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Thought Control Mediates the Relation between Adverse Childhood Experiences and Body Dysmorphic Disorder Symptoms in Undergraduates

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Dedication

Dedicated to Frank Elnashar, a loving and supportive father. I’m sure you’re watching.

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Sincerest thanks to Dr. Brumley for not only serving as my thesis mentor, but for going above and beyond in providing guidance and support in the process. Thank you for the opportunity to complete this achievement.

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Abstract

Purpose: Body dysmorphia (BDD) has been shown to possibly result from multiple environmental factors. However, the exact mechanism by which these environmental factors play a role has yet to be examined. The purpose of the current study is to examine the relationship between adverse childhood experiences (ACEs) and body dysmorphia symptoms through maladaptive thought control as a mediator.

Method: The current study collected data from 127 undergraduate students aged 18-25. A survey was given with questionnaires assessing demographics such as age, sex, and gender, as well as the frequency of ACEs, BDD symptoms, and obsessional beliefs. Pearson's correlation analysis was conducted to examine the associations between questionnaire variables. An ordinary least squares regression analysis was then conducted using the PROCESS macro to establish a mediation effect between ACEs and BDD symptoms with maladaptive thought control as the mediating variable.

Results: Results from the mediation analysis found a significant indirect effect of ACEs on BDD symptoms through maladaptive thought control (b = 0.27, se = 0.13, 95% CI [.02 to .52]), (36% of the total effect), as well as a significant total effect between ACEs and BDD symptoms (b = .74, se = .31, t = 2.39, p = .019, 95% CI [.13 to 1.35]).

Implications: The results of the study suggest a full mediation effect between ACEs and BDD symptoms with maladaptive thought control as a mediator. This provides further context for the mechanism by which BDD is impacted by the environment and can be used to improve clinical outcomes.

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Chapter 1

Thought Control Mediates the Relation between Adverse Childhood Experiences and Body Dysmorphic Disorder Symptoms in Undergraduates

Adverse childhood experiences (ACEs) have been linked to the development and exacerbation of multiple different psychological disorders, including depression, anxiety, and obsessive-compulsive disorder (OCD; Gu et al., 2022). ACEs include potentially traumatic events such as childhood maltreatment, exposure to parental substance use, and exposure to violence (Anda et al., 2006), that can have negative and long-lasting effects on cognition, mental and physical health, and overall well-being (Boullier & Blair, 2018; Ritchie et al., 2010). The mental health disorders linked to ACEs vary widely in their symptomatology and the extent to which they have been researched. Disorders such as depression and generalized anxiety have been researched extensively already (Elmore & Crouch, 2020), but there is limited research demonstrating a relation between ACEs and Body Dysmorphic Disorder (BDD; Longobardi et al., 2022). This gap in research is important to explore, given that many BDD symptoms, such as hypervigilance and higher levels of anxiety for example, are also linked to exposure to ACEs (Bader et al., 2007; Lee et al., 2020). Thus, this paper will examine the link between ACEs and BDD in undergraduate students, and test one possible mechanism by which ACEs might confer risk for BDD: maladaptive thought control strategies.

What is BDD?

BDD is generally characterized by "a preoccupation with perceived appearance defects and repetitive behaviors intended to hide, fix, or check them. The perceived flaws are not observable or only appear minimal to others" (Kuck et al., 2021, pp. 2). In order to be diagnosed

with BDD, four different DSM-5-TR criteria must be met (American Psychiatric Association, 2022, Diagnostic Criteria F45.22). First, the individual must be preoccupied by a perceived flaw or deficit in their appearance, which may or may not be visible to others. Second, the individual must perform repetitive/compulsive behaviors or mental acts related to appearance concerns. This can include excessively checking the mirror to examine physical appearance, or consistently comparing their appearance to the appearance of others. Third, the preoccupation with appearance and associated behaviors must cause significant distress/impairment in daily important functioning. Finally, these appearance concerns and behaviors must not be better explained by concerns with weight or body fat in which the individual's symptoms meet the diagnostic criteria for an eating disorder (American Psychiatric Association, 2022, Diagnostic Criteria F45.22).

As for the prevalence of BDD, around 2.4% of people in the United States meet criteria for BDD, and men and women are roughly equal in prevalence, with 2.5% of women and 2.2% of men meeting DSM-IV criteria (Koran et al., 2008). Most researchers agree that BDD usually begins in adolescence (Phillips et al., 2005; Bjornsson et al., 2010). The disorder is considered chronic (Phillips et al., 2006), although evidence-based treatment and therapies such as cognitive behavioral therapy and SSRIs can help alleviate symptoms (Phillips et al., 2010). While there are many nuances to the development of BDD, the impact this disorder has on an individual's daily life and functioning is immense. Individuals with BDD are at a higher risk for suicide, with some studies showing that up to 28% of individuals with BDD have made a suicide attempt at some point in their lifetime (Phillips, 2007). Additionally, individuals with BDD are at an increased risk for poorer social and academic functioning, with some children even missing school for up to 100 days due to BDD symptoms (Albertini & Phillips, 1999).

Body Dysmorphic Disorder in an Undergraduate Population

While BDD is a disorder that typically onsets around adolescence, undergraduate students are often studied due to convenience of sampling and the relevance of appearance-related pressures during the developmental period of emerging adulthood (Arnett, 2000; Swami et al., 2022). As far as the prevalence of BDD in undergraduates, across all cultures, around 3.3% of students meet full diagnostic criteria for BDD (Veale et al., 2016). Females also have a slightly higher prevalence (3.6%) compared to males (2.2%) (Veale et al., 2016).

As for American undergraduate students specifically, in some cases, studies have shown that the prevalence of BDD in American undergraduates is as high as 13% (Biby, 1998). However, conflicting studies have also found evidence that this prevalence can be as low as 4% (Bohne et al., 2002). While there is a significant variation in the rates of BDD in this population, even the low end of 4% is higher than the cross-cultural/global average. This difference in prevalence may point to the possibility of differences in culture and cognition playing a role in the development of BDD in general.

While rates of BDD provide some of the picture, it is also important to recognize that body dysmorphia exists on a spectrum, and many people experience symptoms of the disorder below the clinical threshold. While research on the effects that sub-clinical BDD symptoms have on an individual and the prevalence of sub-clinical BDD symptoms is limited, one study found that in a sample of 1204 undergraduate students, after administering the BDD-YBOCS (a BDD symptom severity assessment measure), 11% of individuals had mild to moderate BDD symptoms, and 1.5% had severe BDD symptoms (Alam et al., 2022). These symptoms included appearance anxiety, compulsive behavior related to thoughts about appearance, and the

interference it had on the individual's personal life. While the students may not have met the specific clinical threshold to be diagnosed with BDD, the appearance anxiety, compulsive behavior, and the impact on personal functioning that was measured was associated with poorer health decisions such as smoking cigarettes.

Why Do Some People Develop BDD: The Cognitive Model of BDD

A cognitive model of the etiology of BDD purports that maladaptive cognitive vulnerability factors play a significant role in the development of BDD. These factors may begin when an individual develops a distorted mental image of their self, which they then attune to through selective attention on a specific part of their body (Veale, 2004). The perceived importance of physical appearance is also heightened in individuals with BDD, which causes further vulnerability to maladaptive cognitive strategies such as ruminating about a perceived flaw in one's appearance, great belief in the importance of controlling thoughts, and development of social anxiety (Veale, 2004; Lavell et al., 2014). Thus, the ways in which individuals engage with their thoughts about appearance can increase vulnerability to moving from body dissatisfaction into an obsessive-compulsive disorder such as OCD and BDD.

Lavell and colleagues (2014) examined the relation between BDD symptoms and three types of maladaptive thinking styles: 1) obsessional beliefs related to the perceived importance of one's thoughts, which tie to the individual's worth and sense of self (thought control), 2) intolerance of uncertainty and importance of perfectionism (certainty), and 3) hyper vigilance and overestimation of threat (vigilance). When these three thinking styles were examined in a multivariate model, thought control was the only thinking style that was associated with BDD symptoms. However, thought control, vigilance, and certainty were all highly associated with

one another. Given this association, the conclusion was drawn that thought control may incorporate both vigilance and certainty into its domain. Thus, the study concluded thought control can be used as a measure for all three obsessional belief domains in relation to BDD symptoms.

Given the purported link between thought control and BDD symptoms, research has shown a pattern in certain thought control strategies among individuals with BDD. When confronted with an intrusive thought, individuals with BDD tend to use thought control strategies deemed as maladaptive, such as worrying, rumination, and confrontation (focusing on the thought until it goes away), more than healthy controls (Kollei et al., 2012). Combined with the tendency for individuals with BDD to place greater importance on controlling one's thoughts and linking intrusive thoughts to their sense of self (Lavell et al., 2014), these maladaptive cognitive patterns increase the vulnerability for worsening of BDD symptoms.

BDD and Adverse Childhood Experiences

Someone might develop cognitive vulnerabilities that predispose them to developing body dysmorphic symptoms if they grow up exposed to stressful events. ACEs, by their nature, are unpredictable and out of the child's control. This unpredictability has been shown to mediate the relationship between ACEs and poorer mental and physical health outcomes even into adulthood (Maner et al., 2022). Thus, growing up exposed to unpredictable adverse childhood experiences could set the stage for trying to find control in any and all places, such as control over one's own thoughts. Thus, the development of maladaptive cognitive strategies aimed at control may, in turn, further increase vulnerability to developing BDD. Additionally, given that BDD tends to generally begin in adolescence, ACEs can play a significant role in the

development of the disorder. Due to the highly adaptive and changing schemas that adolescents are developing and hold for the world around them and themselves, exposure to ACEs can easily mold and change said schemas during this crucial developmental period. Thus, BDD risk factors such as maladaptive thought control strategies may also arise from an adolescent attempting to adapt their schemas and regain control after exposure to ACEs.

While few studies have tested this link specifically, a meta-analysis conducted by Longobardi et al., (2022) found that ACEs such as abuse, neglect, bullying, and teasing were all found to be positively associated with BDD symptoms. Specifically, there was a low to moderate association between ACEs overall, as well as bullying and abuse specifically, with BDD symptoms. Teasing was found to have a moderate to large association to BDD. The authors theorized that the stronger association between teasing and BDD is because teasing may focus on perceived flaws in appearance, which plays an important role in the development of BDD symptoms.

Additionally, individuals with BDD will sometimes attribute the development of their disorder to a specific event. In a study conducted by Weingarden et al., (2017), about 37% of individuals with BDD felt that a specific stressful event triggered the onset of their symptoms. While these events were not all related to adverse childhood experiences, participants who attributed their disorder to bullying specifically (an adverse childhood experience), were found to have poorer psychosocial outcomes (i.e., depression severity, quality of life, and functional impairments) compared to individuals who attributed their disorder to a different type of event. This difference in outcomes for individuals who experienced an adverse childhood experience

specifically illustrates the importance of ACEs as a potentially driving factor in the development of BDD symptoms.

While traumatic events in childhood such as bullying, abuse, neglect, and teasing do not always lead to a BDD diagnosis, there is evidence to suggest that individuals with BDD are more likely to have experienced traumatic events in their life. This evidence can be found in studies that have examined BDD as a comorbid factor with other disorders in relation to trauma. For example, when examining the traumatic event history of individuals with OCD with or without a comorbid BDD diagnosis, researchers found that individuals with a comorbid BDD diagnosis were more likely to report having a significant traumatic event in their lifetime compared to individuals without comorbid BDD (Valderrama et al., 2020). This highlights the importance of trauma as a defining factor in the development of BDD specifically.

Although the relationship between BDD and ACEs has been established, the mechanisms by which they are related has been largely underexplored. One may argue that given the unpredictable nature of ACEs and the loss of control children may feel after experiencing a traumatic event, controlling one's environment, relationships, and even thoughts could become a way for children to cope with the adverse experience. Thus, the importance of thought control as a mediator between the two should be explored.

Thought Control in Relation to ACEs

Regarding thought control as a maladaptive obsessional belief, prior research has shown that the development of maladaptive beliefs such as certainty, vigilance, and thought control may be uniquely associated to adverse childhood experiences that shape the way children form their cognitive schema (Briggs & Price, 2009). This formation of a control centered approach to the

world around them points towards the idea that thought control is a specific mechanism used by children to maintain control after an adverse experience. While thought control in BDD has not specifically been related to ACEs, thought control strategies in individuals with OCD have been investigated. Research has shown that ACEs positively correlate with maladaptive thought control strategies such as excessive worrying (Vasquez et al., 2022). These strategies, as outlined previously, are a mechanism that not only exist within individuals with OCD, but are also used by individuals with BDD to deal with and control intrusive thoughts.

Current Study

Given the evidence outlined in the literature on the effects of adverse childhood experiences, thought control, and the prevalence/development of BDD in undergraduate students, four main hypotheses have been developed.

First, we expect that undergraduates who report greater exposure to adverse childhood experiences will report higher levels of maladaptive thought control. Second, we expect that undergraduates who report higher levels of maladaptive thought control will report higher levels of BDD symptoms. Third, we expect that undergraduates who report greater exposure to adverse childhood experiences will also report higher levels of BDD symptoms. Finally, we expect that undergraduates who report greater exposure to adverse childhood experiences will also report higher levels of BDD symptoms due, at least in part, to increased maladaptive thought control. We plan to examine gender as a possible covariate due to past research demonstrating that rates of BDD are higher in females compared to males (Veale et al., 2016). We also will examine age as a possible covariate due to evidence that BDD symptoms tend to onset in mid-adolescence (Bjornsson et al., 2010; Phillips et al., 2005), so it may be that younger undergraduates may have

more BDD symptoms compared to undergraduates in the upper-limit of age in our sample. To summarize, we expect that adverse childhood experiences increase the prevalence of maladaptive thought control, which in turn increases levels of BDD symptoms in undergraduates.

Chapter 2

Methods

The data collection for the current study involved secondary data analysis from a larger primary study and was approved by the Institutional Review Board at a mid-sized university in the Mid-Atlantic United States where the study took place. The current study collected data from 127 undergraduate students, aged 18-25 who were currently enrolled in at least one undergraduate class at the university. Graduate students and students above the age of 25 were not included as the current and primary studies are focused on emerging adulthood. Participants were recruited through flyers posted throughout the university and given to professors, as well as the study being posted on the Psychology department's participant pool system where undergraduates receive course credit for participating in the study. When participants opened the survey link, they completed a brief eligibility screener for inclusion criteria (age, undergraduate student), and then were presented with an informed consent form. Participants checked "Yes I agree" to indicate informed consent and continue to the survey, or "No" which ended the survey. At the end of the survey, participants were provided with a list of mental health resources and asked if they would like to provide their contact information in a separate survey link (not linked to their responses) for a research team member to follow up with them to assist with connecting to mental health services. Alternative to course credit, if participants were not eligible for credit, they were given the option to enter a lottery for a chance to win a $100 Visa gift card. They used a separate link to enter contact information so that identifiable information would not be connected to their survey responses.

Measures

Demographics. Participants' age, race and ethnicity, and gender identity were ascertained through a demographics questionnaire (see Appendix A) which followed best practices and general inclusivity guidelines (The University of Arizona, 2019).

Philadelphia ACEs Questionnaire. Exposure to adverse childhood experiences in participants was assessed through the expanded version of the Philadelphia ACEs Questionnaire (see Appendix B; Cronholm et al., 2015). Items assessed exposure to the following before the respondent's 18th birthday: Emotional abuse, Physical abuse, Sexual Abuse, Emotional neglect, Physical Neglect, Witnessing Domestic Violence, Household Substance Abuse, Household Mental Illness, Incarcerated Household Member(s), Witnessing Community Violence, Felt Discrimination, Neighborhood disorder, Bullying, and whether or not participants ever Lived in Foster Care. Depending on the question, participants responded using a choice of either Yes or No, or using a Likert-style scale related to the frequency of the experience. Following research related to cumulative risk factors and the importance of a holistic approach to adverse childhood experiences (Evans et al., 2013), participant responses were scored based on how many ACEs they reached the threshold for, with each threshold being added up for a final cumulative score.

Obsessional Beliefs Questionnaire. Thought control was assessed using a subscale of the 44-item Obsessional Beliefs Questionnaire (OBQ-44; see Appendix C; Obsessive Compulsive Cognitions Working Group, 2005). For the current study, only the 12 statements related to thought control were scored. Thought control statements were given with a 7-point Likert scale, with 1 indicating "disagree very much" and 7 indicating "agree very much". The final additive sum of each thought control statement was counted as the participant's level of maladaptive thought control. Factor analysis from the original OBQ revealed the three-factor

model of responsibility and threat estimation, perfectionism and intolerance of uncertainty, and importance and control of thoughts that accounted for 42% of variance. These three factors informed the three subscales on the OBQ-44. The three scales of the OBQ-44 were moderately correlated, with factor scores ranging from .42 to .52 (Obsessive Compulsive Cognitions Working Group, 2005). As for the reliability and validity of this measure, the OBQ-44 is widely used to quantify obsessive beliefs and is a highly reliable and valid measure. Specifically, higher scores on all 3 subscales are positively correlated with higher levels of obsessive-compulsive symptoms (Myers et al., 2008). Internal consistency was excellent in the original study, with Cronbach's alpha of .89 for importance/control of thoughts (Obsessive Compulsive Cognitions Working Group, 2005). In our sample, internal consistency was also excellent for the importance/control of thoughts subscale (Cronbach's alpha = .94). Multiple studies have used this measure to quantify obsessional beliefs in college students (Myers et al., 2008; Lavell et al., 2014).

Appearance Anxiety Inventory. To quantify the level of BDD symptoms, participants completed the Appearance Anxiety Inventory (AAI; see Appendix D; Veale et al., 2014). There are two subscales that are measured by the AAI, which are avoidance and threat monitoring, which are added together for a total score. The avoidance subscale is scored from questions 1, 3, 5, 7, 9, and 10. The threat monitoring subscale is scored by questions 2, 4, 6, and 8. Both subscales are tallied with a higher total score meaning that the individual reports more of the appearance anxiety-related behavior. Original exploratory factor analysis of the AAI found that avoidance accounted for 37.5% of variance, while threat monitoring accounted for 22.8% of variance (Roberts et al., 2018). The AAI is considered to have good internal consistency/reliability (Cronbach's alpha = .91; Veale et al., 2014) and moderate convergent

validity with other measures of appearance anxiety such as the BDD-YBOCS (Roberts et al., 2018). In the current sample, internal consistency was also excellent with Cronbach's alpha of .91. The AAI has been used in samples of undergraduate students (Roberts et al., 2018; Lavell et al., 2014).

Data Analysis Plan

Descriptive Statistics. We first examined all variables for assumptions for regression. Descriptive statistics on all study variables were performed examining the means, standard deviations, and frequencies. Based on prior research that BDD may differ by gender (Malcolm et al., 2021), we ran an ANOVA to examine whether any of our main analytic variables differ by gender identity. If any of the main analytic variables did vary as a function of gender, we included gender as a control variable in our mediation model.

Hypothesis Testing. To test our first hypothesis, we performed a Pearson's correlation to test the association between number of ACEs and maladaptive thought control. We expected to find a direct relationship such that higher incidence of ACEs would be associated with higher levels of maladaptive thought control. To test our second hypothesis, we performed a Pearson's correlation to test the association between maladaptive thought control and BDD symptoms. We expected to find a direct relationship such that higher maladaptive thought control would be associated with more BDD symptoms. To test our third hypothesis, we performed a Pearson's correlation to test the association between ACEs and BDD symptoms. We expected to find a direct relationship such that exposure to more ACEs would be associated with more BDD symptoms. To examine our final hypothesis, we conducted an Ordinary Least Squares (OLS) multiple linear regression to test the indirect effect of ACEs on BDD symptoms via maladaptive

thought control. We followed methods by Hayes (2013) and used the PROCESS macro for SPSS to run the mediation model, utilizing bootstrapped confidence intervals to test the significance and presence of a mediation effect. We expected that there would be a significant direct effect of ACEs on BDD symptoms, as well as a significant indirect effect of ACEs on BDD symptoms through maladaptive thought exposure. A model was developed to illustrate the hypothesized effects (see Figure 1). We controlled for gender in the model if it was significantly correlated with any of the analytic variables.

Chapter 3

Results

Sample Descriptives

Preliminary analyses examined means, standard deviations, and frequencies for all variables to assess for any outliers or possible issues in the data. The initial sample consisted of 127 participants aged 18 to 24, from a variety of ethnic and racial backgrounds and gender identities (see Table 1). In total, about one fifth of participants (21.3%) reported no incidence of adverse childhood experiences (ACEs). The other 78.7% of participants reported between one and 12 ACEs, with no participants reporting incidence of all 13 measured ACEs. Four participants that identified as outside of the gender binary were removed from the analyses due to significance of binary gender identity as a covariate, as we were concerned that a subgroup of four would be too small to detect meaningful findings regarding nonbinary participants. Three additional participants were removed via listwise deletion due to preferring not to answer responses for key variables. Thus, the final sample of analysis consisted of 120 participants.

Bivariate Analyses

A Pearson's correlation analysis was conducted to test the associations between ACEs, BDD symptoms, Obsessional Belief subscales, Gender, and Age (see Table 2). Assumptions of linearity and normally distributed data were met, as well as minimum outliers being present with only one significant outlier. Analysis showed that there was not a significant correlation between incidence of ACEs and maladaptive thought control (Importance/Control of Thoughts), counter to our first hypothesis. However, there was a moderate correlation between maladaptive thought control and BDD symptoms ($r(118) = 0.46$, $p < .001$), confirming our second hypothesis that

higher maladaptive thought control would be associated with more BDD symptoms. A significant but small correlation was also found between ACEs and BDD symptoms, ($r(118) = 0.22$, $p = .002$), confirming our third hypothesis that greater exposure to ACEs is positively associated with more BDD symptoms. Finally, age was not found to be significantly correlated with appearance anxiety. However, gender was found to be significantly correlated with levels of appearance anxiety ($r(118) = 0.27$, $p = .001$). In particular, women reported more appearance anxiety compared to men ($t(118) = 3.05$, $p = .003$). Note that we ran a t-test rather than the planned ANOVA due to the insufficient cell size of nonbinary/gender fluid participants and decision to focus on males and females. Therefore, gender was included as a covariate in our mediation analysis.

Mediation Analysis

Following the method by Hayes (2013) using the PROCESS macro for an ordinary least squares regression analysis (see Table 3), several assumptions were tested. Residuals were not correlated as tested by Durbin-Watson testing. There was no presence of strong multicollinearity assessed by collinearity diagnostics, homoscedasticity was present as assessed by scatterplot, residuals were normally distributed as assessed by histogram and p-p-plot, there was only one outlier in the data, and there was linearity in the relationships between variables as assessed by scatterplot. Additionally, a significant indirect effect of ACEs on BDD symptoms was found via maladaptive thought control as a mediator while controlling for gender. The overall indirect effect of ACEs on BDD symptoms through maladaptive thought control was significant ($b = 0.27$, $se = 0.13$, 95% CI [0.02 to 0.52]), which accounted for about 36% of the total effect. There was a significant total effect between ACEs and BDD symptoms as well, wherein for every

increase of one in ACEs score, there was a .74 unit increase in BDD symptom score (b = 0.74, se = 0.31, t = 2.39, p = .019, 95% CI [0.13 to 1.35]) (see Figure 2). A significant relationship between maladaptive thought control and BDD symptoms was also found, with reported BDD symptom scores increasing by 0.37 for every one increase of maladaptive thought control scores (b = 0.37, se = 0.06, t = 5.78, p < .001, 95% CI [0.24 to 0.49]). However, there was no direct effect between ACEs and BDD symptoms (b = 0.47, se = 0.28, t = 1.69, p = .09, 95% CI [-0.08 to 1.02]), i.e., when accounting for thought control, the relation between ACEs and BDD symptoms was not significant. The path from ACEs to maladaptive thought control was not significant (b = 0.73, se = 0.39, t = 1.83, p = 0.07, 95% CI [-0.06 to 1.52]). Lastly, there was a significant relationship between gender and BDD symptoms, wherein females reported higher prevalence of BDD symptoms compared to males (b = 4.96, se = 1.34, t = 3.70, p > .001, 95% CI [2.31 to 7.62]), but no significant relationship between gender and maladaptive thought control was found (b = -1.18, se = 1.94, t = -0.61, p = 0.545, 95% CI [-5.05 to 2.68]).

Chapter 4

Discussion

The current study is the first to analyze the relationship between adverse childhood experiences and symptoms of body dysmorphia mediated by maladaptive thought control. We found support for this mediating effect such that maladaptive thought control is a mechanism by which ACEs increase risk for BDD symptoms.

First we examined whether gender or age should be controlled for in analyses as possible covariates. We found that BDD symptoms were not significantly associated with age, which may have been due to the small range of ages included in the sample. Therefore, age was not included as a possible covariate in analyses. However, BDD symptoms were significantly associated with gender such that undergraduates who identified as female reported more BDD symptoms. This is consistent with prior literature in which females outnumber men in BDD prevalence in a majority of different settings (Veale et al., 2016). A future study with a larger sample with greater power may examine a path model including gender as a moderator of the mediation paths, rather than a covariate, to better explore the nature of these relationships.

Our first hypothesis was that undergraduates who report greater exposure to adverse childhood experiences will report higher levels of maladaptive thought control. However, bivariate correlation analysis revealed that the relationship between exposure to ACEs and maladaptive thought control was not significant. This may be due to the wide range of ACEs that were examined, in which maladaptive thought control strategies may result from instances of personal ACEs, and less so from instances of ACEs related to community and secondhand experiences. This would be consistent with prior literature, as ACEs can generally lead to

obsessive beliefs about personal responsibility and first-hand experiences (Briggs & Price, 2009).

Our second hypothesis was that undergraduates who report higher levels of maladaptive thought control will report higher levels of BDD symptoms. We found support for this hypothesis such that there was a significant correlation between maladaptive thought control and BDD symptoms. This is consistent with prior literature in which the prevalence of obsessive beliefs (and thus maladaptive thought control) is higher in individuals diagnosed with BDD (Lavell et al., 2014).

Third, we expected that undergraduates who report greater exposure to adverse childhood experiences will also report higher levels of BDD symptoms. We also found support for this hypothesis as there was a significant correlation between ACEs and BDD symptoms. This is consistent with prior literature, as ACEs such as bullying, teasing, neglect, and abuse have all been associated with the development of BDD (Longobardi et al., 2022),

While ACEs may not have been directly correlated with maladaptive thought control, the significant correlation between ACEs and BDD symptoms, as well as BDD symptoms and maladaptive thought control specifically, leaves room for interpretation of a mediation effect (Hayes, 2013). Given the significant indirect effect between ACEs and BDD symptoms through maladaptive thought control, and the lack of direct effect between ACEs and BDD symptoms, results indicate a full mediation effect. However, the lack of relationship between ACEs and maladaptive thought control may raise concern over the validity of the mediation effect. While this concern may be conservatively valid, contemporary views of mediation analysis, specifically by Hayes and Rockwood (2017), claim that relationships between the independent variable (ACEs) and mediating variable (maladaptive thought control) are insignificant in defining a

mediation effect. Due to the nature of mediation requiring the combination of both the relationship between the independent variable and mediation variable, as well as the mediation variable and the dependent variable, a mediation effect can be established with only the indirect effect.

Overall, the present mediation effect coincides with established prior research. Given that BDD symptoms have been linked to a perceived greater importance of controlling one's thoughts (Lavell et al., 2014), which is a key aspect to maladaptive thought control, and that ACEs such as bullying, teasing, neglect, and abuse have been shown to increase the likelihood of developing BDD (Longobardi et al., 2022), the current findings shed light onto the mechanism by which these relationships occur.

Chapter 5

Study Limitations

There are a few potential limitations that may impact the results of the present study. As previously mentioned, a relationship between ACEs and maladaptive thought control was not found. Depending on interpretation, this lack of relationship could mean that a mediation effect cannot be established, as conservative methods of establishing mediation effects typically depend on the assumption of a relationship between the independent variable and mediation variable being met (Judd & Kenny, 1981). Additionally, while numerous ACEs were examined, a lack of specificity in which ACEs contribute to the development of BDD symptoms may mean that the mediation effect is a result of only a specific type of ACE and not ACEs generally. Third, the data used for the current study was cross-sectional in nature, which may weaken the establishment of the found mediation effect. It is also important to note that the present mediation analysis does not imply causality between any of the stated variables. Thus, establishing causal relationships using the present data and analysis was not feasible.

Finally, we did not have adequately sized subgroups to explore race/ethnicity as a moderator of these effects. This could be interesting in future research given that extant research has found several differences in exposure to ACEs, with prevalence of ACEs overall being higher in Black and Hispanic communities/individuals when compared to White communities/individuals (Zhang & Monnat, 2021). Additionally, research has found differences in BDD symptoms by race/ethnicity, in which White and Hispanic individuals reported a higher prevalence of BDD prevalence when compared to Black individuals (Boroughs et al., 2010). Similarly, those identifying as nonbinary or as a sexual and gender minority also report higher

rates of ACEs (Schnarrs et al., 2023). Little research has been conducted on possible relationships between BDD symptoms and prevalence in nonbinary or sexual and gender minority individuals, which could be an important area for future research to examine. We only had four participants in the sample who identified as nonbinary or genderqueer/gender fluid and were not able to explore this in our sample.

Implications and Future Research

Despite the stated limitations, the results of the present study suggest a full mediation effect between ACEs and BDD symptoms through maladaptive thought control. Establishing this mediation effect has implications for therapeutic interventions, as individuals with BDD symptoms and a history of ACEs may experience better treatment outcomes if given therapy to specifically combat maladaptive thought control. Cognitive behavioral therapy may be a first line of defense, as CBT has been proven to be effective in treating obsessional beliefs such as maladaptive thought control (Diedrich et al., 2016). Regarding future research, examining the relationship between specific ACEs such as bullying, neglect, or physical and emotional abuse and BDD symptoms, could provide useful insight into which ACEs pose more significant risk factors for the development of BDD. Additionally, future research focusing on adolescent populations could be useful, as a history of ACEs may affect adolescents differently, as maladaptive thought control patterns may still be forming. Thus, understanding if the mediating effect of maladaptive thought control exists in an adolescent population specifically could inform treatment options for specific age groups struggling with BDD symptoms or the development of BDD.

Chapter 6

Conclusion

In summary, the present study offers a possible explanation for the development of BDD in some individuals. Specifically, those who have a history of ACEs. Although future research is needed to further define the relationship between ACEs, maladaptive thought control, and BDD symptoms in more specific contexts, the present study continues to shed light on how BDD develops, and the importance of a cognitive model for treatment. Maladaptive thought control as a mediator between ACEs and BDD symptoms should be considered as a possible pathway for diagnosis and treatment, and with this understanding, used to provide more positive treatment and clinical outcomes for individuals who struggle with BDD.

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Table 1

Sample Characteristics (n = x)

Variable	*n* (%) or *M* (*SD*), range
Demographics	
Age	19.4 (1.3), 6 (18-24)
Gender identity	
Woman	71 (55.9%)
Man	52 (40.9%)
Trans or Transgender	0
Agender	0
Nonbinary, Genderfluid, or Genderqueer/Gender Nonconforming	3 (2.4%)
Questioning	1 (.8%)
Other	0
Preferred not to respond	1 (.8%)
Race	
American Indian or Alaska Native	1 (.8%)
Asian	5 (3.9%)
Black or African American	22 (17.3%)
Middle Eastern or Northern African	0
Native Hawaiian or Other Pacific Islander	0
White	105 (82.7%)
Multiracial	0
Other	0
Preferred not to respond	0
Ethnicity	
Non-Hispanic/Latino	118 (92.9%)
Hispanic or Latino	9 (7.1%)
Adverse Childhood Experiences (total count)	
Emotional Abuse	52 (40.9%)
Physical Abuse	30 (23.6%)
Sexual Abuse	11 (8.7%)
Emotional Neglect	4 (3.1%)
Physical Neglect	7 (5.5%)
Domestic Violence	13 (10.2%)
Household Substance Abuse	30 (23.6%)
Household Mental Illness	50 (39.4%)
Incarcerated Household Member	15 (11.8%)
Witnessed Violence	19 (15%)
Felt Discrimination	17 (13.4%)
Adverse Neighborhood Experience	60 (47.2%)
Bullied	11 (8.7%)
Lived in Foster Care	2 (1.6%)

Obsessive Beliefs	Mean(se) minimum-maximum
Importance/Control of Thoughts	33.59(.97) 11-60
Responsibility/Threat Estimation	55.27(1.26) 27-90
Perfectionism/Uncertainty	55.08(1.30) 9-87
Appearance Anxiety	11.92(.79) 0-40

Table 2

Bivariate Correlations among Continuous Variables

	1	2	3	4	5	6	7	8
1. Adverse Childhood Experiences Total	1.00							
2. Appearance Anxiety Total	.220*	1.00						
3. Responsibility/Threat Estimation	.210*	.547**	1.00					
4. Perfectionism/Certainty	.149	.421**	.818**	1.00				
5. Importance/Control of Thoughts	.164	.460**	.868**	.825**	1.00			
6. Gender	.047	.270**	.060	.067	-.048	1.00		
7. Age	-.141	-.070	.056	.076	.055	-.250**	1.00	

*$p < .05$, **$p < .01$

Table 3

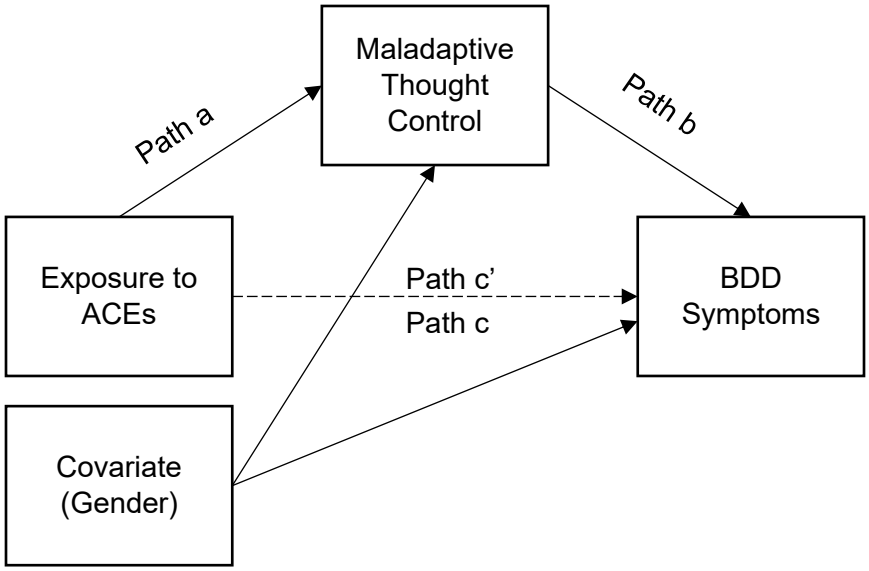
Thought Control Mediates the Relation between ACEs and Appearance Anxiety

	b (se)	*p or CI*
Direct Effect	**.47(.28)**	**.09**
Indirect Effect	**.27(.13)**	**.02 to .52**
Total Effect	**.74(.31)**	**.019**
Ratio of Indirect Effect to Total Effect	**36%**	

Note. Unstandardized regression coefficients (b) and standard errors (se) are reported. The Direct Effect is the effect of ACEs on Appearance Anxiety, controlling for gender. The Indirect Effect is the mediation of ACEs on Appearance Anxiety through Thought Control, controlling for gender. The Total Effect is the sum of the Direct and Indirect Effects. The Ratio of the Total Indirect Effect to the Total Effect was calculated using the unstandardized coefficients, which represents the proportion of the total effect accounted for by the indirect effect.

Figure 1

Conceptual Mediation Model Predicting BDD symptoms in undergraduates after exposure to ACEs

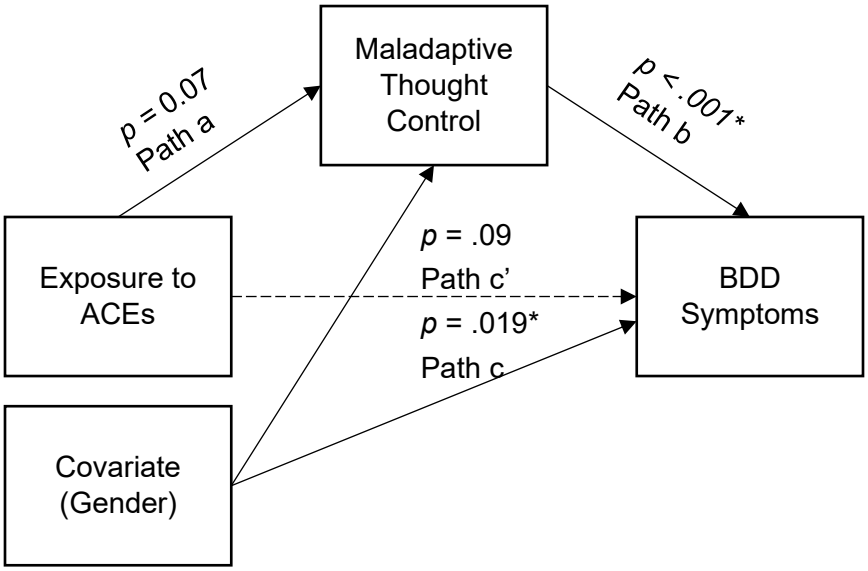


Note. The product of paths a and b represent the indirect effect of adverse childhood experiences (ACE; independent variable) on BDD symptoms (dependent variable) through maladaptive thought control (mediator), controlling for the covariate of gender. Path c' represents the direct effect of ACEs on BDD symptoms, controlling for covariates. Path c represents the total effect, which is the sum of the direct and indirect effect.

Figure 2

Conceptual Mediation Model with p values

*$p < .05$, **$p < .01$



Appendix A

Demographics Questionnaire

How old are you?

____ years old

What is your race and ethnicity? (check all that apply)

- American Indian or Alaska Native
- Asian
- Black or African American
- Hispanic or Latino
- Middle Eastern or Northern African
- Native Hawaiian or Other Pacific Islander
- White
- Other
- Prefer not to answer

Which of the following best describes your gender identity?

- Woman
- Man
- Trans or Transgender

· Agender

· Nonbinary, genderfluid, or genderqueer/gender noncomforming

· An identity not listed; Please self-identify: _____

· I am not sure or am questioning

· I don’t know what this question means

· Prefer not to answer

Appendix B

Philadelphia ACEs Questionnaire

While you were growing up (before your 18th birthday), how often did a parent, step parent, or another adult living in your home swear at you, insult you, or put you down?

More than once

Once

Never

Prefer not to answer

While you were growing up (before your 18th birthday), how often did a parent, step-parent, or another adult living in your home act in a way that made you afraid that you would be physically hurt?

More than once

Once

Never

Prefer not to answer

While you were growing up (before your 18th birthday), did a parent, step-parent, or another adult living in your home hit you so hard that you had marks or were injured?

More than once

Once

Never

Prefer not to answer

While you were growing up (before your 18th birthday), did a parent, step-parent, or another adult living in your home push, grab, shove, or slap you?

More than once

Once

Never

Prefer not to answer

During the first 18 years of life, did an adult or older relative, family member, family friend, or stranger who was at least five years older than yourself ever touch or fondle you in a sexual way or have you touch their body in a sexual way?

Yes

No

Prefer not to answer

During the first 18 years of your life, did an adult or older relative, family member, family friend, or stranger who was at least five years older than yourself ever attempt to have or actually have any type of sexual intercourse (oral, anal, or vaginal) with you?

Yes

No

Prefer not to answer

When you were growing up, there was someone in your life who helped you feel important or special.

Very often true

Often true

Sometimes true

Rarely true

Never true

Prefer not to answer

When you were growing up your family sometimes cut the size of meals or skipped meals because there was not enough money in the budget for food.

Very often true

Often true

Sometimes true

Rarely true

Never true

Prefer not to answer

While you were growing up (before your 18th birthday), how often, if ever, did you see or hear in your home a parent, step parent, or another adult who was helping to raise you being slapped, kicked, punched, or beaten up?

Many times

A few times

Once

Never

Prefer not to answer

While you were growing up (before your 18th birthday), how often, if ever, did you see or hear in your home a parent, step-parent, or another adult who was helping to raise you being hit or cut with an object, such as a stick, cane, bottle, club, knife, or gun?

Many times

A few times

Once

Never

Prefer not to answer

While you were growing up (before your 18th birthday), did you live with anyone who was a problem drinker or alcoholic?

Yes

No

Prefer not to answer

While you were growing up (before your 18th birthday), did you live with anyone who used illegal street drugs or who abused prescription medications?

Yes

No

Prefer not to answer

While you were growing up (before your 18th birthday), did you live with anyone who was depressed or mentally ill?

Yes

No

Prefer not to answer

While you were growing up (before your 18th birthday), did you live with anyone who was suicidal?

Yes

No

Prefer not to answer

While you were growing up (before your 18th birthday), did you live with anyone who served time or was sentenced to serve time in a prison, jail, or other correctional facility?

Yes

No

Prefer not to answer

While you were growing up (before your 18th birthday), how often, if ever, did you see or hear someone being beaten up, stabbed, or shot in real life?

Many times

A few times

Once

Never

Prefer not to answer

While you were growing up (before your 18th birthday), did a parent, step-parent, or another adult who was helping to raise you die suddenly or violently?

Yes

No

Prefer not to respond

While you were growing up (before your 18th birthday), how often did you feel that you were treated badly or unfairly because of your race or ethnicity?

Very often true

Often true

Sometimes true

Rarely true

Never true

Prefer not to answer

While you were growing up (before your 18th birthday), did you feel safe in your neighborhood?

All of the time

Most of the time

Some of the time

None of the time

Prefer not to answer

While you were growing up (before your 18th birthday), did you feel people in your neighborhood looked out for each other, stood up for each other, and could be trusted?

All of the time

Most of the time

Some of the time

None of the time

Prefer not to answer

While you were growing up (before your 18th birthday), how often were you bullied by a peer or classmate?

All of the time

Most of the time

Some of the time

None of the time

Prefer not to answer

Were you ever in foster care?

Yes

No

Prefer not to answer

Appendix C

Obsessional Beliefs Questionnaire (OBQ-44)

This inventory lists different attitudes or beliefs that people sometimes hold. Read each statement carefully and decide how much you agree or disagree with it.

For each of the statements, choose the number matching the answer that *best describes how you think.* Because people are different, there are no right or wrong answers.

To decide whether a given statement is typical of your way of looking at things, simply keep in mind what you are like *most of the time.*

Use the following scale:

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

In making your ratings, try to avoid using the middle point of the scale (4), but rather indicate whether you usually disagree or agree with the statements about your own beliefs and attitudes.

1. I often think things around me are unsafe.	1	2	3	4	5	6	7
2. If I am not absolutely sure of something, I am bound to make a mistake	1	2	3	4	5	6	7
3. Things should be perfect according to my own standards.	1	2	3	4	5	6	7
4. In order to be a worthwhile person, I must be perfect at everything I do.	1	2	3	4	5	6	7
5. When I see any opportunity to do so, I must act to prevent bad things from happening.	1	2	3	4	5	6	7
6. Even if harm is very unlikely, I should try to prevent it at any cost.	1	2	3	4	5	6	7
7. For me, having bad urges is as bad as actually carrying them out.	1	2	3	4	5	6	7
8. If I don't act when I foresee danger, then I am to blame for any consequences.	1	2	3	4	5	6	7
9. If I can't do something perfectly, I shouldn't do it at all.	1	2	3	4	5	6	7

10. I must work to my full potential at all times. 1 2 3 4 5 6 7

11. It is essential for me to consider all possible outcomes of a situation. 1 2 3 4 5 6 7

12. Even minor mistakes mean a job is not complete. 1 2 3 4 5 6 7

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

13. If I have aggressive thoughts or impulses about my loved ones, this means I may secretly want to hurt them. 1 2 3 4 5 6 7

14. I must be certain of my decisions. 1 2 3 4 5 6 7

15. In all kinds of daily situations, failing to prevent harm is just as bad as deliberately causing harm. 1 2 3 4 5 6 7

16. Avoiding serious problems (for example, illness or accidents) requires constant effort on my part. 1 2 3 4 5 6 7

17. For me, not preventing harm is as bad as causing harm. 1 2 3 4 5 6 7

18. I should be upset if I make a mistake. 1 2 3 4 5 6 7

19. I should make sure others are protected from any negative consequences of my decisions or actions 1 2 3 4 5 6 7

20. For me, things are not right if they are not perfect. 1 2 3 4 5 6 7

21. Having nasty thoughts means I am a terrible person. 1 2 3 4 5 6 7

22. If I do not take extra precautions, I am more likely than others to have or cause a serious disaster. 1 2 3 4 5 6 7

23. In order to feel safe, I have to be as prepared as possible for anything that could go wrong. 1 2 3 4 5 6 7

24. I should not have bizarre or disgusting thoughts. 1 2 3 4 5 6 7

25. For me, making a mistake is as bad as failing completely. 1 2 3 4 5 6 7

26. It is essential for everything to be clear cut, even in minor matters.	1	2	3	4	5	6	7
27. Having a blasphemous thought is as sinful as committing a sacrilegious act.	1	2	3	4	5	6	7
28. I should be able to rid my mind of unwanted thoughts.	1	2	3	4	5	6	7
29. I am more likely than other people to accidentally cause harm to myself or to others.	1	2	3	4	5	6	7

1	2	3	4	5	6	7
disagree very much	disagree moderately	disagree a little	neither agree nor disagree	agree a little	agree moderately	agree very much

30. Having bad thoughts means I am weird or abnormal.	1	2	3	4	5	6	7
31. I must be the best at things that are important to me.	1	2	3	4	5	6	7
32. Having an unwanted sexual thought or image means I really want to do it.	1	2	3	4	5	6	7
33. If my actions could have even a small effect on a potential misfortune, I am responsible for the outcome.	1	2	3	4	5	6	7
34. Even when I am careful, I often think that bad things will happen.	1	2	3	4	5	6	7
35. Having intrusive thoughts means I'm out of control.	1	2	3	4	5	6	7
36. Harmful events will happen unless I am very careful.	1	2	3	4	5	6	7
37. I must keep working at something until it's done exactly right.	1	2	3	4	5	6	7
38. Having violent thoughts means I will lose control and become violent.	1	2	3	4	5	6	7
39. To me, failing to prevent a disaster is as bad as causing it.	1	2	3	4	5	6	7
40. If I don’t do a job perfectly, people won’t respect me.	1	2	3	4	5	6	7
41. Even ordinary experiences in my life are full of risk.	1	2	3	4	5	6	7
42. Having a bad thought is morally no different than doing a bad deed.	1	2	3	4	5	6	7
43. No matter what I do, it won’t be good enough.	1	2	3	4	5	6	7
44. If I don't control my thoughts, I'll be punished.	1	2	3	4	5	6	7

Appendix D

Appearance Anxiety Inventory

Please tick the box that best describes the way you have felt about your appearance of a specific feature OVER THE PAST WEEK, INCLUDING TODAY

Name_____ Date_____

		Not at all 0	A little 1	Often 2	A lot 3	All the time 4
1	I compare aspects of my appearance to others					
2	I check my appearance (e.g. in mirrors, by touching with my fingers, or by taking photos of myself)					
3	I avoid situations or people because of my appearance					
4	I brood about past events or reasons to explain why I look the way I do					
5	I think about how to camouflage or alter my appearance					
6	I am focussed on how I feel I look, rather than on my surroundings					
7	I avoid reflective surfaces, photos, or videos of myself					
8	I discuss my appearance with others or question them about it					
9	I try to camouflage or alter aspects of my appearance					
10	I try to prevent people from seeing aspects of my appearance within particular situations					

	(e.g., by changing my posture, avoiding bright lights)					

	Total
Avoidance subscale	
Threat monitoring subscale	
Total	