of anxiety and avoidance and can lead to fewer social connections (de Jong-Gierveld, 2021; Hazan & Shaver, 1987). The experience of loneliness was found to also increase the level of social anxiety due to the limited social relationships, which might be a problem that especially anxious or avoidant-attached individuals are facing, but not securely attached individuals (Lim et al., 2016; Suri et al., 2019; Erozkhan, 2011). However, the interaction between loneliness, attachment, and social anxiety has not been investigated yet. This limits our understanding of loneliness and consequent interventions.

Attachment and Social Anxiety

Attachment is defined as the beliefs one has about oneself and others which are based on and impacted by the quality of the relationship between children and their caretaker (Bowlby, 1969). Differences in the quality of interaction between a primary caretaker and

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children develop into different attachment patterns (Ainsworth et al., 1978). Bowlby (1973) defined secure and insecure attachment, with the latter divided into avoidant and anxious attachment (Ainsworth et al., 1978). These three attachment patterns were used to develop four attachment styles, which were found to be reflected into adulthood (Bartholomew & Horowitz, 1991; Hazan & Shaver, 1987). Furthermore, internal working models, namely the model of the self and the model of others, which shape cognitions and behavior in social situations and relationships (Bowlby, 1973; Bartholomew & Horowitz, 1991), were developed. The attachment styles were defined and based on these models and their levels of anxiety and avoidance (Bartholomew & Horowitz, 1991). Ainsworth and colleagues (1978) and Bartholomew and Horowitz (1991) stated that secure attachment style is defined by low anxiety and avoidance and positive models of the self and others. Ambivalent attachment style, sometimes also called preoccupied, has high levels of anxiety and low levels of avoidance and a positive model of others but a negative model of the self. The avoidant attachment style, also described as dismissing, is characterized by low levels of anxiety but high levels of avoidance and with a negative model of others but a positive one of the self. Lastly, disorganized/fearful attachment style, is described by both high levels of avoidance and anxiety.

Insecure-attached individuals have been shown to struggle with forming and maintaining good relationships or engaging in social interaction, which has been found to increase their anxiety about social situations (Manning et al., 2017; Erozkhan, 2009).

Anxiously-attached individuals have been found to be dependent on others and have an intense, negative reaction, when experiencing separation (Bartholomew & Horowitz, 1991; Lyddon et al., 1993). This leads to expectations of rejection from others and results in high social anxiety (Manning et al., 2017).

Social anxiety has been defined as an experience that is characterized by a strong fear of judgment in social settings (Morrison & Heimberg 2013). Additionally, avoidant

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attachment was associated with social anxiety, since it is characterized by a negative model of others which can result in distant relationships with others and discomfort in close relationships (Edelstein et al., 2004). Avoidant and distancing behaviors have been found for both avoidant and anxious attached individuals since both attachment domains evoked high levels of social anxiety (Read et al., 2018). Furthermore, Manning and colleagues (2017) found anxiously-attached individuals to have higher levels of social anxiety than avoidantly-attached individuals. However, Read and colleagues (2018) stated that an individual with high levels of anxious and avoidant attachment display even higher levels of social anxiety. On the contrary, secure attachment was associated with low levels of social anxiety since these individuals could form close relationships with others due to their positive working models (Wiseman et al., 2006). Therefore, attachment may have an important role in the development of social anxiety (Read et al., 2018; Manning et al., 2017).

The influence of Loneliness

Loneliness has been defined as a state of discomfort when there is a discrepancy between the awareness of the desired and actual interpersonal relationship (Perlman et al., 1984). Lim et al. (2016) determined loneliness as an antecedent for mental health problems, such as social anxiety. Increased levels of social anxiety were associated with biased post-event processing of social events leading to an adverse effect. As a result, negative beliefs about themselves and others were strengthened, and the fear of future events and the likelihood to engage in avoidance behavior was increased (Kashdan & Roberts, 2007). However, it is unknown what consequences this might have for anxiously and avoidantly attached individual, although loneliness has been found to be rooted in the attachment processes developed in childhood (Ernst & Cacioppo, 1999). Furthermore, it might extend their negative working model of others and self and, thereby, could increase their risk of social anxiety, especially considering their higher risk due to elevated loneliness levels. Due to their maladaptive perception of others and behaviors, insecurely attached individuals tend

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to experience poor relationships and social withdrawal (Erozkan, 2011) and as a consequence are more likely to develop and maintain loneliness (Carr et al., 2013). Anxiously-attached individuals were found to be lonelier in comparison to avoidantly-attached individuals, since they fear rejection. Therefore, only a few relationships can be formed and as a result, loneliness can arise (Nottage et al., 2022; Bartholomew, 1990). Avoidantly-attached individuals tend to avoid forming relationships, which results in experiences of loneliness (Nottage et al., 2022; Wiseman et al., 2006). In contrast, securely-attached individuals who felt comfortable being in social situations and interacting with others, reported to be less lonely (Gillath et al., 2008). The impact of loneliness on social anxiety for insecure attached individuals is still unknown and, therefore, the resulting mental health problems as well.

To our knowledge, there is no study investigating the mediating effect of loneliness on the relationship between psychological attachment and social anxiety. Furthermore, only a few studies investigated the relationship between loneliness and social anxiety. Therefore, this study will contribute to this research gap by investigating the mediating effect of loneliness on the relationship between secure attachment, anxious and avoidant attachment domains, and social anxiety.

Research Question and Hypotheses

In summary, this study aims to investigate the possible mediating effect of loneliness on the relationship between attachment and social anxiety. The research question is: What is the mediating effect of loneliness on the relationship between attachment and social anxiety?

The hypotheses are:

Hypothesis 1: Loneliness will mediate the relationship between psychological attachment and social anxiety. More specifically;

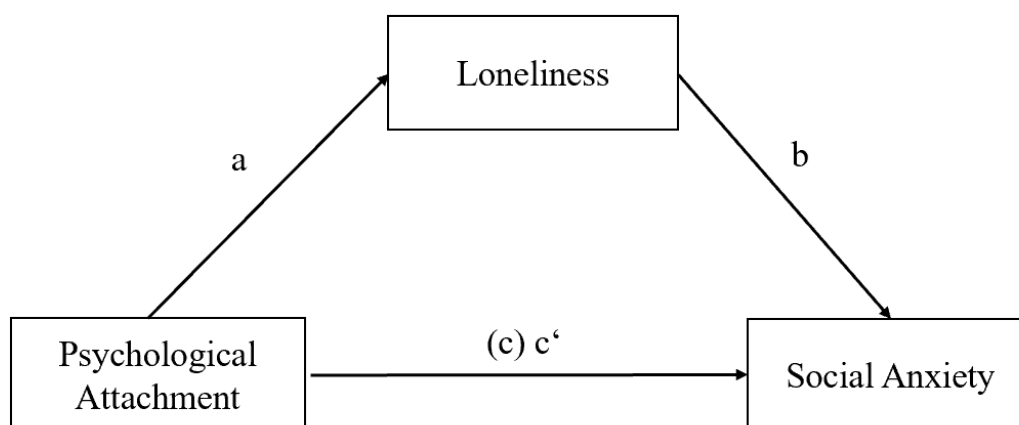
Hypothesis 1.1: Secure attachment will have a negative relationship with loneliness which in turn will be associated with low social anxiety.

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Hypothesis 1.2: Anxious attachment domain will have a positive relationship with loneliness which in turn will be associated with high levels of social anxiety.

Hypothesis 1.3: Avoidant attachment domain will have a positive relationship with loneliness which in turn will be associated with high levels of social anxiety.

Figure 1



Method

Participants

An a priori power analysis was conducted to determine the necessary sample size to test the hypotheses. A medium effect size was chosen with $d = 0.15$. Using the program G*Power revealed a sample size of 68 to achieve a power of 0.8. A total of 122 respondents participated in the study, of whom 28 were removed, due to not completing the questionnaire, being under 18 years old or not giving their consent to participate in the study. The final sample consisted of 94 participants with 69 female, 22 male and three non-binary participants. The age range was 18 to 64, with the majority of participants being in the age groups 18 – 24 and 25 – 34. Since only four participants were part of the older age groups, they were excluded from the study. The sample lives primarily in the Netherlands (70%), followed by

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Germany (24%). One person was living in Turkey, and thus as an outlier, was removed from the sample. The level of education was unevenly distributed in the sample, the majority had a Bachelor degree (72,3%), followed by a Master degree (14,9%), high school diploma (8,5%), vocational diploma (3,2%), and lastly HBO (1,2%) (see Appendix A, Table 1).

The recruitment of the respondents took place via social media, including WhatsApp and Instagram and the online system Sona from Utrecht University, and thereby, could earn 0.5 credits (pp-uur). Apart from that, the participants did not receive any incentives for taking part in the study.

Design and Procedure

The study was executed via an online questionnaire on Qualtrics. First, the purpose of the study was explained, which was to test the relationship between psychological attachment, anxiety in social situations, self-esteem and loneliness (although self-esteem was collected for the broader project and not relevant to this study). The candidate was informed about the possibility to withdraw the study, whom to contact for questions or problems and, the necessity to be at least 18 years old. Following, it was asked for their approval and consent, if this was not given – they were removed from the study. After completing the questionnaires on psychological attachment, social anxiety, loneliness and self-esteem, the demographic questions were asked (i.e., age, gender, level of education and current country of residence (see Appendix B). At the end, a summary informed the participants about the nature of the study and whom to contact if they had any questions.

In total, the questionnaire consisted of 77 questions excluding the self-esteem questionnaire and took approximately ten to fifteen minutes to complete. The participants responses were anonymous and IP addresses were not registered. The study is a cross-sectional in design.

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Ethical approval

The research project was approved by the Faculty Ethics Review Board and registered at the Utrecht University Student Ethics Review & Registration Site (UU-SER).

Measures

Psychological Attachment

Psychological attachment was measured with the Attachment Style Questionnaire (ASQ). Each question was answered on six-point Likert Scale (*1 = totally disagree; 6 = totally agree*), indicating how much they agreed with each statement. The questionnaire consisted of 40 items and three subscales, namely, secure attachment with statements such as, *“I am easier to get to know than most people”*, avoidant attachment, *“I prefer to depend on myself rather than other people”* and anxious attachment, *“It’s important to me to avoid doing things that others won’t like.”* (see Appendix B). For each scale different minimum and maximum scores were feasible, for secure attachment a minimum of 8 and a maximum score of 48, for avoidant a minimum of 17 and a maximum of 102, and, for anxious attachment a minimum of 15 and a maximum score of 90. Three items were reversed coded and, therefore, were adapted (see Appendix B). Past studies have shown that the scale is valid and reliable ($\alpha = 0.85$, Feeney et al., 1994; Iwanaga et al., 2018). For the sake of this research project, it will be focused on only secure attachment, anxious attachment domain and avoidant attachment domain.

Social Anxiety

To measure social anxiety, the 17-item Social Phobia Inventory (SPIN) was utilized. It was answered on a five-point Likert Scale (*0 = not at all; 4 = extremely*), thereby, a minimum score of 0 and a maximum score of 68 is possible. Each statement was rated regarding the frequency of experiencing one. Such statements were for e.g., *“Parties and social events*

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scare me.” (see Appendix B). Past studies determined that the scale is valid and reliable ($\alpha = 0.86$, Davidson et al., 1997; LeBeau et al., 2016).

Loneliness

For the determination of loneliness, the revised UCLA Loneliness Scale was used, which was answered on a four-point Likert scale ($1 = \textit{never}$; $4 = \textit{always}$) to indicate the frequency of experiencing each statement. A maximum score of 80 can be achieved, and a minimum of 20. Nine items were reversed-scored, and thus, were adjusted (see Appendix B). It included 20 items such as, *“I lack companionship.”* (see Appendix B). The scale has been shown to be valid and reliable ($\alpha = 0.94$, Hughes et al., 2004; Russel et al., 1980).

Statistical Analysis

The software Statistical Package IBM SPSS Statistics v28 (2021) was used to conduct the statistical analysis. The dependent variable was social anxiety, the independent variable psychological attachment and loneliness the mediator. After the data cleaning, an intercorrelation matrix was computed to determine if any variable needed to be controlled for. Following, the descriptive statistics were conducted including maximum, minimum, mean of the scores, the standard deviation, standard error and lastly kurtosis and skewness. To estimate the effect of the three mediation analyses, *PROCESS macro SPSS package*, version 4.1, was used.

Results

For each sub-hypothesis, a mediation analysis was performed to determine if loneliness mediated the relationship between secure attachment, avoidant and anxious attachment domain and social anxiety.

Descriptive statistics

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The descriptive statistics, particularly, the means showed a normal distribution (Table 2). This indicates that the sample did not report extremely high or low levels on social anxiety, loneliness, secure attachment, and any domain of attachment.

Table 2*Descriptive Statistic*

Variables	<i>M</i>	<i>Maximum</i>	<i>Minimum</i>	<i>SE</i>	<i>SD</i>	<i>Kurtosis</i>	<i>Skewness</i>
Social Anxiety	24,8	64	0	1.3	13	-.4	.3
Secure A. ^a	31,6	45	19	0.6	5.7	-.3	.2
Avoidant A. D. ^a	54,5	79	37	1.0	10	-.8	.1
Anxious A.D. ^a	54,5	78	31	0.9	9.3	-.4	-.1
Loneliness	38,8	62	22	0.9	9.4	.9	.2

Note. *N* = 82. ^aPsychological Attachment; ^a Secure Attachment; ^a Avoidant, Anxious Attachment Domain

The correlations between all variables were estimated to determine if another variable, next to the main variables correlated with social anxiety. Gender significantly correlated with social anxiety; thus, it was controlled for during the analyses (see Table 3 below).

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Table 3*Correlation between Social Anxiety and all Other Variables*

Variable	1	2	3	4	5	6	7	8	9
1. Social Anxiety	-								
2. Secure Attachment ^a	-.58**	-							
3. Anxious Attachment D. ^a	.47**	-.60**	-						
4. Avoidant Attachment D. ^a	.49**	-.70**	.61**	-					
5. Loneliness	.49**	-.75**	.49**	.69**	-				
6. Gender	.22*	-.07	.21*	.03	-.04	-			
7. Age	-.01	-.04	-.03	.07	.07	-.17	-		
8. Country ^a	.01	.09	.06	-.05	-.06	.32**	-.52**	-	
9. Education ^a	.17	.02	-.04	.11	.01	.24*	.14	.07	-

Note. $N = 82$. ** $p < 0.01$; * $p < 0.05$. ^a Country of Residency. ^a Level of Education. ^a Secure Attachment; ^a Avoidant, Anxious Attachment Domain

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Main analyses

A mediation analyses with *PROCESS macro SPSS package*, model 4 was chosen, to test the mediating effect of loneliness on psychological attachment and social anxiety. Gender was included as a control variable. Following, a multiple linear regression was performed, and the outcome of path a of the indirect effect was reported, which is the relationship between attachment (secure, anxious, avoidant) and loneliness (see Figure 1). Next, via a hierarchical regression analysis, path b of the indirect effect was determined, which is the relationship between loneliness and social anxiety (see Figure 1). Then the indirect effect ($a*b$) was estimated and with bootstrapping the significance was determined via the 95% confidence intervals. Furthermore, the direct effect (path c) between attachment on social anxiety, was computed (see Figure 1). Lastly, the total effect (path c') was reported as well (see Figure 1).

Multiple assumptions were tested to see if the variables were suitable for conducting the analyses. The first assumption tested the linear relation between secure, avoidant and anxious attachment, loneliness and social anxiety by checking the scatterplot and determining the linear relation via a line. This assumption was met. Second, the assumption of multicollinearity was tested by inspecting the correlation between the variables, since the correlations were not higher than 0.8 (Table 3), it was fulfilled. This can also be tested by checking the VIF value. No VIF value exceed 10, therefore, the assumption was met. Following, the independence of residuals was investigated and met with the Durbin-Watson statistic variable. Thereby, the variable must lie between the value of 1 and 3 and be as close as possible to the value of 2. These requirements were also fulfilled. Moreover, homoscedasticity, the variance of the residuals, was tested for being constant. Thereby, the scatterplot was checked to be random and not in a funnel shaped structure, which was the case and, thus, the assumption was fulfilled. Next, the residuals were tested to be normally distributed, whereby, it was checked if the p-plot demonstrated that the values of the sample

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were close to the ideal line. Also, this assumption was fulfilled. Moreover, skewness and kurtosis were utilized to test normality. The data was shown to be normally distributed, since the values were between -1 and +1 (Table 2). Lastly, the Cook's values determined if influential cases were found that bias the model. The assumption was met since no value exceeded 1 and thereby, no influential cases were detected.

Hypothesis 1

For the first sub-hypothesis, the effect of loneliness on the relationship between secure attachment and social anxiety was investigated. A significant relationship was detected between secure attachment and social anxiety ($\beta = -.97, t = -3.40, p = 0.001$) but not between loneliness and social anxiety ($\beta = .25, t = 1.44, p = .151$), while it was controlled for gender ($\beta = 5.38, t = 2.36, p = .02$). Moreover, a significant relationship was found between secure attachment and loneliness ($\beta = -1.23, t = -10.98, p = .001$), while controlling for gender ($\beta = -1.78, t = -1.31, p = .19$).

Thus, no mediating effect was found for loneliness on the relationship between secure attachment and social anxiety. However, both the total and direct effect were significant and showed that secure attachment negatively influenced social anxiety without loneliness and in the presence of the mediator loneliness. Secure attachment did not impact social anxiety via loneliness, so the indirect effect was not significant (Table 4).

Hypothesis 2

For the next sub-hypothesis, the mediating influence of loneliness was tested on the relationship between anxious attachment and social anxiety, while controlling for gender. A significant relationship was detected between anxious attachment and social anxiety ($\beta = .34, t = 2.43, p = 0.01$) and between loneliness and social anxiety ($\beta = .53, t = 3.88, p = .001$), while controlling for gender ($\beta = 5.02, t = 2.08, p = .03$). Moreover, a significant relationship

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was discovered between anxious attachment and loneliness ($\beta = .52, t = 5.63, p = .001$), while controlling for gender ($\beta = -2.88, t = -1.58, p = .11$).

A mediating effect of loneliness on the relationship between anxious attachment and social anxiety was found. A significant total effect indicated that anxious attachment positively influenced social anxiety. Moreover, the indirect effect was significant, thus, anxious attachment impacts social anxiety positively through loneliness. A significant effect was found for the direct effect, indicating that anxious attachment influences social anxiety significantly when loneliness is included (Table 4).

Hypothesis 3

The effect of loneliness on avoidant attachment and social anxiety was investigated. The relationship between avoidant attachment and social anxiety was shown to be significant ($\beta = .33, t = 2.14, p = .03$), as well as between loneliness and social anxiety ($\beta = .45, t = 2.69, p = .01$), while it was controlled for gender ($\beta = 6.20, t = 2.62, p = .01$). Furthermore, the relationship between avoidant attachment and loneliness was discovered to be significant ($\beta = .64, t = 9.26, p = .001$), while controlling for gender ($\beta = -1.02, t = -.69, p = .49$).

Hereby, all effects were found to be significant. Thus, the impact of avoidant attachment on social anxiety was significant and positive without the mediator. The relationship was also found to be significant via the mediator loneliness when it was included. Therefore, loneliness partially mediated the relationship between avoidant attachment and social anxiety, while controlling for gender (Table 4).

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Table 4*Total, direct, and indirect effects*

Variables			Total effects			Direct effects			Indirect effects			
IV	M	DV	β	t-value	p-value	β	t-value	p-value	β	SE	95% CI	
											Lower	Upper
Secure Attachment	Loneliness	Social Anxiety	-1.28	-6.82	0.001**	-.97	-3.40	.001**	-.31	.27	-	.20
Anxious Attachment	Loneliness	Social Anxiety	.62	4.77	0.001**	.34	2.43	.016*	.27	.09	.12	.45
Domain												
Avoidant Attachment	Loneliness	Social Anxiety	.62	5.43	0.001**	.33	2.14	.03*	.29	.12	.04	.53
Domain												

Note. $N = 82$. ** $p < 0.01$; * $p < 0.05$. SE = Standard Error, IV = Independent Variable; DV = Dependent Variable; M = Mediator

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Discussion

This study's purpose was to gain a better understanding of the influence of loneliness on the relationship between attachment and social anxiety, particularly the impact on secure, avoidant, and anxious attachment.

The mediating effect of loneliness

Hypothesis 1

Contrary to the first hypothesis, loneliness did not mediate the relationship between secure attachment and social anxiety, and therefore, secure attachment was not associated with a decrease in social anxiety as a consequence of low feelings of loneliness. However, it was found that secure attachment decreased loneliness and social anxiety directly.

While these findings were not expected, they provide novel insight into the relationship between secure attachment, loneliness, and social anxiety. One explanation might be the sample's similarities. The sample has a western European cultural background and is highly educated. Furthermore, they are between 18 and 34 years old, thus, young adults and in the same developmental stage (early adulthood) (Wood et al., 2018). This combination of characteristics might lead to similar developmental experiences in life, such as moving out and starting university. The developmental stressors can negatively influence the stability of their attachment when a situation is inconsistent with their expectation (Fraley, 2002; Raby et al., 2013). This might be the reason for the moderate secure attachment scores, which consequently could have led to the missing mediating effect of loneliness. Furthermore, different levels of secure attachment were found. Notzon and colleagues (2016) determined less securely attached individuals to score slightly higher on anxiety and avoidance and, thereby, on social anxiety. In comparison higher securely attached individuals were found to have lower levels of loneliness (Carcedo et al., 2022). Thus, highly securely attached

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individuals enjoy social interactions, leading to lower levels of loneliness and social anxiety (Gillath et al., 2008; Wiseman et al., 2006).

This implies that just being securely attached is not enough to eliminate loneliness and social anxiety since the level of security of your attachment is essential. Research supports the effect of secure attachment on social anxiety and loneliness (Lim et al., 2016; Suri et al., 2019; Erozkhan, 2011; Gillath et al., 2008).

Hypothesis 2

Loneliness was found to partially mediate the relationship between anxious attachment and social anxiety. This means that anxious attachment increases loneliness, which in turn, increases social anxiety.

Whilst the mediation has not been studied before, the significant findings of direct relationships are in line with previous research (Manning et al., 2017; Erozkhan, 2011). It was found that anxiously-attached individuals have high levels of loneliness, which are associated with high levels of social anxiety (Manning et al., 2017; Erozkhan, 2011). Also, the mediation showed that anxious attachment increased loneliness, which evoked high social anxiety. One possible explanation is that anxiously-attached individuals have a rather negative image of themselves but a positive one of others, which elicits the expectations that others might reject them. This fear of rejection can result in fewer social connections resulting in loneliness (Nottage et al., 2022; Manning et al., 2017). The absence of social connections and interaction elicited through loneliness increases social anxiety in anxiously-attached individuals (Erozkhan, 2011).

Hypothesis 3

The last hypothesis was also supported, loneliness partially mediated the relationship between avoidant attachment and social anxiety. This indicates that avoidant attachment increases loneliness which in turn has a positive effect on social anxiety.

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This mediation has not been investigated before, except for individual significant relationships, which are in line with previous research (Edelstein et al., 2004; Nottage et al., 2022; Wiseman et al., 2006). A possible explanation might be that avoidant individuals have a positive working model of themselves but a negative working model of others. Thereby, they tend to avoid intimate and close relationships and struggle in social settings, which positively impacts loneliness (Nottage et al., 2022; Wiseman et al., 2006). Loneliness, in turn, leads to a further absence of relationships, which is positively related to social anxiety (Erozkan, 2011).

Limitations

A limitation of this study is the possibility of sampling bias, since the sample consisted of 73% females, 23% males, and only 3% non-binary, which limits the generalizability for men and non-binary people. For an evenly distributed sample, different outcomes might have been presented since women were found to be more likely to have high levels of social anxiety (Asher et al., 2017). Furthermore, people identifying as non-binary are more prone to discrimination, which can result in high levels of social anxiety and loneliness (Testa et al., 2015; Anderssen et al., 2020). Thus, future research should investigate the relationship with equal-sized groups to determine possible differences and similarities between gender. Another limitation was that the sample was only from western European countries, the Netherlands and Germany. Therefore, the outcomes should be interpreted with caution and cannot be generalized to other cultures. What is associated as normative in one culture might not be the same in another (Keller, 2013). Hutten and colleagues (2022) showed that young adults with a non-western background experience higher levels of loneliness than individuals with a western background. Therefore, future research should further investigate whether loneliness mediates between attachment and social anxiety in a non-western sample. Moreover, this sample was highly educated since the majority had a university degree (Bachelor or Master degree). Education might have worked as a protective factor since only

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moderately strong scores were found for attachment, social anxiety and loneliness. Besides education, social desirability bias might be a possible reason for the outcome. It is described as answering questions in a socially desirable way instead of giving honest answers (Grimm, 2010). Lastly, only partial mediations were found, which suggests that a second mediator might influence the relationships (Zhao et al., 2010) which future research can explore.

Theoretical and Practical Implications

Despite the limitations, the study offers practical and theoretical implications for the attachment field. To our knowledge, this is the first study investigating the mediating effect of loneliness on secure attachment, avoidant and anxious attachment domains and social anxiety. This gives an important insight into the influence of loneliness. Thereby, a basis was constructed to investigate this topic further and study this relationship for the four attachment styles, secure, fearful, dismissing, and preoccupied (Bartholomew & Horowitz, 1991). Another implication is that the interplay between attachment, loneliness, and social anxiety was shown. The anxious and avoidant attachment domains were shown to increase loneliness and thereby further increase social anxiety. This relation can be considered when one of these factors is treated in clinical interventions. One form of intervention that might work for insecure attachment, loneliness, and social anxiety, is online interventions. This might be a comfortable way for insecurely attached individuals to interact with others (Oldmeadow et al., 2013). Thereby, this intervention should focus on providing social support, enhancing social skills, giving opportunities for controlled and secure interaction with others, and lastly, addressing maladaptive social cognition since they have been found to be an essential key factor in improving the experience of loneliness (Masi et al., 2011).

Conclusion

In conclusion, the study shows that loneliness impacts the relationship between attachment domains and social anxiety. Avoidant and anxious attachment domain is shown to

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increase the effect of loneliness on social anxiety. However, for secure attachment, loneliness has no mediating effect on social anxiety. Therefore, the findings of this study demonstrate the importance and severity of loneliness in the context of attachment and social anxiety. This study provided implications and suggestions for future research to determine and reduce the effect of loneliness and social anxiety in differently attached individuals.

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Appendix A

Table 1

Sociodemographic Data of Participants

Gender			Age			Country of residency			Level of Education		
	n	%	Age Group	n	%	Country	n	%	Education	n	%
Female	69	73.4	18-14	71	75.5	The Netherlands	70	74.5	Bachelor degree	68	72.3
Male	23	23.4	25-34	23	24.5	Germany	24	25.5	Master degree	14	14.9
Non-Binary	3	3.2							High school graduate	8	8.5
									Vocational Training	3	3.2
									Other: HBO	1	1.1

Note. N = 82.

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Appendix B**Psychological Attachment: Attachment Style Questionnaire**

1 = totally disagree; 2 = disagree; slightly; 3 = slightly disagree; 4 = slightly agree; 5 = agree;
6 = totally agree

1. Overall I am a worthwhile person
2. I am easier to get to know than most people
3. I feel confident that other people will be there for me when I need them.
4. I prefer to depend on myself rather than other people.
5. I prefer to keep to myself.
6. To ask for help is to admit that you're a failure
7. People's worth should be judged by what they achieve.
8. Achieving things is more important than building relationships.
9. Doing your best is more important than getting on with others
10. If you've got a job to do, you should do it no matter who gets hurt.
11. It's important that others like me
12. It's important to me to avoid doing things that others won't like.
13. I find it hard to make a decision unless I know what other people think.
14. My relationships with others are generally superficial.
15. Sometimes I think I am no good at all
16. I find it hard to trust other people.
17. I find it difficult to depend on others
18. I find that others are reluctant to get as close as I would like.
19. I find it relatively easy to get close to other people.
20. I find it easy to trust others. ®
21. I feel comfortable depending on other people ®

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22. I worry that others won't care about me as much as I care about them.
23. I worry about people getting too close.
24. I worry that I won't measure up to other people.
25. I have mixed feelings about being close to others
26. While I want to get close to others, I feel uneasy about it.
27. I wonder why people would want to be involved with me.
28. It's very important to me to have a close relationship.
29. I worry a lot about my relationships.
30. I wonder how I would cope without someone to love me.
31. I feel confident about relating to others.
32. I often feel left out or alone.
33. I often worry that I do not really fit in with other people ®
34. Other people have their own problems, so I don't bother them with mine.
35. When I talk over my problems with others, I generally feel ashamed or foolish
36. I am too busy with other activities to put much time into relationships.
37. If something is bothering me, others are generally aware and concerned.
38. I am confident that other people will like and respect me
39. I get frustrated when others are not available when I need them.
40. Other people often disappoint me.

Social Anxiety: Social Phobia Scale (SPIN)

0 = not at all; 1 = a little bit; 2 = somewhat; 3 = very much; 4 = extremely

1. I am afraid of people in authority
2. I am bothered by blushing in front of people.
3. Parties and social events scare me.
4. I avoid talking to people I don't know.

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5. Being criticized scares me a lot
6. I avoid doing things or speaking to people for fear of embarrassment
7. Sweating in front of people causes me distress.
8. I avoid going to parties.
9. I avoid activities in which I am the center of attention.
10. Talking to strangers scares me.
11. I avoid having to give speeches.
12. I would do anything to avoid being criticized.
13. Heart palpitations bother me when I am around people.
14. I am afraid of doing things when people might be watching.
15. Being embarrassed or looking stupid are among my worst fears.
16. I avoid speaking to anyone in authority.
17. Trembling or shaking in front of others is distressing to me.

Loneliness: revised-UCLA Loneliness Scale

1 = never; 2 = rarely; 3 = sometimes; 4 = always

1. I feel in tune with the people around me. ®
2. I lack companionship.
3. There is no one I can turn to.
4. I do not feel alone.
5. I feel part of a group of friends. ®
6. I have a lot in common with the people around me. ®
7. I am no longer close to anyone.
8. My interests and ideas are not shared by those around me.
9. I am an outgoing person. ®
10. There are people I feel close to. ®

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11. I feel left out.
12. My social relationships are superficial.
13. No one really knows me well.
14. I feel isolated from others.
15. I can find companionship when I want it. ®
16. There are people who really understand me. ®
17. I am unhappy being so withdrawn.
18. People are around me but not with me.
19. There are people I can talk to. ®
20. There are people I can turn to. ®