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Depression and Anxiety among Gay and Bisexual Men: Testing a Mediated Moderation Model of Mindfulness and Adult Attachment

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Abstract: For sexual minority men (SMM), attachment anxiety and attachment avoidance are evidenced to predict poor mental health (e.g., depression and anxiety). While mindfulness is known to mediate this relationship among the general population, it has yet to be examined among SMM. This study examined the interaction of attachment anxiety and avoidance, and the mediating effect of mindfulness, in predicting symptoms of depression and anxiety among a sample of gay and bisexual men (GBM) in the U.S. We used regression-based path analyses to test the interaction of attachment anxiety and avoidance on symptoms of anxiety and depression. Attachment anxiety and avoidance were positively associated with mental health symptoms. In the model predicting anxiety, we found a significant interaction, indicating that individuals high in attachment anxiety and avoidance had the highest BSI scores. In model 2, direct effects for attachment anxiety and avoidance remained significant, and mindfulness was negatively associated with both mental health symptoms. Significant indirect effects from attachment anxiety and attachment avoidance, through mindfulness, to both depressive and anxiety symptoms were observed. No evidence of mediated moderation was found. Our findings show that attachment is an important predictor of mental health among GBM and support previous research on the mediating role of mindfulness in this association.

Keywords: LGBTQ+ health; attachment; quantitative methods; moderated mediation; anxiety; depression; mindfulness

1. Introduction

Sexual minority male populations experience significant mental health disparities compared to heterosexual populations [1,2]. Gay and bisexual men (GBM), specifically, are three times more likely to experience major depression, are nearly five times more likely to meet the criteria for a panic disorder [3], and are at an increased risk of experiencing suicidality and higher rates of substance use [4,5] when compared to their heterosexual counterparts. These higher rates of mental health problems are associated with various factors, such as greater risk for, and experiences of, parental physical abuse and familial rejection [6,7] and experiences of minority stress based on sexual orientation, such as

stigmatization, discrimination, and victimization [5,7]. These experiences and stressors have significant negative impacts on the health outcomes and overall quality of life of SMM [5,6].

Developmental factors such as parental acceptance among LGBTQ+ youth [8] and secure attachment orientation among GBM [9] have been shown to be protective against negative mental health outcomes. Specifically, the protective effects of a secure attachment orientation are well documented and have been established for both anxiety and depression [9–12]. The adult attachment literature describes two central dimensions of attachment: attachment anxiety and attachment avoidance [13,14]. Attachment anxiety is characterized by anxiety and dependency in intimate relationships, and the preoccupation with and fear of abandonment. Attachment avoidance is characterized by the tendency to avoid depending on others or intimate relationships. Conversely, attachment security is characterized by low levels in each of these dimensions [14,15]. There is a well-established connection between mental health and dimensional attachment among general populations. Individuals with insecure attachment of either dimension are more likely to experience depressive symptoms [16–18], difficulty with regulating emotion, and clinically significant anxiety [10,19]. This is compared to individuals with secure attachment, which predicts better mental health outcomes overall [18]. Secure attachment is positively associated with one's ability to utilize adaptive emotion regulation strategies when coping with negative emotions [20] and increased cognitive ability to cope with distress [15]. Secure attachment is also positively associated with one's metacognitive capacity when coping specifically with depressive symptoms [14,21]. While the majority of research examining this relationship between attachment and mental health largely comprises heterosexual samples, thus failing to consider individuals of diverse sexual orientation [22–24], there is a growing body of work exploring this association among SMM specifically [23,24].

SMM experience higher rates of attachment insecurity compared to the general population [25]. Research has shown that when compared to heterosexual peers, LGBTQ+ youth experience lower levels of parental closeness and less secure attachment [24,26]. Elizur and Mintzer (2003) [27] produced an integrated model of attachment and sexual minority stress, describing how sexual minority stress may intersect with and negatively impact attachment orientations. Negative experiences around sexual identity development and disclosure, occurring somewhere between childhood and adulthood, can shift one's attachment orientation away from secure and towards anxious or avoidant. For sexual minority young adults, an insecure attachment style has been shown to be a significant determinant in the onset of depression [28]. Secure attachment has also been found to have a moderating effect on childhood traumatic experiences and depressive symptoms in young Black GBM [29], while insecure attachment has been linked with greater internalized homophobia [30]. The importance of attachment orientation to the overall health of sexual minority individuals has also been found in relation to drug use and sexual risk-taking among GBM [31–33], and to mental health distress, self-efficacy for condom use, and sexual risk-taking among transgender women [34].

Mindfulness shows a mediating effect on the relationship between adult attachment and mental health among the U.S. adult general population [15]. Described as non-judgmental, present-moment awareness [35], mindfulness has been empirically linked to a wide range of psychological and physiological outcomes. Research has demonstrated that secure attachment fosters the development of dispositional or trait mindfulness [36], referred to as one's intrinsic ability to pay attention to and maintain attention to experiences of mindfulness [37].

Further, trait mindfulness is negatively correlated with both attachment anxiety and attachment avoidance [38]. Researchers have found mindfulness and emotional regulation to be sequential mediators between attachment security and depression [39]. Dispositional mindfulness was also found to mediate the relationship between attachment orientation and psychological distress [40]. However, the mediating effect of mindfulness on the

association between attachment and mental health symptoms has yet to be tested among SMM populations.

Given that SMM experience higher rates of attachment insecurity and are disproportionately affected by mental health issues, mindfulness may be an important intervention target for this population. The current study tested a conceptual model, examining the indirect effect of mindfulness in the association between adult attachment and subsequent mental health symptoms (e.g., depression and anxiety), with a large sample of GBM (see Figure 1). We hypothesized that attachment anxiety, attachment avoidance, and their interaction would all be associated with greater mental health symptoms. We hypothesized that mindfulness would be inversely associated with attachment anxiety, attachment avoidance, and their interaction, as well as mental health symptoms. Specifically, we expected that individuals with low levels of attachment anxiety and attachment avoidance (i.e., secure attachment) would endorse the least amount of mental health symptoms and report greater scores of mindfulness. Finally, we hypothesized that mindfulness would mediate the pathways from attachment anxiety, attachment avoidance, and their interaction to mental health symptoms.
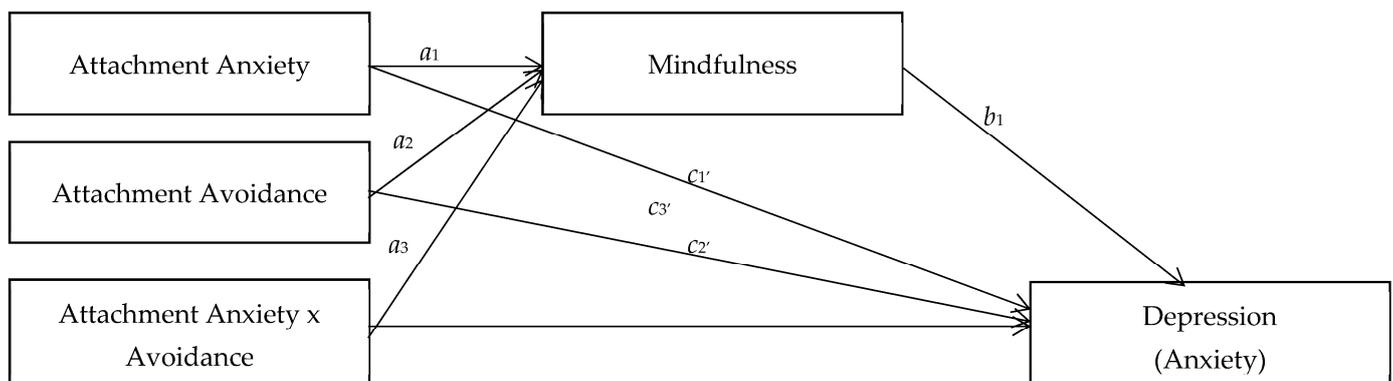

Figure 1. Mediated Moderation Model. The model is estimated for depression and anxiety separately. Model adjustments for age, race, and income not shown for clarity.

2. Materials and Methods

2.1. Participants and Procedures

This study reports the findings of secondary data analysis with a sample of 1071 GBM from the One Thousand Strong national cohort study. This study took place over a period of three years (2013–2016). Our analyses for the present article examine baseline and 12-month follow-up survey data that were collected using an at-home online survey. The comprehensive recruitment and screening procedures for this study can be found elsewhere [41]. Participants were identified via a Community Marketing and Initiatives (CMI) panel comprising LGBTQ individuals. Individuals as part of the panel, from over 200 sources, were contacted and screened for eligibility by study staff. If eligibility criteria were met, panelists provided informed consent and were enrolled in the study. The eligibility criteria included (a) being a current resident of the U.S., (b) being at least 18 years of age, (c) having been assigned male biological sex at birth and self-identifying as male at the time of the study, (d) self-identifying as gay or bisexual, (e) reporting having had sex with a man in the past 12 months, (f) self-identifying as HIV-negative, (g) being willing to complete at-home rapid HIV antibody testing, and (h) being willing to complete self-administered sexually transmitted infection (STI) testing. Participants also needed to (i) have the ability to understand and comprehend the English language to complete assessments, (j) have access to the internet and to a device that was capable of taking a digital photo, (k) have an address to receive mail (not including a P.O. box), and (l) report stable residence (i.e., moving no more than twice in the past 6-month period). All participants provided their consent to take part in the study and were compensated

for completing each survey. The study protocols received ethical approval from the City University of New York (CUNY) Institutional Review Board.

2.2. Measures

2.2.1. Demographic Characteristics

Participants reported their age, race, sexual orientation, gender, income, and relationship status. Participants also reported their educational attainment and whether they were currently employed.

2.2.2. Adult Attachment

The Experiences in Close Relationships—Revised Questionnaire (ECR-R) was used to measure two dimensions of attachment [42]. The ECR-R includes 36 items with two subscales measuring attachment avoidance and attachment anxiety. The stem item for this measure was "The statements below concern how you feel in emotionally intimate relationships. We are interested in how you generally experience relationships, not just in what is happening in a current relationship. Respond to each statement by circling a number to indicate how much you agree or disagree with the statement". A sample item from the avoidance subscale was "I prefer not to show a partner how I feel deep down". A sample item from the anxiety subscale was "I often worry that my partner doesn't really love me". Response options ranged from 1 (strongly disagree) to 5 (strongly agree). Higher scores indicated greater levels of avoidance or anxiety for each subscale. Cronbach's alpha was 0.752 for the avoidance subscale and 0.783 for the anxiety subscale in this study.

2.2.3. Mindfulness

To measure mindfulness, we used the mindfulness subscale of the Self Compassion Scale—Short Form (SCS-SF) [43], which comprises 2 items: "when something upsets me I try to keep my emotions in balance" and "when something painful happens I try to take a balanced view of the situation". Response options ranged from 1 (almost never) to 5 (almost always). Higher scores indicated greater levels of mindfulness. Cronbach's alpha for this study was 0.678 for this subscale.

2.2.4. Depressive Symptoms

At the 12-month follow-up, depressive symptoms were measured using the Center for Epidemiological Studies Depression Scale (CES-D) [44], which includes 20 items that assess depressive symptomology over the past three months. Sample items include "I felt sad", "I felt that people disliked me", and "I thought my life had been a failure". Response options ranged from 0 (rarely or none of the time) to 3 (most or all of the time). Higher scores on this measure indicate higher levels of depressive symptomology. For this study, Cronbach's alpha was 0.927.

2.3. Analyses

Descriptive statistics (mean and standard deviation) and the association between measures (bivariate correlations) were estimated in SPSS v.25 (IBM, New York, NY, USA). Independent-sample *t*-tests were conducted to examine mean differences in attachment anxiety, attachment avoidance, mindfulness, and symptoms of depression and anxiety across different demographic groups (e.g., race, sexual orientation, employment status, and income).

Regression-based path analyses were performed in Mplus v.8 (Muthen & Muthen, Los Angeles, CA, USA). For depressive and anxiety symptoms, the statistical models depicted in Figure 1 were estimated separately. In the first step of each model, we examined attachment anxiety, attachment avoidance, and their interaction in predicting mental health symptoms. Both the attachment anxiety and attachment avoidance variables were mean-centered before creating the interaction term. We note that all models were adjusted for age

(continuous), race (i.e., Black vs. non-Black), and income (i.e., $30,000 annual income or more vs. less than $30k).

In step two of each model, we tested a mediated moderation hypothesis to examine the indirect effect of attachment avoidance (IV), attachment anxiety (moderator), and their interaction on mental health symptoms of depression and anxiety (DV) through mindfulness (mediator). Specifically, we hypothesized that the moderator would have a significant effect on the strength of the association between the IV and the mediator (path a), as well as the strength of the association between the IV and the DV (path c). Further, we conducted a conditional process analysis to probe the significance of the conditional direct and indirect effects at set values of the moderator ($+/-$ 1 SD). The mediated moderation model is shown in Figure 1. Indirect effects were probed using the bootstrapping procedure (5000 samples).

3. Results

Demographics and sample characteristics are presented in Table 1. Bivariate correlations among measures and descriptive statistics are presented in Table 2. We also examined mean differences in mindfulness, attachment, and mental health symptoms by demographic characteristics. We observed a significant mean difference ($t(1069) = 2.01$, $p = 0.05$), indicating that unemployed participants reported a greater level of attachment anxiety ($M = 25.02$, $SD = 7.65$), compared to participants who were employed ($M = 23.70$, $SD = 8.01$). Additionally, there was a significant mean difference in depressive symptomology ($t(1015) = 2.17$, $p = 0.03$), where unemployed participants reported greater scores ($M = 16.31$, $SD = 10.73$), compared to those who were employed ($M = 14.34$, $SD = 10.65$). There was also a significant mean difference in attachment anxiety ($t(1069) = -4.25$, $p < 0.001$), indicating that participants who made less than $10k per year reported a greater level of attachment anxiety ($M = 27.08$, $SD = 7.40$), compared to participants who made more than $10k per year ($M = 23.59$, $SD = 7.95$). Additionally, there was a significant mean difference in depressive symptomology ($t(1015) = -3.77$, $p < 0.001$), where participants who made less than $10k per year reported more depressive symptoms ($M = 18.63$, $SD = 10.42$), compared to participants who made more than $10k per year ($M = 14.26$, $SD = 10.64$). Finally, we also observed a significant mean difference in symptoms of anxiety ($t(1015) = -3.15$, $p = 0.002$), where participants who made less than $10k per year reported more depressive symptoms ($M = 2.00$, $SD = 1.09$), compared to participants who made more than $10k per year ($M = 1.67$, $SD = 0.94$). We did not observe significant mean differences for mindfulness or attachment, and we did not find differences across any of these measures based on race or sexual orientation.

Table 1. Sample Demographics (*n* = 1071).

	N (%)	Mean (SD)
Age		40.24 (13.84)
Race/Ethnicity		
Black	83 (7.7%)	
Latino	135 (12.6%)	
White	763 (71.2%)	
Other	90 (8.4%)	
In a Relationship	522 (48.7%)	
Not in a Relationship	549 (51.3%)	
Sexual Orientation		
Gay	1017 (95%)	
Bisexual	54 (5%)	
Education		
4-year college degree	597 (55.7%)	
<4-year college degree	474 (44.3%)	

Table 1. *Cont.*

	N (%)	Mean (SD)
Employed	896 (83.7%)	
Unemployed	175 (16.3%)	
Income		
>$75k	213 (19.9%)	
$20k–49k	362 (33.8%)	
$50k–74k	201 (18.8%)	
<$20k	295 (27.5%)	

Table 2. Bivariate Correlations among Measures.

	1	2	3	4	5
1. Mindfulness	-	−0.33 **	−0.13 **	−0.35 **	−0.15 **
2. Attachment Anxiety		-	0.13 **	0.35 **	0.19 **
3. Attachment Avoidance			-	0.23 **	0.08 **
4. Depression (CESD)				-	0.49 **
5. Anxiety (BSI)					-
Mean	3.70	23.92	16.29	14.65	1.70
SD	0.89	7.96	6.56	10.69	0.96
α	0.68	0.78	0.75	0.93	0.87

** $p < 0.01$.

Next, we conducted a path analysis to examine the association between attachment and mental health outcomes, as well as the mediating role of mindfulness. The results from these analyses are shown in Table 3. We specified two models, predicting each mental health outcome (i.e., depression and anxiety symptoms) separately. In step one of each model, we examined the association between attachment anxiety, attachment avoidance, and their interaction in predicting mental health outcomes (e.g., depression and anxiety), while adjusting for demographic covariates (path c). At step one, attachment variables and the demographic covariates accounted for 9.7% of the variance in symptoms of anxiety and 18.1% of the variance in symptoms of depression. In step two of each model, we examined the mediating role of mindfulness in these associations. Specifically, we tested mindfulness as an outcome (path a), and this model, which included attachment variables and demographic covariates, accounted for 12.6% of the variance in mindfulness scores. We also examined mindfulness as a predictor of mental health symptoms (path b), while adjusting for all other variables. Finally, we examined the association between attachment anxiety, attachment avoidance, and their interaction in predicting mental health outcomes (e.g., depression and anxiety), while adjusting for demographic covariates and mindfulness (path c'). The addition of mindfulness to the model accounted for an additional 1.4% of the variance in anxiety symptoms reported in the BSI and an additional 5.5% of the variance in depression symptoms.

Table 3. Mediated Moderation Models Predicting Depression and Anxiety.

Path Model Predicting BSI—Anxiety	Model 1 Anxiety			Model 2					
				Mindfulness			Mindfulness > Anxiety		
	R2	β	p	R2	β	p	R2	β	p
	0.01			0.13			0.11		
Black		−0.06	0.03		0.07	0.02		−0.06	0.05
Income $30k+		−0.09	0.01		0.06	0.06		−0.08	0.02
Age		−0.11	0.00		−0.03	0.38		−0.12	0.00
Attachment Avoidance		0.09	0.01		−0.10	0.00		0.08	0.02
Attachment Anxiety		0.20	0.00		−0.31	0.00		0.17	0.00
Attachment Avoidance x Anxiety		0.07	0.05		−0.03	0.32		0.07	0.07
Mindfulness		-	-		-	-		−0.12	0.00

Table 3. *Cont.*

Path Model Predicting Depression	Model 1 Depression			Model 2					
				Mindfulness			Mindfulness > Depression		
	R2	β	p	R2	β	p	R2	β	p
	0.18			0.13			0.24		
Black		−0.02	0.53		0.07	0.02		0.00	0.92
Income $30k+		−0.14	0.00		0.06	0.06		−0.13	0.00
Age		−0.05	0.11		−0.03	0.38		−0.05	0.06
Attachment Avoidance		0.19	0.00		−0.10	0.00		0.16	0.00
Attachment Anxiety		0.30	0.00		−0.31	0.00		0.22	0.00
Attachment Avoidance x Anxiety		0.03	0.35		−0.03	0.32		0.01	0.61
Mindfulness		-	-		-	-		−0.24	0.00

Step one for both path analyses tested path c of our mediated moderation model (see Figure 1). In the model predicting symptoms of anxiety, having a Black racial identity ($\beta = -0.06$, $p = 0.03$), having a higher income ($\beta = -0.09$, $p = 0.01$), and being older in age ($\beta = -0.11$, $p < 0.001$) were independently and negatively associated with the outcome variable. Attachment anxiety ($\beta = 0.20$, $p < 0.001$), attachment avoidance ($\beta = 0.09$, $p = 0.01$), and their interaction ($\beta = 0.07$, $p = 0.05$) were significantly and independently associated with symptoms of anxiety. However, we note that the finding of this interaction is marginally significant. The plot of the regression lines demonstrating the significant interaction between attachment anxiety and attachment avoidance is presented in Figure 2. This indicated that individuals with high levels of attachment anxiety and high levels of attachment avoidance exhibited the greatest symptoms of anxiety on the BSI. Further, individuals with high avoidance and low anxiety reported the lowest scores on the BSI. In the model predicting symptoms of depression, having a higher income ($\beta = -0.14$, $p < 0.001$) was independently and negatively associated with the outcome variable. Attachment anxiety ($\beta = 0.29$, $p < 0.001$) and attachment avoidance ($\beta = 0.19$, $p < 0.001$) were also significantly and independently associated with symptoms of depression. The interaction between attachment anxiety and attachment avoidance was not a significant predictor in the model.
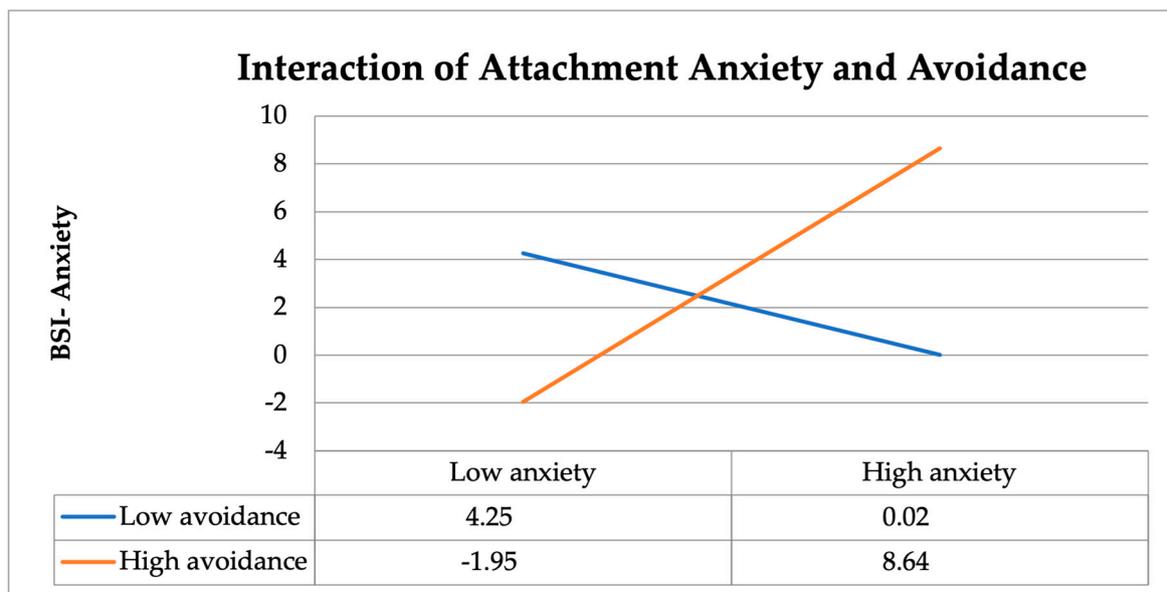

Figure 2. Interaction of Attachment Anxiety and Avoidance Predicting BSI-Anxiety.

In step two of each model, we examined mindfulness as a mediator in these associations. We first tested path a, looking at mindfulness as an outcome, which was the same for each set of analyses. In both models, attachment anxiety ($\beta = -0.31$, $p < 0.001$) and

attachment avoidance ($\beta = -0.10$, $p = 0.002$) were significantly associated with mindfulness; however, their interaction was not. Additionally, having a Black racial identity was significantly associated with mindfulness ($\beta = 0.07$, $p < 0.05$). Next, we tested paths b and c' of our mediated moderation model. Mindfulness was negatively associated with both symptoms of depression ($\beta = -0.24$, $p < 0.001$) and anxiety ($\beta = -0.12$, $p = 0.001$). In testing path c' for both models, attachment anxiety and attachment avoidance ($\beta = 0.19$, $p < 0.001$) remained significant predictors of depression and anxiety. The interaction between attachment anxiety and attachment avoidance remained insignificant in both models.

Next, we examined the indirect effect of attachment variables in predicting mental health outcomes, via mindfulness (see Table 4). The analyses revealed a significant indirect effect of attachment anxiety ($\beta = 0.04$, $p = 0.001$) and attachment avoidance ($\beta = 0.01$, $p = 0.02$), through mindfulness, on symptoms of anxiety. There was also a significant indirect effect of attachment anxiety ($\beta = 0.08$, $p < 0.001$) and attachment avoidance ($\beta = 0.02$, $p = 0.004$), through mindfulness, on symptoms of depression. However, the indirect effect for the interaction term was not significant in either model.

Table 4. Testing the Indirect Effect of Mindfulness in Models Predicting Depression and Anxiety.

	β	*p*
BSI Model		
Indirect Effect from Attachment Avoidance to BSI—Anxiety	0.01	0.02
Indirect Effect from Attachment Anxiety to BSI—Anxiety	0.04	0.00
Indirect Effect from Attachment Avoidance x Anxiety to BSI—Anxiety	0.00	0.36
CESD Model		
Indirect Effect from Attachment Avoidance to Depression	0.02	0.00
Indirect Effect from Attachment Anxiety to Depression	0.08	0.00
Indirect Effect from Attachment Avoidance x Anxiety to Depression	0.01	0.32

Note. Standardized regression coefficients reported. Bootstrap sample size = 5000.

However, findings from the conditional process analyses demonstrated evidence of mediated moderation for the model predicting anxiety symptoms reported in the BSI. Specifically, we examined the conditional indirect effect of attachment avoidance (through mindfulness) at various levels of attachment anxiety ($+/- 1$ SD). These findings revealed that the conditional indirect effect was only significant at moderate levels of attachment anxiety. This effect was not significant at low or high levels of attachment anxiety. Further, the conditional process analyses revealed that the direct and total effects were significant at moderate and high levels of attachment anxiety; however, they were not significant at low levels of attachment anxiety (see Table 5).

Table 5. Conditional Process Analysis: Probing the Interaction of Attachment Anxiety and Avoidance in the Model Predicting BSI—Anxiety.

	β	*p*	BootLLCI	BootULCI
Conditional direct effect analysis at Attachment Anxiety = M ± SD				
M − 1SD (−7.96)	0.00	0.58	−0.004	0.007
M (0)	0.01	0.02	0.003	0.014
M + 1SD (7.96)	0.02	0.02	0.005	0.026
Conditional indirect effect analysis at Attachment Anxiety = M ± SD				
M − 1SD (−7.96)	0.00	0.10	0.000	0.002
M (0)	0.00	0.02	0.001	0.002
M + 1SD (7.96)	0.00	0.05	0.001	0.003
Conditional total effect analysis at Attachment Anxiety = M ± SD				
M − 1SD (−7.96)	0.00	0.43	−0.003	0.008
M (0)	0.01	0.01	0.004	0.016
M + 1SD (7.96)	0.02	0.01	0.006	0.027

Note. Unstandardized regression coefficients reported. Bootstrap sample size = 5000. LL = low limit, CI = confidence interval, UL = upper limit.

4. Discussion

This study examined attachment anxiety, attachment avoidance, and their interaction as predictors of mental health symptoms among a nationwide sample of GBM in the U.S. while also examining the mediating effect of mindfulness in each of these associations. Our findings show that insecure attachment patterns are a significant predictor of anxiety and depression among GBM, adding to the evidence base built by prior research [25,32,45]. Moreover, our findings demonstrated a mediating effect of mindfulness in these associations, which provides new evidence for this dynamic among a GBM population. Below we discuss the implications of these findings for the development of interventions aiming to improve mental health outcomes among GBM, as well as directions for future research.

The protective effects of a secure attachment orientation are well documented for mental health outcomes both in the general population and among SMM [9,24,25,46]. Cook and Calebs (2016) [24] proposed an integrated attachment and sexual minority stress model suggesting that sexual minority stigma may be directly associated with a decreased capacity for developing and maintaining a secure attachment with parents in early life and with peers and romantic partners across the life course. This theory also proposes a bidirectional relationship between adult attachment and experiences of sexual minority stress, which is, to some degree, supported by previous studies showing that sexual minority stressors such as concealment of sexuality [47,48] and internalized homophobia are associated with insecure attachment [49]. Finally, this model posits that adult attachment (1) has a direct effect on health outcomes, (2) has an indirect effect on health outcomes via its effect on minority stress, and (3) serves as a moderator providing a buffering effect on the association between sexual minority stress and health outcomes [24]. Also, the transdiagnostic treatment approach for syndemic health conditions among GBM [50] proposes disrupted attachment as a pathway from minority stress to syndemic health outcomes, including depression and anxiety, which, in turn, are associated with HIV risk behavior and infection. Further, Pachankis (2015) [50] highlighted disrupted attachment as an RDoC mechanism in the domain of social functioning, as outlined by the National Institute of Mental Health (NIMH), and designated it as a proposed treatment target in the model. We note that RDoC refers to NIMH's research domain criteria, wherein social processes and functioning is one of the six domains specified in the RDoC model.

The importance of our results is further underscored by research demonstrating that, in addition to the negative impact of sexual minority stress on attachment, SMM youth are particularly vulnerable to poor parent–child relationships. In a study comparing heterosexual and sexual minority siblings, mothers reported less affection toward children and YGBM reported more insecure parent–child attachments, compared to their heterosexual siblings [25]. Another study reported that, even before children realized their sexual orientations, parental rejection was experienced as a result of gender non-conformity, which, in turn, was associated with developing an insecure attachment [51]. Studies show that a lack of maternal support for their child's sexuality is associated with both avoidant and anxious attachment [47]. Further, research also shows that GBM experience a lack of acceptance from their parents significantly more often than their heterosexual peers [48], which can lead to the development of rejection sensitivity—a central trait of high attachment anxiety. This may provide some evidence for the bidirectional association between attachment and sexual minority stress, posited in Cook and Calebs's model [24].

Given these findings, early intervention to foster secure parent–child attachment has been identified as not only important for improving mental health outcomes for SMM but also an important strategy to buffer against later HIV risk [50,52,53]. Yet few programs have actually utilized this approach in working with SMM, with one review study reporting that only 2 out of 44 programs targeting sexual minority stress utilized an attachment-based intervention approach [54]. Notably, this may be due to the issue that, for many SMM, re-establishing a safe and secure parent–child relationship is simply not possible. Another promising approach to intervention suggests that adults with insecure attachment patterns can change their trajectory through developing what has been termed as "earned

security" [55]. Notably, there have been few studies which have examined the process through which an individual moves from insecure to secure attachment [24]. However, observational studies that have simply tracked individuals' transitions from insecure to secure attachment have found that participants report lower overall depression over time, compared to those who transition from a secure to insecure attachment style [56].

Importantly, mindfulness has been identified as a target mechanism in achieving this goal. Researchers have suggested that mindfulness can be seen as "a way of developing a secure attachment with yourself", or, rather, developing what is often termed as "earned security" [57]. In fact, mindfulness has been proposed as a potential variable to interrupt the intergenerational transmission of attachment [58]. Further, prior studies have demonstrated that secure attachment fosters the development of dispositional mindfulness [36]. In this way, the association between attachment and mindfulness may be bidirectional, though additional research is needed to further support this claim [59]. Specifically, researchers may consider using longitudinal data to assess the potential bidirectionality of these constructs through testing cross-lagged path models.

Continued research is needed to better understand the mechanisms through which mindfulness may assist GBM and other SMM in developing "earned attachment security". Researchers have suggested that attachment orientations can influence how SMM perceive minority stress [24]. One study found that discrimination partially mediated the association between attachment anxiety and depression in a sample of gay men [45], suggesting that SMM with anxious attachment may experience greater rejection sensitivity in relation to experiences of sexual minority stress. Mindfulness—both dispositional and cultivated—is known to buffer against stress. The mechanism through which mindfulness lowers stress has been said to function through changing stress appraisals or promoting adaptive coping during stressful situations [60]. In this way, it is possible that mindfulness may promote the development of "earned attachment security" through reducing rejection sensitivity and by helping SMM better cope with experiences of sexual minority stress. Further, if sexual minority stress does decrease SMM's capacity for developing and maintaining secure attachments, as posited in Cook and Calebs' model of integrated attachment and sexual minority stress [24], it would make sense that mindfulness may interrupt this pathway through these mechanisms.

In terms of intervention implications, our findings lend support for the use of mindfulness-based interventions (MBIs) in helping buffer experiences of sexual minority stress and improving mental health outcomes among GBM. Research shows that MBIs improve mental health across various populations [61], including SMM and those most affected by HIV [62]. Among these populations, mindfulness programs have been effective in decreasing emotional distress and symptoms of anxiety [62] and depression [63]. Further, MBIs are also effective in reducing HIV risk behavior [64], which may be an important consideration for this population. In addition to MBIs, recent research has also indicated that various emotion regulation skills, in which mindfulness is commonly conceptualized to be a component, mediate associations between insecure attachment and depression [65]. Future work should also explore these related skills and components to inform targeted interventions that harness the protective effect of mindfulness in SMM populations. Additionally, researchers may also explore the utility of MBIs in mediating or moderating the association between variables such as everyday discrimination and internalized homophobia or rejection sensitivity. Future research may also consider the development of multicomponent interventions that leverage more than one mechanism as the intervention target.

Limitations

We have discussed our findings in the context of two theoretical frameworks that considered the impact of sexual minority stress, attachment, and mental health, as we believe these models to be most useful in understanding data from this sample of GBM. However, we do acknowledge that the present study did not directly examine minority stress. Future research should consider testing these two models [24,50], while also

considering the potential role that mindfulness may play as a target mechanism in these associations. The present study examined mindfulness as a mediator in the relationship between attachment and mental health symptoms. However, it is possible that mindfulness may also independently moderate developmental pathways to mental health and HIV risk. As such, we recommend that future research explore this possibility.

In addition, we acknowledge that the methods used in this study were not without limitation. Participants were identified and enrolled through the Community Marketing Insights (CMI) LGBTQ panel, which required them to have access to the internet and to have familiarity with completion of online surveys, possibly limiting the representativeness of the sample. Additionally, involvement in the study required participants to have access to the internet and a stable residence, which may also have limited the representativeness of the sample. We also note that this study was conducted prior to the COVID-19 pandemic, which may also affect the generalizability of our results.

Recruitment parameters were utilized to enroll a cohort that closely represented the U.S. general population and distribution of GBM across the U.S., resulting in a geographically diverse sample. However, due to the inclusion criterion that participants' serostatus be HIV-negative, these results may not be generalizable to the experiences of individuals with an HIV-positive serostatus, and we acknowledge that this sample does not sufficiently reflect the ongoing racial and ethnic disparities among GBM and other SMM of color with regard to HIV burden [66].

Lastly, data were collected longitudinally via closed-ended computerized surveys. Future studies should consider including other forms of data collection, such as qualitative data or event-level (e.g., daily diary, ecological momentary assessment) data in order to obtain more nuanced information on participants' lived experiences. A major limitation with longitudinal research is that retrospective recall introduces bias and measurement error. Recall biases are more common when participants are asked to aggregate emotions, experiences, or events over a given period. Reported aggregation is often biased by the saliency or intensity of the participants' most recent experience [67,68]. Research on depression and anxiety may benefit from a more ecologically valid approach to data collection. Ecological momentary assessment (EMA) is a strong method that circumvents these errors in measurement. Because EMA methods allow for the collection of momentary data, they reduce time-related recall biases, which increases the validity of EMA data. Further, EMA provides greater ecological validity [69] as data are collected in the context of participants' daily lives, removing bias introduced by artificial lab settings. For future studies on anxiety and depression, researchers should consider this approach as EMA methods would capture daily shifts in mood and variation in symptoms.

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