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Body Image Dissatisfaction and Anxiety Trajectories during Adolescence

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Abstract

Objective: The primary goal of this study was to examine the associations between baseline body image dissatisfaction (BID) and subsequent anxiety trajectories in a diverse, community sample of adolescent girls and boys.

Method: Participants were 581 adolescents (baseline age: $M=16.1$, $SD=0.7$; 58% female; 65% non-Hispanic White) from U.S. public high schools. Self-report questionnaires were administered during school at three annual assessment waves. Latent growth curve modeling examined the association between baseline BID and growth factors of anxiety disorder symptom trajectories. Covariates included baseline gender, age, race/ethnicity, parental education attainment, body mass index standard scores (BMI-z), and depressive symptoms.

Results: Higher BID at baseline was significantly associated with higher initial symptoms of generalized anxiety disorder (GAD), panic disorder (PD), social anxiety disorder (SAD), and significant school avoidance (SSA; $p=.001-.04$), but was unrelated to initial separation anxiety disorder (SEP) symptoms ($p=.27$). Higher baseline BID also was associated with attenuated decreases in SAD symptoms across time ($p=.001$). Among adolescents with low baseline anxiety symptoms only, higher BID was associated with more attenuated decreases in SAD symptoms ($p=.01$) and greater increases in PD symptoms ($p=.02$). BID was unrelated to changes in GAD, SEP, and SSA symptoms ($p=.11-.94$).

Conclusions: Findings suggest that BID is associated with concurrent symptoms of multiple anxiety disorders; and may have a prospective link to SAD and PD symptoms during adolescence. As such, assessing body image issues may be important to assess when identifying adolescents at risk for exacerbated SAD and PD symptoms.

Keywords

body image; body dissatisfaction; physical appearance; anxiety; adolescents

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Adolescence represents a high risk developmental period for the emergence and exacerbation of anxiety disorder symptoms (Beesdo-Baum & Knappe, 2012). Nearly one-third of U.S. adolescents report the presence of at least one anxiety disorder (Merikangas et al., 2010). Adolescents reporting anxiety disorder symptoms, at both subthreshold and full-syndrome levels, are at greater risk for the onset and/or persistence of anxiety disorders later in adolescence and adulthood (Beesdo-Baum & Knappe, 2012). Furthermore, elevated anxiety disorder symptoms during adolescence are associated with high rates of psychiatric comorbidity, significant impairment in social and academic domains, and increased health service utilization (Kendall et al., 2010; Merikangas et al., 2010).

Body image satisfaction, which refers to individuals' perceptions of their physical appearance and the thoughts and/or feelings resulting from these perceptions (Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), tends to decrease from childhood into adolescence, following the onset of puberty and an increased salience of physical appearance for both girls and boys (Bully & Elosua, 2011). Body image dissatisfaction is common among adolescents, with prevalence rates ranging from 30–80% (Dion et al., 2015). Moreover, such dissatisfaction confers increased risk for the onset of eating disorders, depression, substance use and abuse, and suicidality in adolescents (du Roscoät, Legleye, Guignard, Husky, & Beck, 2016; Field et al., 2014; Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006; Stice, 2002).

Body image dissatisfaction also may play a role in the etiology of anxiety disorder symptoms in adolescents. Sociocultural models of body image dissatisfaction and eating disorder psychopathology (Fitzsimmons-Craft et al., 2012; Stice, 2001; Thompson et al., 1999) propose that perceived pressure from family, peer, and the media to conform to sociocultural body ideals leads individuals to internalize these ideals as being their personal standard, central to their self-worth, and important to attain. Such body ideal internalization gives rise to appearance-based social comparisons with others and body surveillance (i.e., thinking about how one's body looks to others) (Fitzsimmons-Craft et al., 2012; Thompson et al., 1999), which often elicits poor perceived physical appearance because these body ideals are extremely difficult to achieve. Body dissatisfaction subsequently is posited to lead to negative affect because physical appearance is central to self-evaluations. Prior theories have focused on negative affect as being comprised of depressive symptoms and poor self-esteem (Stice, 2001). However, there are theoretical and empirical reasons that anxiety disorder symptoms, as a component of negative affect, also would emerge and/or worsen in response to body image dissatisfaction via sociocultural mechanisms.

Several eating disorder models posit that anxiety may function as a core mechanism through which body image dissatisfaction leads to and maintains disordered eating behaviors (Aspen, Darcy, & Lock, 2013; Pallister & Waller, 2008). Actual and potential negative evaluations about one's physical appearance are hypothesized to become feared outcomes that pose substantial threats to the self and one's sense of worth among individuals who internalize sociocultural body ideals. As such, perceived pressures to conform to sociocultural body ideals, weight- and shape-related teasing or rejection, appearance-based social comparisons, and body surveillance are conceptualized as potent social evaluative threats. Among individuals who develop body image dissatisfaction, exposure to appearance-related social

evaluative threats is hypothesized to give rise to biased implicit attention and memory for appearance-related stimuli and explicit rumination about feared or actual consequences of negative evaluations. These cognitive vulnerabilities are posited to elicit anxiety symptoms directly and also result in the implementation of safety behaviors that seek to gain control and prevent feared consequences (e.g., self-weighing to ameliorate weight gain fears) that then paradoxically exacerbate anxiety.

Adolescents may be especially susceptible to experiencing anxiety in response to body dissatisfaction and sociocultural pressures about physical appearance ideals. The pressure to conform to sociocultural ideals and engage in social comparisons with peers is of central importance during this developmental period (Rose & Rudolph, 2006), making negative appearance-based evaluations especially salient (Myers & Crowther, 2009). Relative to children and adults, adolescents also experience a neural imbalance between enhanced corticolimbic circuit sensitivity to perceived threats and immature cognitive control circuitry that occurs as a function of normative brain development (Somerville & Casey, 2010). As such, adolescents with body image dissatisfaction may experience heightened anxiety responses upon exposure to appearance-related social evaluative threats, but have a limited capacity to regulate emotions, cognitive vulnerabilities, and safety behaviors. The influence of body image dissatisfaction on anxiety disorder symptoms, therefore, may be particularly robust among adolescents and represent an important intervention target during this high risk developmental period.

In support of these theoretical tenets, body image dissatisfaction consistently has been associated with more concurrent overall anxiety symptoms and, specifically, more symptoms of generalized anxiety disorder (GAD), panic disorder (PD), social anxiety disorder (SAD), and separation anxiety disorder (SEP) in community samples of adolescents (Abdollahi, Abu Talib, Mobarakeh, Momtaz, & Mobarake, 2015; Cruz-Sáez, Pascual, Salaberria, & Echeburúa, 2015; Dooley, Fitzgerald, & Giollabhui, 2015; Duchesne et al., 2016; Ferguson, Munoz, Contreras, & Velasquez, 2011; Hughes & Gullone, 2011; Ivarsson, Svalander, Litlere, & Nevonen, 2006; Touchette et al., 2011). Conversely, adolescents with better body image satisfaction report lower anxiety symptoms (Cromley et al., 2012; Koronczai et al., 2013). Despite consistent cross-sectional associations, few studies have examined the prospective relationship between body image dissatisfaction and anxiety disorder symptoms. In the only known prospective study involving adolescents, higher baseline body image satisfaction was associated with lower trait and state anxiety one year later (Ohannessian, Lerner, Lerner, & von Eye, 1999). Overall, existing research suggests that body image satisfaction may play a role in the etiology of anxiety in adolescents. Yet, it is crucial for advancing developmental risk models and interventions for research to investigate the unique role of body image dissatisfaction in trajectories of *specific* facets of anxiety disorder symptoms (rather than total anxiety symptoms) during adolescence.

The Present Study

Adolescence represents a critical risk period for the development and exacerbation of anxiety disorder symptoms, underscoring the importance of identifying novel risk factors to improve screening, early identification, and intervention efforts. Body image dissatisfaction,

which also carries a heightened salience during adolescence, has been proposed to contribute to the emergence and worsening of negative affect (Stice, 2001). Although sociocultural theories have focused on depressive symptoms and self-esteem at the exclusion of anxiety, preliminary evidence and theories that consider cognitive behavioral mechanisms suggest that body image dissatisfaction also may influence the etiology of anxiety disorder symptoms (Aspen et al., 2013; Ohannessian et al., 1999; Pallister & Waller, 2008). Body image dissatisfaction appears to be a modifiable risk factor, as several interventions targeting improvements in body image satisfaction have been effective in reducing risk for adverse psychological outcomes (Atkinson & Wade, 2015; McLean, Wertheim, Marques, & Paxton, 2016; Stice, Marti, Spoor, Presnell, & Shaw, 2008; Wilksch & Wade, 2009, 2014). Therefore, elucidating the role of body image dissatisfaction in specific anxiety disorder symptoms trajectories among adolescents has the potential to yield significant theoretical and clinical implications.

In addition, several notable gaps in the literature examining body image dissatisfaction and anxiety remain. First, the majority of studies include only females, limiting the generalizability of findings to males who also experience body dissatisfaction and anxiety at high rates (Dion et al., 2015; Merikangas et al., 2010). In addition, although prior studies often have included demographic characteristics (i.e., age, gender, race/ethnicity, socioeconomic status) and body composition as covariates, most studies have failed to adjust for depressive symptoms in the analyses. Similar to these to these other covariates (Anderson & Mayes, 2010; Beesdo-Baum & Knappe, 2012; Garipey, Nitka, & Schmitz, 2010; Kimber, Couturier, Georgiades, Wahoush, & Jack, 2015; Ohannessian, Milan, & Vannucci, 2017; Pelegrini et al., 2014), depressive symptoms are associated with both anxiety symptoms and body image dissatisfaction (Kendall et al., 2010; Stice, 2001). As such, it is unclear as to whether the relationship between body image dissatisfaction and anxiety persists beyond the effects of depressive symptoms. Finally, no known prospective studies have examined the relationship between body image dissatisfaction and specific facets of anxiety disorder symptoms, with existing work focusing on total anxiety. Although there are core features common across all anxiety disorders, anxiety nonetheless is a heterogeneous construct with many presentations (e.g., GAD, PD, SAD, SEP, among others) that have diverse implications for etiology and treatment.

Given these limitations, the current study sought to examine the associations between baseline body image dissatisfaction and subsequent anxiety disorder symptom trajectories in a large, diverse community sample of adolescent girls and boys. We hypothesized that adolescents with higher body image dissatisfaction at baseline would report higher concurrent GAD, PD, SAD, SEP, and significant school avoidance (SSA) symptoms, as well as greater increases (or more attenuated decreases) in these symptoms over time, above and beyond the effects of demographic characteristics, body composition, and depressive symptoms.

Method

Participants

All adolescents who were enrolled full-time in the 10th and 11th grades at seven public high schools in the Mid-Atlantic region of the United States (U.S.) were eligible for the study. Participants who completed self-reports of their demographic characteristics, body image dissatisfaction, and anxiety disorder symptoms were included in the present study. There were no additional exclusion criteria. At baseline, the sample was comprised of 678 adolescent girls and boys (58% female; Age: $M = 16.07$, $SD = 0.71$ years). The race/ethnicity composition was: 65% non-Hispanic White, 18% African American, 9% Hispanic, 3% Asian, and 5% "Other." Adolescents reported their parents' highest level of education completed as follows: less than high school for 4% of mothers, 3% of fathers; high school for 39% of mothers, 46% of fathers; two years of college for 20% of mothers, 18% of fathers; four years of college for 28% of mothers, 25% of fathers; and graduate/medical school for 9% of mothers, 8% of fathers.

Procedures

All 10th and 11th grade students enrolled at seven public high schools located within 60 miles of the study site (Newark, Delaware, U.S.) were invited to participate in a longitudinal study of adolescent adjustment via an invitation letter sent directly to parents. Parents provided informed consent passively, which was indicated by a non-response to the research team. Parents who did not want their adolescents to participate (<1%) contacted the research team directly. Adolescents provided assent for their participation until age 18, at which time participants provided their own informed consent. Approximately 20% of students were absent on the day of data collection, and 3% of adolescents declined participation. Participating adolescents completed self-report surveys during the spring of 2007 (Time 1), 2008 (Time 2), and 2009 (Time 3). Trained research personnel administered surveys in schools. Adolescents who were not present on the day of data collection were mailed surveys to complete at home and return to the research team. Participants who graduated from high school were invited to take an online version of the survey. The survey took approximately 40 minutes to complete. At each time point, participants were given a movie pass upon turning in their survey. A Certificate of Confidentiality was obtained to protect the participants' privacy. All procedures were approved by the University of Delaware Institutional Review Board.

Participants with data from at least two assessment waves were included in the current study ($N = 581$). There were no significant differences between the full baseline sample ($N = 678$) and this subsample with regard to demographic characteristics and baseline body image dissatisfaction, anxiety disorder symptoms, and depressive symptoms ($ps > .05$). Data were missing for 4.3% of participants at Time 2 and 22.8% of participants at Time 3, respectively. Participants with data missing for at least one assessment wave (Age: $M = 16.12$, $SD = 0.71$ years) were significantly older than those who were not missing any data (Age: $M = 15.83$, $SD = 0.64$ years), $t(554) = -3.53$, $p = .002$. However, there were no systematic differences between those with and without missing data in other demographic characteristics or

baseline anxiety disorder symptoms, depressive symptoms, or body image dissatisfaction ($ps > .05$).

Measures

Body image dissatisfaction.—The Physical Appearance Self-Competence subscale of the Self-Perception Profile for Adolescents (SPPA; Harter, 2012) assessed adolescents' degree of satisfaction with their physical appearance at baseline. This subscale was comprised of 5 items that were presented in a structured alternative format (sample item: *Some teenagers wish their body was different but other teenagers like their body the way it is*). For each item, adolescents chose which description fit them the best and then rated whether that description was *sort of true* or *really true* for them. Items were scored on a 4-point scale and summed to generate the subscale. The subscale score subsequently was reverse coded so that higher scores reflected higher body image dissatisfaction. The SPPA has demonstrated good internal consistency, test-retest reliability, and construct validity in adolescents (Harter, 2012). Cronbach's alpha coefficient was .88 in the current study.

Anxiety disorder symptoms.—The Screen for Child Anxiety Related Disorders (SCARED; Birmaher, Khetarpal, Cully, Brent, & McKenzie, 1995) assessed anxiety disorder symptoms at Times 1–3. Adolescents rated how frequently they experienced 41 anxiety symptom descriptions over the past three months (sample item: *I feel nervous with people I don't know well*). The response scale ranged from 0 = *not true or hardly ever true* to 2 = *very true or often true*. Responses were summed to generate the SCARED subscales, which included: GAD (9 items), PD (13 items), SAD (7 items), SEP (8 items), and SSA (4 items). The SCARED possesses excellent reliability and good convergent validity with clinical assessment measures in adolescent samples (Muris, Merckelbach, Ollendick, King, & Bogie, 2002). The Cronbach alpha coefficients for the SCARED subscales in the current study had the following ranges across time points: GAD = .87–.88, PD = .87–.88, SAD = .84–.88, SEP = .78–.80, and SSA = .70–.71.

Demographic information.—A demographic questionnaire assessed participants' baseline gender (male or female), age (years), race/ethnicity (white, black or African American, Hispanic or Latino, Asian, and “other”), and their parents' highest level of education completed (less than high school, high school, two years of college, four years of college, graduate or medical school).

Body composition.—Adolescents reported on their weight and height, which was used to calculate their body mass index (BMI) as weight in kilograms divided by the square of height in meters (kg/m^2). Numerous studies have found high correlations between self-reported and actual measured weight and height, as well as BMI calculated from these metrics in adolescents ($rs = .82$ – $.96$; De Vriendt, Huybrechts, Ottevaere, Van Trimpont, & De Henauw, 2009). BMI standard (BMI- z) scores adjusted for age and sex were calculated based on the Centers for Disease Control and Prevention 2000 growth charts (Kuczmarski et al., 2002).

Depressive symptoms.—The Center for Epidemiological Studies Depression Scale for Children (CES-DC; Weissman, Orvaschel, & Padian, 1980) assessed depressive symptoms in the past week at baseline. The CES-DC is a 20-item self-report measure with item responses ranging from 1 = *not at all* to 4 = *a lot*. A total score is generated by summing the responses. The CES-DC is a reliable and valid measure of depressive symptoms in adolescents (Garrison, Addy, Jackson, McKeown, & Waller, 1991). The Cronbach's alpha coefficient was .90 in this study.

Analytic Plan

Data were screened for normality. All continuous variables exhibited satisfactory skew (values ranged from -0.08 to 1.70) and satisfactory kurtosis (values ranged from -0.62 to 5.99), and no outliers were identified. Analyses were conducted with Mplus version 7.4 software (Muthen & Muthen, 1998–2015).

Latent growth curve modeling using the structural equation modeling framework (Wickrama, Lee, O'Neil, & Lorenz, 2016) was conducted to examine whether baseline body image dissatisfaction was associated with the initial level and subsequent changes in anxiety disorder symptoms. Factor loadings for the latent slope factor were set at 0, 1, and 2 for anxiety disorder symptoms observed at Time 1, Time 2, and Time 3, respectively. A linear slope function was evaluated. Although a non-significant Chi-square test indicates adequate model fit, this test statistic is highly sensitive to sample size and therefore often inflated and significant with large samples despite very small departures in how well the model reproduces the variance-covariance matrix (Wickrama et al., 2016). Therefore, acceptable model fit was indicated by values of the comparative fit index (CFI) greater than .95 and values of the root mean squared error of approximation (RMSEA), the upper limit of the RMSEA's 90% confidence interval, and the standardized root mean square residual (SRMR) less than .08 (Wickrama et al., 2016).

For each anxiety disorder symptom trajectory, an initial unconditional latent growth curve model was estimated to confirm the appropriateness of using a linear slope function. Subsequently, conditional latent growth curve models were estimated to investigate the effects of baseline body image dissatisfaction on growth factors of anxiety disorder symptom trajectories. Five models were estimated to examine GAD, PD, SAD, SEP, and SSA symptom trajectories. In each model, body image dissatisfaction was included as the predictor and baseline reports of gender, age, race/ethnicity, mean parental education status (as a proxy of socioeconomic status), BMI-z scores, and depressive symptoms were included as covariates. These covariates were selected because prior literature has suggested that each construct is systematically linked to both body image dissatisfaction and anxiety symptoms (Anderson & Mayes, 2010; Beesdo-Baum & Knappe, 2012; Gariepy et al., 2010; Kimber et al., 2015; Ohannessian et al., 2017; Olino, Klein, Lewinsohn, Rohde, & Seeley, 2010; Pelegrini et al., 2014; Stice & Shaw, 2002). Associations were considered statistically significant at p values < .05.

As described in the procedures section, data were determined to be missing at random. The full information maximum likelihood (FIML) estimation approach was applied to handle missing data, which uses all available data to produce maximum likelihood-based sufficient

statistics (Wothke, 2000). FIML yields unbiased parameter estimates, preserves sample size, and minimizes potential missingness biases (Wothke, 2000). Notably, follow-up sensitivity analyses revealed the same pattern of results when including only individuals with complete data.

Results

Bivariate correlations for baseline variables indicated that higher body image dissatisfaction was significantly associated with higher BMI-z scores ($r = .17, p < .001$) and more depressive symptoms ($r = .38, p < .001$). Higher baseline body image dissatisfaction also was correlated with lower parental education ($r = -.10, p = .049$), but there were no significant gender or race/ethnicity differences ($p = .10$).

Unconditional Latent Growth Curve Models

Fit indices from unconditional latent growth curve models indicated that a linear slope function was a good fit for all anxiety disorder symptom trajectories (Chi-Square test $p = .01$ -.66; CFIs = .96–1.00; RMSEAs, RMSEA Upper 90% CIs, and SRMRs = .003-.07). Table 1 depicts the unstandardized parameter estimates across all anxiety disorder symptom trajectories. Figure 1 displays the estimated growth factors for each trajectory. The mean intercept factor scores differed significantly from zero for GAD, PD, SAD, SEP, and SSA symptoms ($p < .001$). Significant negative slope factor scores were observed for SAD, SEP, and SSA symptoms ($p = .002$), suggesting overall decreases across time. Mean slope factor scores did not significantly differ from zero for GAD and PD symptoms ($p = .10$ -.30), suggesting an overall stable course.

The variances of the intercept factors were statistically significant for GAD, PD, SAD, SEP, and SSA symptoms ($p < .001$), which indicated the presence of substantial inter-individual variability in adolescents' initial symptom levels. The variances of the slope factors also were statistically significant for GAD, PD, SAD, and SSA symptoms ($p < .001$), which suggested the presence of substantial variability in adolescents' rates of change in these anxiety disorder symptoms. However, the slope factor variance was not significant for SEP symptoms ($p = .67$), suggesting that most adolescents reported similar decreases in SEP symptoms. Finally, there was significant, negative covariance between the intercept and slope factors for GAD, PD, SAD, and SSA symptoms ($p < .001$), which indicated that adolescents with higher initial anxiety disorder symptoms tended to have greater decreases in these symptoms across time. The covariance between intercept and slope factors was not significant for SEP symptoms ($p = .66$).

Conditional Latent Growth Curve Models

Fit indices from conditional latent growth curve models indicated that all anxiety disorder symptom trajectory models including baseline body image dissatisfaction and covariates were a good fit (Chi-Square test $p = .01$ -.98; CFIs = .96–1.00; RMSEAs, RMSEA Upper 90% CIs, and SRMRs = .002-.07). Table 2 displays the unstandardized parameter estimates for adjusted models. Higher ratings of body image dissatisfaction at baseline were significantly associated with higher mean intercept factor scores for GAD, SAD, PD, and

SSA symptoms ($p < .05$), indicating that adolescents reporting greater body image dissatisfaction had lower higher anxiety disorder symptoms. Baseline body image dissatisfaction was unrelated to the intercept factor score for SEP symptoms ($p = .27$). There was a significant association between baseline body image dissatisfaction and mean slope factor scores for SAD symptoms ($p = .001$), which suggested that adolescents reporting higher body image dissatisfaction experienced more attenuated decreases and/or greater increases in SAD symptoms across time. There was no significant association between body image dissatisfaction and slope factor scores for GAD, PD, SEP, and SSA symptoms ($p = .11-.94$).

Exploratory Post-Hoc Analyses

Adolescents without elevated anxiety disorder symptoms.—To evaluate whether body image dissatisfaction predicted trajectories involving the initial onset of anxiety symptoms, conditional latent growth curve models were conducted that excluded participants who met the clinical cutoff for any of the anxiety disorder subscales or total score ($n = 103$; 18% of original sample). Fit indices from conditional latent growth curve models indicated that all models were a good fit (Chi-Square test $p = .01-.96$; CFIs = .95–1.00; RMSEAs, RMSEA Upper 90% CIs, and SRMRs = .001-.08). Higher body image dissatisfaction was significantly associated with higher initial GAD, PD, SAD, and SSA symptoms ($p < .01$), but was unrelated to initial SEP symptoms ($p = .64$). There were significant associations between baseline body image dissatisfaction and mean slope factor scores for SAD and PD symptoms ($p = .01-.02$), which suggested that adolescents reporting higher baseline body image dissatisfaction experienced more attenuated decreases in SAD symptoms and greater decreases in PD symptoms over time. There was no association between body image dissatisfaction and slope factor scores for GAD, SEP, and SSA symptoms ($p = .18-.71$).

Gender differences in full sample.—In light of theory hypothesizing that the link between body image dissatisfaction and negative affect may be more robust among adolescent girls relative to boys (Klump, 2013; Stice, 2001), multiple group analysis using nested model comparisons was conducted to test whether there were gender differences in the degree to which baseline body image dissatisfaction was associated with anxiety disorder symptom trajectory parameters. No significant gender differences were observed.

Discussion

The objective of this prospective study was to investigate whether body image dissatisfaction was associated with concurrent anxiety disorder symptoms and subsequent anxiety trajectories in a community sample of adolescent girls and boys. Findings indicated that adolescents reporting higher body image dissatisfaction at baseline had higher initial symptoms of GAD, PD, SAD, and SSA. Strikingly, higher body image dissatisfaction predicted more attenuated decreases in SAD symptoms and more accelerated increases in PD symptoms. These relationships were observed even after accounting for the effects of age, gender, race/ethnicity, parent education, body composition, and depressive symptoms. These novel prospective findings suggest that body image dissatisfaction contributes to

differential changes in SAD symptoms and worsening of PD symptoms during adolescence. As such, it may be worthwhile for sociocultural models to include SAD and PD symptoms into the construct of negative affect and integrate cognitive behavioral and neural mechanisms into these models.

The overall trajectories of GAD and PD symptoms were stable across two years from middle-to-late adolescence, whereas SAD, SEP, and SSA symptom trajectories decreased over time. These findings are consistent with developmental theories suggesting that the predominant manifestation of specific anxiety symptoms is linked to developmental tasks and contexts (Weems, 2008). SEP tends to predominate during childhood as a result of attachment-related fears, then decreases throughout adolescence as youth gain autonomy (Hale, Raaijmakers, Muris, & Meeus, 2008; Nelemans et al., 2014). SAD emerges in early adolescence due to increases in the salience of peers and social comparisons to self-evaluations (Beesdo-Baum & Knappe, 2012), which may then either stabilize or decrease as youth gain experience with navigating their diverse social contexts (Hale et al., 2008; Nelemans et al., 2014). GAD and PD often emerge in adolescence and predominate into adulthood with increased performance- and future-oriented fears (Beesdo-Baum & Knappe, 2012). To this end, GAD and PD symptoms tend to remain relatively stable throughout the middle-to-late adolescent period (Ohannessian et al., 2017).

Consistent with prior cross-sectional studies in adolescent samples (Abdollahi et al., 2015; Ivarsson et al., 2006; Touchette et al., 2011), body image dissatisfaction exhibited concurrent associations with GAD, PD, and SAD symptoms. Although body dissatisfaction has been linked to SEP symptoms in adolescents (Ivarsson et al., 2006; Touchette et al., 2011), this relationship was not observed in the current study. Extending prior work, adolescents with higher body image dissatisfaction also reported higher anxiety-related SSA symptoms. Indeed, sociocultural theories (Stice, 2001; Thompson et al., 1999) suggest that adolescents who are dissatisfied with their bodies internalize pressures from peers to adhere to sociocultural body ideals or engage in unfavorable appearance-based comparisons with peers. The perceived peer pressure, appearance-related teasing, and social comparisons may, in turn, lead to increased anxiety and avoidance about attending school among those with poor body image.

Higher baseline body image dissatisfaction was prospectively predictive of more attenuated decreases in SAD symptoms. Body image dissatisfaction may have a causal link to SAD symptoms because social evaluative processes are inherent to body image dissatisfaction. According to sociocultural models, individuals realize discrepancies between their actual and ideal bodies via appearance-based comparisons with peers and media figures and considerations about how one's body looks to others (Fitzsimmons-Craft et al., 2012; Thompson et al., 1999). Such social comparisons and body surveillance come to represent potent social evaluative threats and frequently elicit body dissatisfaction because sociocultural body ideals are nearly impossible to actualize (Aspen et al., 2013; Pallister & Waller, 2008; Stice, 2001). Notably, findings are consistent with hypotheses made by cognitive behavioral models that propose a link between body image dissatisfaction and anxiety symptoms. Specifically, body dissatisfaction is hypothesized to give rise to subsequent negative self-evaluations, cognitive biases, and safety behaviors that lead to and

maintain anxiety (Aspen et al., 2013; Pallister & Waller, 2008). It is also possible that fears of negative evaluation, social appearance anxiety, and increased neuroendocrine sensitivity to appearance-based social evaluative threats also account for the prospective relationship between body image dissatisfaction and SAD symptoms (Levinson et al., 2013; Friederich et al., 2007; Lupis, Sabik, & Wolf, 2016; Menatti, DeBoer, Weeks, & Heimberg, 2015). Research is needed to evaluate these mechanisms in adolescents.

Among adolescents with subclinical anxiety symptoms only, those reporting higher body image dissatisfaction at baseline experienced greater increases in PD symptoms. In line with both sociocultural and cognitive behavioral models, individuals with severe body image disturbances report that perceived appearance-related social evaluations from others, body surveillance, and body checking behaviors serve as common triggers for PD symptoms (Phillips, Menard, & Bjornsson, 2013). As such, adolescents with poor body image satisfaction may perceive potential appearance-related social evaluations as threatening and engage in body vigilance more frequently (Fitzsimmons-Craft et al., 2012; Leahey, Crowther, & Ciesla, 2011), thereby increasing their panic-provoking triggers and subsequent risk for exacerbated PD symptoms. Upon exposure to appearance-related social evaluative threats, cognitive behavioral models suggest that it also is possible that adolescents with higher body image dissatisfaction have more cognitive biases that elicit or exacerbate PD symptoms, such as attention and memory biases for appearance-based imperfections/rejection and inaccurate perceptions of ambiguous social situations as threatening (Fang & Wilhelm, 2015; Rodgers & DuBois, 2016).

Adolescence may represent a high risk developmental period during which the relationship of body image dissatisfaction with SAD and PD symptoms is especially robust. A marked social re-orientation occurs during adolescence, as peer relationships become increasingly salient and emotionally charged (Nelson, Jarcho, & Guyer, 2016). Peer relationships among adolescents also are in constant flux and involve prominent social hierarchies, with their daily lives becoming entrenched with social comparisons (Nelson et al., 2016). In addition, social evaluative fears and peer rejection sensitivity increase sharply through adolescence (Nelson et al., 2016). As such, negative appearance-based social comparisons made by adolescents with body image dissatisfaction may be particularly provocative and more likely to elicit SAD and PD symptoms. Of note, the surge of gonadal steroid hormones during puberty exerts organizational effects on the regulation of neurotransmitter systems relevant for both body image dissatisfaction and anxiety (Klump, 2013; Nelson et al., 2016). It is possible that these post-pubertal organizational effects on brain structure and function may cause neural perturbations that enhance sensitivity to perceived appearance-related social evaluative threats and subsequently exacerbate SAD and PD symptoms.

Strengths and Limitations

The current study was novel in its investigation of body image dissatisfaction as a predictor of *specific* anxiety disorder symptom trajectories during adolescence, a high risk developmental period for the emergence of body image and anxiety problems. Additional study strengths include the prospective design and the inclusion of important covariates in analyses. However, the narrow age range (15–17 years) did not allow for the systematic

examination of developmental differences. Despite the diverse racial/ethnic composition of the sample, the subsamples of non-White participants were too small to conduct meaningful multiple group analyses to evaluate racial/ethnic differences.

Although the self-report measures utilized were well validated, shared method variance may have influenced the findings because all constructs were self-reported. Adolescents' self-report responses also may be subject to systematic reporting biases that could have impacted the findings, such as overweight adolescents under-reporting their weight, boys over-reporting their height, or adolescents not accurately reporting on their true anxiety or depressive symptoms. As such, replication is required using gold standard clinical interviews and body composition assessments. In addition, the body image measure broadly assessed the degree to which adolescents were dissatisfied with their general bodies, which was a study strength because the measure was applicable to adolescents of any sex or gender orientation. However, future studies would benefit from also including gender-specific body image dissatisfaction measures (e.g., focus on thinness for girls versus musculature for boys) that may capture unique associations between girls' and boys' body image dissatisfaction and anxiety trajectories.

Several aspects of the study design must be considered when making inferences about the study findings. It was not possible to examine non-linear slope trajectories without setting at least one parameter equal to zero because anxiety disorder symptoms were assessed at only three time points. In addition, body image dissatisfaction was assessed only at baseline and therefore it was not possible to examine bidirectional effects between body image dissatisfaction and anxiety disorder symptoms. An important direction for future research will be to distinguish the direction of this relationship. In light of the significant negative covariance between the intercept and slope factors scores for GAD, PD, SAD, and SSA symptoms, it is possible that findings may be partly attributed to the regression to the mean bias. Follow-up analyses excluding adolescents who met clinical cutoffs for any probable anxiety disorder revealed comparable findings to initial models, which bolsters confidence that regression to the mean was likely minimal. Although findings generalized to the subset of adolescents with subclinical anxiety disorder symptoms, the data did not afford the ability to evaluate the true onset of initial social anxiety disorder and panic disorder symptoms because the vast majority of participants (96%) reported at least some minimal anxiety disorder symptoms at baseline. Additional prospective studies in children and adolescents with minimal anxiety disorder symptoms at baseline are needed to examine whether body image dissatisfaction is a risk factor for the development of anxiety disorders.

Conclusions and Implications

In the present study, higher body image dissatisfaction was associated with higher concurrent symptoms of GAD, PD, SAD, and SSA, and was predictive of more attenuated decreases in SAD symptoms and greater increases PD symptoms over time in a community sample of adolescents. Prospective findings suggest that PD and SAD symptoms may be in part linked to body image dissatisfaction among adolescents, and therefore should be considered as a component of negative affect in sociocultural models of body image and disordered eating. It also may be worthwhile for sociocultural models to evaluate the validity

of incorporating cognitive, behavioral, and neuroendocrine mechanisms that give rise to anxiety and other aspects of negative affect such as depression. To elucidate developmental theories of disordered eating and anxiety, comparable prospective studies are needed to examine the temporal relationship between other forms of eating disorder psychopathology and anxiety trajectories across the lifespan as well. Taken together, findings suggest that body image issues may be important to assess within the context of comorbid anxiety disorder symptoms. Assessing whether adolescents have higher levels of body image dissatisfaction also may be important when identifying which adolescents are at higher risk for exacerbated SAD and PD symptoms.

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Figure 1. Estimated Growth Factors of Anxiety Trajectories from Unconditional Latent Growth Curve Models.

Note: SCARED = Screen for Child Anxiety Related Disorders.

* Slope factors of these anxiety trajectories were statistically significant ($p < .001$), suggesting overall decreases in symptoms over time.

Table 1.

Unstandardized Parameter Estimates for Unconditional Latent Growth Curve Models of Anxiety Disorder Symptom Trajectories in Adolescents.

Parameter	GAD Symptoms			PD Symptoms			SAD Symptoms			SEP Symptoms			SSA Symptoms		
	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value	Estimate	SE	p-value
Intercept															
Mean	5.40	0.19	<.001	3.56	0.19	<.001	4.38	0.15	<.001	2.15	0.11	<.001	1.41	0.07	<.001
Variance	18.90	1.14	<.001	19.38	2.13	<.001	11.80	0.71	<.001	3.31	0.57	<.001	2.13	0.21	<.001
Linear Slope															
Mean	-0.21	0.13	.10	-0.15	0.14	.30	-0.33	0.10	.002	-0.30	0.07	<.001	-0.20	0.04	<.001
Variance	3.01	0.64	<.001	4.92	1.16	<.001	1.85	0.42	<.001	-0.15	0.35	.67	0.48	0.10	<.001
I-S Covariance	-7.96	0.64	<.001	-9.60	1.49	<.001	-5.16	0.42	<.001	-0.18	0.40	.66	-0.76	0.13	<.001

Note: GAD = Generalized Anxiety Disorder; PD = Panic Disorder; SAD = Social Anxiety Disorder; SEP = Separation Anxiety Disorder; SSA = Significant School Avoidance; I = Intercept; S = Slope.

Table 2.

Unstandardized Parameter Estimates of the Conditional Latent Growth Curve Models Examining Associations Between Baseline Body Image Dissatisfaction and Anxiety Disorder Symptom Trajectory Growth Factors in Adolescents.

	<u>Intercept Factor</u>			<u>Linear Slope Factor</u>		
	γ	SE	p value	γ	SE	p value
<u>Generalized Anxiety Disorder (GAD) Symptoms</u>						
Age	0.23	0.21	.25	-0.01	0.18	.99
Gender	-1.45	0.31	< .001	0.35	0.27	.20
Race/Ethnicity	-0.03	0.32	.92	0.14	0.28	.63
Parental Education	-0.07	0.15	.65	-0.25	0.14	.07
BMI-z	0.22	0.17	.18	0.01	0.15	.94
Depressive Symptoms	-0.16	0.04	< .001	0.07	0.01	< .001
Body Image Satisfaction	0.24	0.04	< .001	-0.06	0.04	.11
<u>Panic Disorder (PD) Symptoms</u>						
Age	0.21	0.21	.30	-0.04	0.19	.83
Gender	-1.19	0.31	< .001	0.68	0.28	.02
Race/Ethnicity	-0.60	0.32	.06	0.47	0.29	.11
Parental Education	0.18	0.15	.24	-0.28	0.14	.05
BMI-z	0.11	0.17	.52	0.05	0.16	.76
Depressive Symptoms	-0.15	0.02	< .001	0.08	0.01	< .001
Body Image Satisfaction	0.15	0.05	.01	0.06	0.04	.13
<u>Social Anxiety Disorder (SAD) Symptoms</u>						
Age	0.06	0.19	.75	0.02	0.15	.90
Gender	-0.77	.29	.008	0.36	0.22	.10
Race/Ethnicity	0.33	0.30	.27	-0.19	0.23	.39
Parental Education	0.14	0.15	.33	-0.13	0.11	.23
BMI-z	0.18	0.16	.27	0.10	0.12	.39
Depressive Symptoms	-0.04	0.01	.004	0.01	0.01	.29
Body Image Satisfaction	0.26	0.04	< .001	-0.10	0.03	.001
<u>Separation Anxiety Disorder (SEP) Symptoms</u>						
Age	-0.02	0.13	.86	-0.04	0.10	.68
Gender	-0.83	0.19	< .001	0.05	0.15	.73
Race/Ethnicity	0.19	0.20	.33	0.09	0.15	.55
Parental Education	0.21	0.09	.03	-0.04	0.07	.63
BMI-z	-0.03	0.10	.78	-0.08	0.08	.32
Depressive Symptoms	-0.05	0.01	< .001	0.01	0.01	.65
Body Image Satisfaction	0.03	0.03	.27	-0.01	0.02	.94
<u>Significant School Avoidance (SSA) Symptoms</u>						
Age	0.03	0.08	.67	-0.10	0.06	.10

	<u>Intercept Factor</u>			<u>Linear Slope Factor</u>		
	γ	SE	<i>p</i> value	γ	SE	<i>p</i> value
Gender	-0.42	0.12	< .001	0.01	-.09	.98
Race/Ethnicity	-0.12	0.12	.34	0.21	0.09	.03
Parental Education	0.04	0.06	.47	0.01	0.05	.88
BMI-z	0.03	0.06	.66	-0.01	0.05	.86
Depressive Symptoms	-0.05	0.01	< .001	0.02	0.01	< .001
Body Image Satisfaction	0.03	0.02	.04	0.01	0.01	.42

Notes: BMI-z = body mass index standard scores adjusted for age and sex. Gender was coded as female = 1 and male = 0. Race/ethnicity was coded as non-Hispanic white = 1 and other = 0. *p* values < .05 were considered statistically significant.