

**The Associations of Attachment Dimensions and Their Interaction with Prolonged Grief
Symptoms**

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Abstract

Prolonged grief (PG) is characterized by intense and enduring emotional distress following the loss of a loved one. One useful framework for understanding why some individuals are more vulnerable to developing PG than others is adult attachment theory. This study explored how attachment anxiety and attachment avoidance, the two dimensions of attachment insecurity, are associated with prolonged grief symptoms (PGS), as both have been proposed risk factors for PG. Further, we examined the interaction between these two dimensions to also shed light on the roles of secure and disorganized attachment, which are theorized to reflect specific combinations of high or low levels of attachment anxiety and avoidance. A convenience sample of bereaved adults ($N = 351$) completed a self-report questionnaire assessing attachment dimensions and prolonged grief symptom levels. Results showed that both attachment anxiety and attachment avoidance were independently positively associated with PGS, with attachment anxiety demonstrating a relatively stronger relationship with PGS, underscoring the meaningful role of insecure attachment in grief responses. However, the interaction effect of attachment dimensions was not significant. This suggests that attachment anxiety and attachment avoidance contribute to grief independently rather than through a unique combined effect, and that secure and disorganized attachment, as theoretically assumed, may be less relevant or cannot be adequately captured through the interaction of attachment anxiety and avoidance. This highlights the need for continued research on using alternative measurements to capture secure and disorganized attachment.

Keywords: Attachment theory, Attachment anxiety, Attachment avoidance, Prolonged grief symptoms, Secure attachment, Disorganized attachment

The Associations of Attachment Dimensions and Their Interaction with Prolonged Grief Symptoms

Losing a loved one is one of the most significant life stressors a person can experience in life (O'Connor, 2019). This event exposes many individuals to the experience of intense emotional periods and longing, frequent thoughts of the deceased, often accompanied by other physical and cognitive symptoms (Shear, 2012; Zisook et al., 2014). Whereas most people adjust to the loss of a loved one (Shear, 2012; Zisook et al., 2014), a minority of people grieve more severely and suffer from severe, enduring, and debilitating grief reactions described as “prolonged grief” (PG) (Eisma et al., 2023; Janshen et al., 2024). Prolonged Grief Disorder (PGD) was officially added to the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders in 2022 (DSM-5-TR; American Psychiatric Association, 2022; Eisma, 2023), which recognizes it as an official mental health condition. Prolonged grief symptoms (PGS) include longing for the deceased, an intense yearning, and additional symptoms such as intense emotional pain, loneliness, and difficulty with reintegration into life (American Psychiatric Association, 2022). Suffering from PGS can negatively affect people’s mental health and is a risk factor for developing depression symptoms, suicidal ideation, cancer, and other adverse physical health conditions (Prigerson et al., 1997; Prigerson et al., 2008; Stroebe et al., 2007). Considering these negative health consequences, the importance of finding effective treatment approaches for PGD is emphasized.

Cognitive Behavioral Therapy (CBT) has been established as one of the most promising treatment methods for bereaved individuals. Nonetheless, it should be acknowledged that clear evidence for universal interventions remains limited, as CBT still does not show clinically significant improvements for a substantial proportion of bereaved individuals (Doering & Eisma, 2016). This highlights the importance of understanding the mechanisms and factors underlying prolonged grief responses (Maccallum & Bryant, 2018).

There is still a lack of comprehensive knowledge about the complexity of PG, its causes, and predictive factors, which could be crucial for refining treatment methods (Jordan & Litz, 2014; Szuhany et al., 2021).

Despite this lack of extensive knowledge, it has been shown that some variability in grief reactions can be explained through the emotional bond the bereaved has with the deceased (Stroebe et al., 2005). One useful framework for understanding how people develop these interpersonal bonds and cope with the death of a loved one is Bowlby's (1980) attachment theory (Mikulincer & Shaver, 2022). In his theory, Bowlby (1973) proposed that humans have an innate psychobiological system driving them to seek safety and security through close relationships with so-called *attachment figures*, typically early caregivers, who attend to the child's attachment needs. These needs include protecting the child against psychological and physical harm, providing safety, and assisting emotional self-regulation (Shaver & Mikulincer, 2009). Bowlby (1980) theorized that humans form mental images through their interactions with primary caregivers and referred to these images as "attachment styles". When attachment needs are not consistently satisfied in early childhood, adults may develop insecure attachment styles (Bowlby, 1973).

Based on Bowlby's attachment theory (1973), Ainsworth (1978) identified three distinct attachment styles, one defined as secure and the other two as insecure attachment styles, named anxious and avoidant attachment styles. A fourth attachment style was added by Main and Solomon (1990): the disorganized attachment style. It was later established that these attachment styles could be mapped onto two primary attachment dimensions, which are attachment anxiety and attachment avoidance (Brennan et al., 1998). Avoidant attachment style is characterized as high attachment avoidance and low attachment anxiety and describes individuals who distrust and distance themselves from others, resist emotional closeness, and fear dependence on others (Mikulincer & Shaver, 2022; Paetzold et al., 2015). Anxious

attachment style results from the combination of scoring high on the anxiety dimension and low on the avoidance dimension and describes individuals who have an intense fear about abandonment and sensitive feelings about rejection which leads them to seek constant reassurance and closeness from others (Mikulincer & Shaver, 2022; Pollard et al., 2023). People who score low on both dimensions can be described as securely attached (Mikulincer & Shaver, 2022; Paetzold et al., 2015). This secure attachment style is theorized to result from positive experiences of fulfilled caregiving in childhood and is characterized by the ability to manage emotions effectively, build relationships, and maintain positive views about oneself and other people (Pollard et al., 2023). Lastly, disorganized attachment style describes people who score high on both attachment anxiety and attachment avoidance dimensions (Fraley and Shaver, 2000). It has been proposed that disorganized attachment results from frightening interactions between the infant and the early attachment figure, which leads the infant to an internal conflict of seeking comfort in their attachment figure, but simultaneously fearing them (Pollard et al., 2023). This is proposed to result in contradictory, disoriented, or inconsistent behaviors towards the attachment figure (Paetzold et al., 2015; Pollard et al., 2023).

Although attachment styles develop in early childhood, Bowlby (1973) proposed that an individual's attachment system remains active throughout life and influences relationships across the lifespan (Eisma et al., 2023). It is expressed in one's thoughts and actions during times of need and in response to distress, reflected in the concept of "adult attachment" (Shaver & Mikulincer, 2009). Furthermore, attachment styles are proposed to influence how one deals with emotional regulation, separation, and relational threats, such as the unavailability of an attachment figure (Bowlby, 1980). An extremely profound and highly emotional case of attachment-figure unavailability is the death of one's attachment figure. The severity of grief responses and accompanying distress after the loss of an attachment figure is

proposed to be influenced by one's attachment orientation (Mikulincer & Shaver, 2022; Shaver & Tancredy, 2001). Individuals who are securely attached are proposed to have the "healthiest" response to grief. They may initially experience strong emotions following the loss of a loved one, but typically manage to construct a coherent understanding of the loss and experience a reduction in grief severity as time passes. Individuals scoring high on either or both of the attachment dimensions are presumed to handle emotions towards loss less effectively. Individuals scoring high on attachment anxiety likely have an intense emotional reaction to loss and have difficulties dealing with the loss over time. Those scoring high on attachment avoidance are theorized to suppress loss-related emotions as they usually minimize their emotional dependence on close others, which often results in delayed grief reactions or difficulties handling distress in the long term (Mikulincer & Shaver, 2022; Shaver & Tancredy, 2001). Individuals characterized by disorganized attachment are marked by an inconsistent and disorganized response to bereavement (Sekowski, 2022). They are proposed to show an impaired capacity to think and react consistently and productively about their attachment-related loss (Shaver & Tancredy, 2001). Despite this range of associations between different attachment orientations and reactions towards grief, past literature did not investigate these associations evenly.

Most research on attachment and PGS has focused on dimensions of attachment anxiety and attachment avoidance. Eisma et al. (2023) conducted a systematic meta-analysis providing an overview of the research findings of thirty-one studies, showing small to moderate positive associations between insecure attachment dimensions and PGS, with attachment anxiety showing slightly stronger effects on PGS than attachment avoidance (Eisma et al., 2023). Although rarely examined, some studies found that secure attachment was negatively associated with grief symptoms, supporting that secure attachment might have a potential protective role towards PGS, which might be associated with their openness

towards seeking social support (Levi-Belz & Lev-Ari, 2019; Pini et al., 2012). However, it should be mentioned that this association was not consistently reported in the literature on this topic, showing a non-significant association (Joyce, 2010). This suggests that this relationship should be further examined. Moreover, disorganized attachment was not significantly associated with PGS in the same studies, which is inconsistent with one recent study yielding a significant positive relation (Sekowski & Prigerson, 2022).

The fact that only a few studies explore secure and disorganized attachment implies that crucial information about the range of attachment-related reactions to loss may be missing in current research. Individuals with a disorganized attachment style may experience different or even stronger grief responses than those who score high on either attachment anxiety or attachment avoidance alone, as disorganized attachment is characterized by high levels of both dimensions (Fraley & Shaver, 2000). Disorganized attachment is also proposed to be associated with unresolved loss, characterized by having difficulties processing the death of a loved one (Sekowski & Prigerson, 2022). Therefore, it can be hypothesized that these difficulties contribute to the development of PGS. Understanding the association between disorganized attachment and PGS is of importance as it can help identify individuals who are at high risk of PGS and promote research on supportive and refined treatment methods for bereaved individuals.

As individuals characterized by secure attachment are theorized to have the healthiest reaction to grief (Shaver & Tancredy, 2001), it might be informative and insightful to consider that attachment style evenly in the relation to PGS. Especially, it could be beneficial to explore whether these individuals benefit from some sort of adaptive coping mechanism that helps them deal with grief more effectively (Levi-Belz & Lev-Ari, 2019).

Since both the disorganized and secure attachment style are theorized to reflect a combination of attachment anxiety and attachment avoidance dimensions, it is theoretically

useful to investigate the interaction effect between these two attachment dimensions and how the combination of different levels of the dimensions might elicit unique grief responses. This could improve our understanding of the underlying mechanisms that contribute to different grief reactions among individuals scoring high on both dimensions (disorganized attachment) or low on both dimensions (secure attachment). Some studies explored this interaction but found no significant effect beyond the individual effects of attachment anxiety and attachment avoidance on PGS (Fraley & Bonanno, 2004; Janshen et al., 2024; Wijngaards-de Meij et al., 2007). Nonetheless, research focusing on the interaction effect is scarce, validating the intention of the present study to investigate this interaction effect further, especially because some of the mentioned studies had comparably smaller samples than the present study.

The current study aims to replicate findings from a meta-analysis of thirty-one empirical studies (Eisma et al., 2023), hypothesizing that attachment anxiety (H1) and attachment avoidance (H2) show small to moderate positive cross-sectional correlations with PGS. Moreover, we expect that attachment anxiety will have a slightly stronger effect on PGS than attachment avoidance in a multiple regression (H3). Furthermore, we will explore the interaction effect between attachment anxiety and attachment avoidance on PGS. Connecting to this, we predict that the effect of attachment anxiety on PGS will become stronger for higher levels of attachment avoidance, and weaker for lower levels of attachment avoidance (H4).

Methods

Procedure

The present study was approved by the Ethics Committee for Behavioural and Social Sciences at the University of Groningen, registered as PSY-2324-S-0263, employing a cross-sectional design and using a correlational survey, which was administered through Qualtrics. A convenience sample of bereaved adults was used as participants were recruited through the

personal networks of psychology students, with each student inviting at least three bereaved individuals to take part in the study. After accessing the link to the online survey, participants were first presented with an information sheet, followed by a consent form, and subsequently informed that their participation was voluntary, that they could withdraw from the study at any time without consequences, and that their personal data would be anonymized. They were also informed about the research topic (“the role of social relationships in coping with bereavement”), as well as the study’s potential benefits (such as contributing to improved care for bereaved individuals). Before starting the online survey, participants were asked to provide their informed consent online. Completing the questionnaire took around 20 minutes in total.

An a priori power analysis was conducted using G*Power (Faul et al., 2007) to determine the required sample size for our primary research question which examines the relationship between attachment anxiety and attachment avoidance and prolonged grief symptoms. Previous meta-analytic findings have reported a small effect size ($r = .13$) for the association between attachment avoidance and prolonged grief symptoms, and a moderately stronger effect ($r = .28$) between attachment anxiety and prolonged grief symptoms (Eisma et al. 2023).

Choosing a conservative approach to ensure sufficient statistical power to detect the smallest anticipated meaningful association, $r = .13$ was used in the a priori power analysis to determine the required sample size for this paper’s research question. A one-sided test was applied, based on the directional hypothesis that higher levels of attachment anxiety and attachment avoidance would be positively associated with prolonged grief symptoms (Eisma et al., 2023). The power analysis was conducted with a significance level of .05, and a desired power of .80, resulting in a minimum of 364 participants required to detect a statistically significant effect.

Individuals were excluded from the study if they did not meet the minimum age requirement of 18 years or older. Additionally, participants were required to meet the time criterion related to bereavement: the loss must have occurred at least six months prior to participation. 68 out of 429 people who accessed the questionnaire did not complete both the TGISR+ and the ECR-SF. One entry was labeled as a "test survey", two participants were unable to answer the questions well due to some technical difficulties, and five participants had experienced loss less than 6 months. There were also two double entries, which were from the same person and same IP address. The final sample size resulted in $N = 351$, after removing these entries.

Table 1

Sample demographics and characteristics (N=351)

Characteristics	Category	<i>n</i>	%
Gender of participant	Female	221	63
	Male	128	36.5
	Non-binary	2	0.6
Age in years		$M = 45.6$ $SD = 16.4$	
Level of Education ^a	Lower education	155	44.1
	Higher Education	191	54.4
	Other education	5	1.4
Kinship to the deceased ^b	Partner	30	8.5
	Parent	237	67.5
	Sibling	25	7.1
	Child	5	1.4
	Other person	53	15.1
Gender of the deceased	Female	169	48.1
	Male	182	51.9
	Non-binary		

Cause of death ^a	Natural	316	90
	Accident	17	4.8
	Suicide	8	2.3
	Homicide	6	1.7
	Other causes	4	1.1
Expectedness of death ^a	Expected	140	39.9
	Unexpected	120	34.2
	Other experience	91	26
Time since loss in months	6-35	190	54.1
	36-60	103	29.3
	61-96	29	8.2
	<120	11	3.1
	>120	18	5.1
Attachment Dimensions		<i>M</i>	<i>SD</i>
	Attachment avoidance	19.7	6.51
	Attachment anxiety	19.7	7.24
Prolonged Grief Symptoms		28.6	10.4

Note. ^aLower Education = all education types except college or university education, Higher Education = College or University Education, Other Education = Postdoctoral ($n=5$).

^bOther person = friend ($n=4$), multiple losses ($n=6$), and other family members ($n=42$).

^cOther causes = medical error ($n=2$) and unknown ($n=2$).

^dOther experience= both expected and unexpected ($n=89$), neither expected or unexpected ($n=2$).

Measures

Sociodemographic and Loss-related Characteristics

We used a self-constructed questionnaire to assess sociodemographic characteristics (i.e., gender, age, education level) and loss-related characteristics (i.e., time since loss, relationship to the deceased, gender of the deceased, cause of death, and expectedness of death).

Prolonged Grief Symptoms

PGS were assessed using the Traumatic Grief Inventory Self Report Plus (TGI-SR+; Lenferink et al., 2022), a self-report questionnaire that aims to assess prolonged grief symptoms. In the current study, only the 12 items reflecting the DSM-5-TR criteria for prolonged grief disorder were used. Participants were asked to rate the frequency of symptoms during the previous month on a 5-point Likert-scale ranging from 1 (*never*) to 5 (*always*). Items reflect core features of prolonged grief, such as persistent yearning and emotional distress (e.g., “*I found myself longing or yearning for the person who died*”, “*I experienced intense emotional pain, sadness, or pangs of grief*”). A total prolonged grief symptoms score was calculated by summing the scores on all items (ranging from 12 to 60). A total score equal to or higher than 33 indicates clinically significant levels of prolonged grief (Lenferink et al., 2022). Prior research supports the construct, convergent, and known-groups validity and the reliability of the TGI-SR+ for the Dutch and German versions (Lenferink et al., 2022; Trembl et al., 2024). In our study, reliability for the total score was excellent, Cronbach’s $\alpha = .93$.

Attachment Dimensions

To assess attachment dimensions in relation to other people in general, we used the 12-item Experiences in Close Relationships Short Form (ECR-SF; Wei et al., 2007). A formal translation-back-translation procedure was used for the Dutch and German version. Participants were asked to indicate how they generally feel in social relationships (e.g., “*It helps to turn to people around me in times of need*”, “*I need a lot of reassurance that I am loved by the people around me*”). ECR-SF items were scored on a 7-point Likert scale ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). To calculate the total scores, the six uneven numbered items were summed to obtain a total score for *Attachment Avoidance*. Reverse-scored items 1, 5 and 9 were recoded before summing. Similarly, the six even-numbered items were summed to calculate the total score for *Attachment Anxiety*, with reverse-scored item 8 being recoded as

well. Past research supports the reliability and construct validity of the ECR-SF (Wei et al., 2007). In the present study, the subscales of attachment avoidance and attachment anxiety demonstrated (minimally) acceptable reliability, Cronbach's $\alpha = .69$, and Cronbach's $\alpha = .75$, respectively.

Data Analysis

TGI-SR+ total scores were used as a measure of prolonged grief symptoms in the main analyses, with higher scores indicating greater severity of prolonged grief. Total scores on the ECR-SF were used to represent the independent variables of attachment anxiety and attachment avoidance. Higher scores reflected higher levels of attachment insecurity.

Descriptive statistics were computed for all sociodemographic and loss-related variables, as well as the aforementioned key variables (Table 1). Assumptions of linearity and (bivariate) normality were assessed through scatterplots, histograms, and Q-Q plots. Outliers were examined using boxplots as well as Cook's distance (with a recommended threshold of 1.0; Tabachnick & Fidell, 2007), ensuring no extreme values inappropriately influenced the results. The Durbin-Watson statistic was used to assess independence of residuals (Durbin & Watson, 1971). Homoscedasticity was checked by inspecting scatterplots of the standardized residuals against predicted values to ensure constant variance across levels of the attachment dimensions. Multicollinearity was examined through the VIF and tolerance values.

To examine the strength and direction of the associations between attachment dimensions and prolonged grief symptoms, bivariate Pearson's correlations analyses were conducted. Additionally, whether the association between prolonged grief symptoms and attachment anxiety was significantly stronger than that with attachment avoidance was assessed with the use of a multiple linear regression analysis.

All statistical analyses were conducted using IBM SPSS Statistics 28 (IBM Corp., 2021). We used one-sided tests with a standard significance level ($\alpha = .05$) for all analyses.

For correlation analyses, effect sizes were interpreted according to Cohen's (1988) guidelines; correlations between .10 and .29, .30 and .49, and higher than .50 were respectively considered to indicate small, moderate, and large effects. For the regression analysis, standardized beta coefficients (β), unstandardized beta coefficients (B), confidence intervals (CI's), and p -values were reported for each predictor. Model fit was evaluated by examining the proportion of explained variance (R^2) and the significance of the F -statistic. R^2 values of .02, .13, and .26 were interpreted as small, medium, and large effect sizes, respectively (Cohen, 1988).

A moderation analysis will be conducted using PROCESS macro (Hayes, 2022) to examine whether attachment anxiety and attachment avoidance interact with each other and how this interaction affects PGS. An interaction term will be created after mean-centering the two independent variables, attachment avoidance and attachment anxiety. To determine whether the interaction term is significant, the p -values and Confidence Intervals of the interaction term will be examined. The conditional effects of one of the mean-centered predictor variables will be examined at different values of the moderator variable (at the mean and ± 1 standard deviation) to assess whether the effect changes depending on the level of the moderator. If there is a significant interaction effect, simple slopes will be plotted to visualize how the relationship between one independent variable (e.g., attachment avoidance) and the dependent variable (PGS) varies across different levels of the other independent variable (e.g., attachment anxiety).

Results

Preliminary analysis

Assumptions for Correlation

Before conducting the main analysis, the assumptions for a correlation analysis were tested. Histograms and Q-Q plots were inspected to test whether the values of each variable

are approximately normally distributed. The distribution of PGS and of attachment anxiety were both slightly skewed to the right; therefore, a formal test of skewness was conducted. The skewness value for PGS was .496 (SE = .13) and for attachment anxiety .41 (SE = .13), resulting in a z-score of 3.815 for PGS, and a z-score of 3.153 for attachment anxiety, indicating a statistically significant deviation from normality. Trimmed means were compared to the normal means of PGS and attachment anxiety, and no substantive differences were discovered. Based on the inspections, we concluded minor violations of the normality assumption for two of the variables. The values of attachment avoidance were normally spread, showing a bell-shaped distribution. Linearity for the correlation analysis was assessed through scatterplots. The scatterplots depicting the relationship between each independent variable and the outcome variable displayed a roughly elliptical pattern, supporting the assumption of linearity. Lastly, boxplots were examined to inspect potential outliers that could influence the outcome of the analysis. Three outliers were found, of which none were influential based on Cook's distance, since none of the values were above the threshold level (>1) for influential observations (Cook & Weisberg, 1982). The assumptions were sufficiently met to proceed with the correlation analysis. Nevertheless, Spearman's rho for the relationships under investigation was also inspected as a non-parametric alternative, revealing no substantial differences in outcomes (p-values, direction and size of effects), which supported the decision to proceed with reporting the more commonly used Pearson correlation coefficients.

Assumptions for Regression

Histograms and Q-Q plots of the standardized residuals were inspected to assess whether the residuals were normally distributed. Both graphs indicated that the standardized residuals follow an approximately normal distribution. To check the assumption of linearity of residuals, a scatterplot of the standardized predicted values against the regression standardized

residuals was inspected. The dots depicted a random pattern around the horizontal line, indicating no violation of linearity. Multicollinearity was examined by inspecting the VIF for both attachment anxiety and attachment avoidance, which were both below the threshold of five, indicating no violation (Marcoulides & Raykov, 2019). Homoscedasticity was assessed using a scatterplot of standardized residuals, which depicted a rectangular pattern, indicating no violation of the homoscedasticity assumption. Lastly, the scatterplots of the standardized residuals were examined to inspect potential outliers that could violate the assumption for regression analyses. One outlier was found, but it was not influential based on Cook's distance observations (Cook & Weisberg, 1982). All assumptions were sufficiently met to proceed with the regression analysis.

Descriptive statistics

The sample comprised 351 participants. Scores for total PGS ranged from 12 to 57, with a mean score of 28.584 ($SD = 10.363$), and 32.2% of the sample scored above the clinical threshold of prolonged grief, reflecting the tendency of a subclinical sample (Lenferink et al., 2022). The scores for attachment avoidance varied from 6 to 39 ($M = 19.718$, $SD = 6.515$), while those for attachment anxiety varied from 6 to 42 ($M = 19.681$, $SD = 7.249$).

Zero-order Correlations

Zero-order correlations between the main variables are shown in Table 2. PGS were significantly positively correlated with both attachment anxiety and attachment avoidance, with attachment anxiety depicting a stronger correlation with PGS than attachment avoidance. Attachment anxiety and attachment avoidance were also significantly positively correlated with each other.

Table 2*Bivariate Correlations (N = 351)*

Variable	Total PGS	Attachment avoidance	Attachment anxiety
1. Total PGS	1	.233*	.357*
2. Attachment avoidance		1	.29*
3. Attachment anxiety			1

Note. * = $p < .01$ (one-tailed).

Main Analysis

A multiple linear regression model was conducted to assess the unique contribution of attachment anxiety and attachment avoidance to PGS. The overall model was significant, $F(2, 347) = 29.722$, $p < .001$, and explained 14.6% of the variance in PGS ($R^2 = .146$; adjusted $R^2 = .141$), indicating a moderate effect and showing that the model explains a significant amount of variance in PGS. Squared semi-partial correlations showed that attachment anxiety uniquely explained 9.12% of this variance, whereas attachment avoidance uniquely explained 1.85%.

The multiple regression analysis showed that attachment anxiety had a significantly positive effect on PGS CI [.306, .597], controlling for the effect of attachment avoidance. Attachment avoidance also significantly predicted PGS CI [.063, .387], controlling for the effect of attachment anxiety. As predicted, attachment anxiety had a stronger effect than attachment avoidance on PGS (Table 3).

Table 3*Hierarchical Regression Analysis*

Model	ΔF	$\Delta^2 R$	B	β	t
Step 1					
Attachment anxiety			.452**	.316**	6.103
Attachment avoidance			.225*	.142*	2.737
Step 2					
Interaction	1.27	.0031	.012	.056	1.128

Note. * = $p < .05$; ** = $p < .001$; (step 1): Attachment anxiety and attachment avoidance were included in the model; (step 2): The interaction term was added in addition to the variables mentioned under step 1.

Moderation analysis

An interaction analysis was conducted to test whether attachment avoidance moderated the relationship between attachment anxiety and PGS. The interaction term between attachment anxiety and attachment avoidance was not significant ($p = .260$; CI [- .009, .033], see Table 3). The hypothesis that attachment avoidance moderates the effect between attachment anxiety and PGS was therefore not supported.

Discussion

This study aimed to examine the relationships of attachment anxiety and attachment avoidance and their interaction on PGS, to shed light on the potential relevance of attachment dimensions and secure and disorganized attachment styles. It was hypothesized that both dimensions would be positively associated with PGS (H1 and H2), with attachment anxiety showing a slightly stronger contribution (H3), based on meta-analytic findings (Eisma et al., 2023). Furthermore, it was hypothesized that attachment avoidance would moderate the association between attachment anxiety and PGS (H4). Our results supported the first three hypotheses, but not the fourth hypothesis, as the interaction effect was nonsignificant.

The significant findings align with attachment theory (Bowlby, 1980; Shaver & Tancredy, 2001) as well as previous research findings (Eisma et al., 2023), supporting the theoretical assumption that one's attachment orientation influences how one copes with loss. Individuals high on attachment anxiety, marked by their constant fear of abandonment and strong dependence on others, experience intense grief responses (Mikulincer and Shaver, 2022; Shaver & Tancredy, 2001). On the other hand, individuals scoring high on attachment avoidance typically suppress their loss-related emotions and strive to be emotionally independent of others (Fraley & Shaver, 2000; Mikulincer & Shaver, 2022). Attachment avoidance may therefore be protective in some cases and for some individuals, as these often diminish their attachment needs when dealing with distress (Mikulincer & Shaver, 2010). However, as time passes, individuals high on attachment avoidance often experience increased difficulties adapting to the new reality of losing someone, which may lead to delayed grief (Mikulincer & Shaver, 2022). This may explain the weaker association with PGS, than with attachment anxiety (H3). When interpreting these findings, it should be noted that longitudinal studies, controlling for baseline symptoms, found nonsignificant effects of insecure attachment dimensions on PGS over time (Boelen, 2012; Harris et al., 2021; Lee et al., 2020; Suttle et al., 2022), which might indicate that insecure attachment may be associated with, but not cause PGS.

Beyond examining these main effects, this study also aimed to shed light on the relations of secure and disorganized attachment by mapping them on the two dimensions (Brennan et al., 1998). We expected that certain combinations of both dimensions, essentially high levels of both (disorganized attachment) or low levels of both (secure attachment), would be associated with particularly low or high levels of grief, due to the interaction effect of both dimensions. This expectation was not supported by our data.

These results reveal important considerations for secure attachment, suggesting that these individuals may have lower levels of PGS, but that the interaction effect does not add unique information beyond the individual effects of both dimensions. Rather, these individuals may simply have better coping strategies available to deal with loss effectively (Shaver & Tancredy, 2001), which might be potentially shaped by their positive mental models and sense of safety and security in relationships (Mikuliner & Shaver, 2022; Wayment & Vierthaler, 2002).

An alternative explanation is that secure attachment might be better measured as a distinct construct, as the dimensional model might not fully capture its complexity. This might require different instruments to capture the characteristics of secure attachment sufficiently. For instance, Levi-Pelz & Lev-Ari (2019) found a positive association between secure attachment and PGS after using a self-report questionnaire, the Relationships Questionnaire (RQ), that measured it as a distinct style, and not as the interaction of two dimensions.

Similarly, this nonsignificant result also has implications for disorganized attachment. Being high on both dimensions does not necessarily result in stronger PGS than expected from each dimension's individual effects. This suggests that attachment anxiety and attachment avoidance may influence PGS through individual mechanisms (Shaver & Tancredy, 2001; Mikuliner & Shaver, 2022). This aligns with findings from previous research, yielding a nonsignificant interaction effect between attachment anxiety and attachment avoidance on grief symptoms (Fraley & Bonanno, 2004; Janhsen et al., 2024).

An alternative explanation is that disorganized attachment might not simply equal scoring high on both attachment dimensions, but rather reflect a more complex construct that needs to be assessed separately. Disorganized attachment is proposed to have one specific characteristic, the fear of the attachment figure, which is different from a fear of abandonment in anxious attachment and a fear of rejection in avoidant attachment. Individuals who have a

disorganized attachment style might have characteristics of anxious or avoidant attachment as well, but it may be more than the combination of the two (Paetzold, 2015). Research has shown that measuring disorganized attachment as a distinct construct with the *Adult Disorganized Attachment scale* (ADA) resulted in a significant positive association with PGS (Sekowski & Prigerson, 2022). This suggests that our nonsignificant interaction effect might not completely exclude the relevance of the relationship between disorganized attachment and PGS but rather highlight measurement limitations in our study.

Other measurements that aim to measure disorganized attachment directly have been evaluated by Pollard et al., (2023) as promising in their psychometric qualities, for example the *Childhood Disorganization and Role Reversal Scale* (CDRR) (Meier & Bureau, 2018) or the *Psychological Treatment Inventory - Attachment Styles Scale* (PTI-ASS) (Giannini et al., 2011), which could be considered in future research on disorganized attachment.

Practical and Theoretical Implications

Our findings have important practical and theoretical implications. By replicating previous findings, we supported the assumption that both anxious and avoidant attachment pose significant risk factors for developing PGS following bereavement. This strengthens the theoretical assumption that attachment orientations play an important role in grief-related responses and highlights the importance of considering these in explaining variations in grief reactions (Mikulincer & Shaver, 2022). This was also supported by our results showing that 14.6% of the variance in PGS was explained by our model, including the two attachment dimensions.

Recognizing and refining research that examines these associations could be used to guide grief-related treatment approaches in the future, however, more longitudinal studies are needed to support the present findings. Increasing the understanding of the underlying

processes of PGS might improve intervention approaches and treatment effectiveness for bereaved individuals.

Furthermore, although no significant interaction effect was found, our findings emphasize the need to expand grief research and bring more awareness to the under-exploration of secure and disorganized attachment in research. As securely attached individuals might indeed cope better with loss (Fraley & Shaver, 2000), it may be beneficial to further explore the underlying mechanisms that protect them from developing PGS. Our study also suggests a reconsideration of how secure attachment and disorganized attachment should be measured in grief research, proposing more nuanced assessment methods.

It should be reconsidered whether disorganized attachment can be fully captured by the two dimensions, or whether it should instead be evaluated as a distinct construct. Expanding the research on individuals with a disorganized attachment style and exploring the underlying mechanisms and core characteristics of it more deeply could help answer this question. Given its potential heightened susceptibility to PGS (Sekowski & Prigerson, 2022), the role of disorganized attachment in relation to PGS requires further investigation, which may aid in identifying individuals who are at high risk for developing PGS.

Limitations

Despite its contributions, some limitations of this study should be acknowledged. First, the use of self-report questionnaires for both attachment and grief symptoms may limit the validity of our findings and introduce certain biases, such as social desirability (Van de Mortel, 2008). For example, avoidantly attached individuals tend to avoid dependence on others and prefer independent coping (Fraley & Shaver, 2000; Mikulincer & Shaver, 2022), which may have led them to underreport the severity of their symptoms. Therefore, it might be useful to include other methodologies such as the Adult Attachment Interview (Hesse,

1999) or the Adult Attachment Projective Picture System (AAP) (George, 2023) in future research to provide a more fine-grained approach to understand attachment tendencies.

Furthermore, the cross-sectional correlational design limits our ability to infer causal relations. Longitudinal studies, controlling for baseline symptoms, did indeed find nonsignificant effects between insecure attachment and PGS (e.g. Boelen, 2012; Fraley & Bonanno, 2004), suggesting that insecure attachment is not causally related to PGS. Future longitudinal, multi-wave studies are recommended to further clarify the long-term effects of attachment insecurity on PGS and to explore changes over time.

We also used a convenience sample recruited by the close acquaintances of university students, with 63% females and 36.5% males, introducing a highly educated sample and unequal gender distribution, which introduces a threat to the generalizability of our findings. Grief reactions may differ across individuals with different educational levels and genders, which is not captured in this study and should therefore be considered in future studies (Lundorff et al., 2020). Furthermore, most participants had subclinical symptom levels of prolonged grief. It might as well be possible that the results differ for a clinical sample, which also should be researched and compared in future research.

Additionally, we assessed general attachment dimensions of the participants, in line with the majority of research in the area, rather than their attachment dimensions in relation to the deceased person (Eisma et al., 2023). It should, however, be considered that one's attachment orientation might differ from one relationship to the next (Shaver & Tancredy, 2001). Research findings considering the attachment relation to the deceased, instead of general attachment style, have revealed inconsistent findings (Black, 2019; Huh, 2017; Joyce, 2010; Smigelsky, 2020). That is, when attachment avoidance was assessed as relating to the deceased, it did not indicate a significant association to PGS. However, general attachment avoidance was significantly associated with PGS (Eisma et al., 2023). Future research should

measure and compare both general attachment orientations and relationship-specific attachment to the deceased to infer accurate conclusions about the association between attachment dimensions and PGS.

Conclusion

This study investigated the relationships between attachment anxiety and avoidance and their interaction with PGS. Consistent with prior research (Eisma et al., 2023), both attachment dimensions were significantly positively associated with PGS, suggesting that individuals characterized higher on insecure attachment dimensions are more likely to experience PGS following the death of a loved one. However, the interaction between the two dimensions was not statistically significant, suggesting that the individual effects of the dimensions on PGS are not different depending on levels of the other dimension. The findings of this study highlight the importance of considering attachment theory in understanding individual grief responses and underscore the complexity and need to increase the understanding of secure and disorganized attachment in the context of bereavement and PGS.

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