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BRIEF REPORT

Appearance-Related Teasing and Substance Use During Early Adolescence

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Appearance-related teasing is a pervasive form of bullying during adolescence. Yet, the impact of appearance-related teasing on risk for alcohol and marijuana use is unknown. This study, therefore, examined the relationship between appearance-related teasing and the use of alcohol and marijuana in a sample of 1,344 students (52% female; 51% non-Hispanic White; ages 11–14 years, $M = 13.20$, $SD = 0.65$) from 5 public middle schools. Participants completed a survey that assessed demographic characteristics, weight status, depressive symptoms, general peer victimization, experiences of appearance-related teasing perpetrated by family and peers, and substance use in the fall of 2016 (Time 1 [T1]) and spring of 2017 (T2). Findings at baseline (T1) indicated that more frequent appearance-related teasing was associated with higher concurrent levels of total alcohol consumption, binge drinking, and marijuana use ($ps < .001$). Longitudinally, more frequent appearance-related teasing at T1 predicted greater increases in total alcohol consumption ($p < .01$) and binge drinking frequency ($p < .05$) by T2 but was unrelated to changes in marijuana use ($p > .05$), adjusting for age, gender, race and ethnicity, perceived socioeconomic status, body mass index z scores, depressive symptoms, general peer victimization frequency, and substance use at T1. Moderation analyses generally suggested that the positive associations between appearance-related teasing and alcohol use measures were stronger among adolescents who were girls (vs. boys) and who were overweight or obese (vs. nonoverweight). These findings suggest that appearance-related teasing may play a role in the origins of alcohol use during early adolescence and emphasize the need to mitigate the effects of appearance-related teasing and prevent early substance use.

Keywords: appearance-related teasing, alcohol, marijuana, adolescence, body image

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Adolescence is a developmental period characterized by increased experimentation with substance use (Johnston et al., 2018). However, early substance use initiation (~14 years or younger) is linked to heavier substance use and increased risk for substance use disorders over time, as well as delinquency, depression, and suicidality (Marti, Stice, & Springer, 2010; Richmond-Rakerd, Slutske, & Wood, 2017). Recent estimates from a large, nationally representative sample of U.S. adolescents have suggested that alcohol (41%) is the most commonly used substance during early

adolescence, whereas marijuana (29%) increases in prevalence across the adolescent period (Johnston et al., 2018). These estimates are troubling given that binge drinking is a leading cause of morbidity and mortality during adolescence (Johnston et al., 2018) and that marijuana use in adolescence has been shown to predict poor school performance (Ehrenreich, Nahapetyan, Orpinas, & Song, 2015), future illicit drug use in young adulthood (Lessem et al., 2006), and numerous other adverse outcomes. Further, longitudinal evidence indicates that there may be factors that exacerbate

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risk for early substance use initiation (Marti et al., 2010; Richmond-Rakerd et al., 2017); however, the factors that contribute to these developmental differences are not well understood. As such, this study will focus on examining risk factors related to alcohol and marijuana use during early adolescence.

In addition to escalations in substance use, early adolescence is marked by the onset of puberty and subsequent substantial physiological changes. It is, therefore, unsurprising that physical appearance becomes increasingly central to self-evaluations and self-worth during adolescence (Ricciardelli & Yager, 2016). Yet, at the same time, appearance, body shape, and being overweight are the most common reasons why adolescents report being bullied or teased (Puhl, Suh, & Li, 2016). As such, a considerable body of literature has emerged examining teasing and bullying specifically regarding one's appearance. Appearance-related teasing, in this study, refers to any type of negative feedback related to one's body weight or shape, such as insults, cruel comments, sexist remarks, and poking fun (Almenara & Ježek, 2015). Among adolescents, the prevalence of such teasing ranges between 17% and 40% (Greenleaf, Petrie, & Martin, 2014). Unlike other forms of bullying that are often perpetrated by peers or siblings, for overweight youth, appearance-related teasing is also perpetrated by parents (37%) and other adults (27%), in addition to being perpetrated by peers (92%) and friends (70%; Puhl, Peterson, & Luedicke, 2013). Notably, gender and weight status differences in teasing experiences likely contribute to the wide range of reported prevalence rates. Although appearance-related teasing during adolescence appears to confer risk for internalizing problems and eating disorder psychopathology (Haines, Hannan, Van Den Berg, Eisenberg, & Neumark-Sztainer, 2013; Puhl et al., 2017), the impact of appearance-related teasing on substance use remains unclear. An improved understanding of the relationship between appearance-related teasing and substance use is important for the development of prevention and intervention strategies for early substance use onset and substance misuse.

Appearance-Related Teasing and Substance Use

The bullying literature suggests that the experience of appearance-related teasing has the potential to lead to substance use during early adolescence. Davis and colleagues (2018) examined longitudinal associations between general peer victimization and substance use during middle school, and findings indicated that peer victimization experiences predict subsequent problem alcohol use. Notably, this study did not specifically examine appearance-related teasing or marijuana use. Nonetheless, these findings provide preliminary support for the conceptual framework proposed by Hong et al. (2014), which posits that victimization experiences related to adolescent substance use are important interpersonal risk factors to consider. Based on the interpersonal risk pathways from victimization to substance use proposed by this framework (Hong et al., 2014), it is possible that adolescents who are teased about their appearance by peers and/or family members may also be driven to avoid school and home environments, which may lead to affiliation with delinquent peers who increase substance use risk. Another possibility is that adolescents who experience victimization are compelled to use alcohol and marijuana to escape or alleviate negative emotions stemming from victimization (Hong et al., 2014), which is consistent with self-medication

models of substance use, which posits that individuals may use substances to cope with negative affect (e.g., to reduce stress, forget worries; Sher & Slutske, 2003). Elucidating the direct relationships between appearance-related teasing and substance use, specifically alcohol and marijuana use, is therefore important for the development of substance use prevention programs during early adolescence.

Role of Gender and Weight Status

It is important to identify potential moderating factors that either exacerbate or attenuate the relationship between appearance-related teasing and substance use during early adolescence to understand why some victims of appearance-related teasing are more or less likely to turn to substances than others are.

Gender

Body image pressures are especially stringent for girls, and therefore it is not surprising that being the victim of appearance-related teasing by both peers and parents is more common among adolescent girls than boys (Almenara & Ježek, 2015). Notably, prevalence rates of weight-based teasing among adolescent girls are nearly double than those reported by boys (33% vs. 18%; Goldfield et al., 2010; Zimmer-Gembeck, Webb, Farrell, & Waters, 2018). Further, girls who are overweight or obese experience the highest rates of weight-based teasing (52%), even when compared to adolescent boys with overweight or obesity (30%; Goldfield et al., 2010). Although boys display heavier substance use patterns across midadolescence into early adulthood (Popovici, Homer, Fang, & French, 2012), recent studies have suggested that girls begin using substances at a younger age and demonstrate higher levels of substance use during early adolescence in comparison to boys (Bright et al., 2017; Chen & Jacobson, 2012). It is possible that gender differences in substance use trajectories stem, in part, from the disparate social and interpersonal contexts of boys and girls during adolescence. Sociocultural theories of disordered eating (R. S. Weissman, 2019) suggest that the extreme societal pressure for girls to adhere to stringent body image ideals is likely to result in body image being central to girls' self-worth and self-evaluations. Further, sociocultural theories posit that receiving negative appearance-related feedback is more likely to result in greater negative affect in girls, compared to boys, due to these internalized body ideals (R. S. Weissman, 2019). Such increases in negative emotions elicited by negative appearance-related feedback are hypothesized to confer heightened risk for disordered eating behaviors among adolescent girls. In light of self-medication models of substance use (Sher & Slutske, 2003), these mechanisms proposed by sociocultural theories of disordered eating may extend to substance use outcomes in adolescent girls who experience appearance-related teasing. Indeed, there is evidence to suggest that adolescent girls report greater negative affect in response to weight-based victimization than boys do (Puhl & Luedicke, 2012). Additionally, Hong and colleagues (2014) posited that gender may moderate the association between peer victimization and substance use, likely due to the differential coping styles used by girls and boys during adolescence. Specifically, there is evidence to suggest that girls are more likely than boys to utilize avoidant behaviors, such as substance use, to cope with stress

(Lee-Winn, Mendelson, & Johnson, 2018). However, it is unclear whether there are gender differences in the relationship between appearance-related teasing and the use of alcohol and marijuana during early adolescence.

Weight Status

Adolescents who are overweight or obese report higher rates of appearance-related teasing than their nonoverweight peers do (Reulbach et al., 2013). One study found that 45% of youth who are overweight or obese experience weight-based teasing, versus only 25% of normal-weight youth (Goldfield et al., 2010). Being overweight or obese is also differentially related to substance use risk during adolescence, but findings have been conflicting. Some studies have indicated that adolescents who are overweight or obese are at lower risk for substance use than nonoverweight youth are (e.g., Gearhardt, Waller, Jester, Hyde, & Zucker, 2018). It has been hypothesized that this inverse association may potentially result from avoidance of social events due to fear of victimization and thus being less likely to use substances relative to nonoverweight adolescents (Gearhardt et al., 2018). In contrast, other studies have found that being overweight or obese increases substance use (e.g., Ramseyer Winter, Kennedy, & O'Neill, 2017). As an alternative theory consistent with the interpersonal risk model of peer victimization and substance use (Hong et al., 2014), it has been suggested that overweight and obese youth engage in more frequent substance use as a result of connecting with deviant peers upon being socially marginalized (Lanza, Grella, & Chung, 2015). According to self-medication models of substance use (Sher & Slutske, 2003) and interpersonal risk model of peer victimization and substance use (Hong et al., 2014), the experience of appearance-related teasing may also increase the risk for substance use as a means to cope with or escape from negative emotions. Therefore, it is possible that youth who are overweight or obese may have a robust relationship between appearance-related teasing and substance use, justifying the need to examine weight status as a moderator. Research is needed to clarify these opposing theories.

The Present Study

Longitudinal studies are needed to examine whether appearance-related teasing predicts substance use during early adolescence, a vulnerable period for increases in both appearance-related teasing and substance use. Identifying factors that may exacerbate the link between appearance-related teasing and early substance use is also needed to understand who may be at elevated risk for the heaviest substance use. As such, the present longitudinal study addressed the following research questions: (a) Is appearance-related teasing related to alcohol and/or marijuana use during early adolescence? and (b) Do these relationships differ by gender and/or weight status?

Method

Participants

All adolescents who were enrolled full-time in the seventh and eighth grades at five public middle schools located within 70 miles of the study site (Hartford, Connecticut) were invited to participate

in a longitudinal study examining predictors of anxiety and depression during adolescence (pandaresearchproject.org). Adolescents who could not comprehend the study purpose, risks, or survey items due to limited English language skills or a teacher-reported severe developmental disorder were excluded during the informed assent process. The sample comprised 1,344 early adolescents (52% girls; age: $M = 13.20$ years, $SD = 0.65$, range = 11–14). The race or ethnicity composition was 51% non-Hispanic White, 21% Hispanic/Latinx, 9% Black, 3% Asian, 15% multiracial or ethnic, and 1% other.

Procedure

An invitation letter describing the study was mailed to parents of all students enrolled in the participating middle schools ($N = 1,589$). Parents who did not want their adolescents to participate in the study contacted the research team (2%). Adolescents provided written assent prior to data collection ($N = 1,344$); those who did not provide their assent to participate were absent, declined to participate, or were excluded. Data collection occurred in schools during the fall of 2016 (Time 1 [T1]) and 6 months later, during the spring of 2017 (T2). Trained research personnel administered the surveys, which took ~60 min to complete. Among the 1,344 adolescents who were included in the study at T1, there was 88% participant retention at T2 ($n = 1,183$). Attrition resulted from adolescents transferring out of the school district, being absent on the day of data collection, or declining follow-up participation. Study procedures were approved by the Connecticut Children's Medical Center Institutional Review Board.

Measures

Appearance-related teasing. The Appearance-Related Teasing Questionnaire (Levine, Smolak, & Hayden, 1994) assessed the degree to which adolescents have experienced weight- or shape-related teasing from their mothers, fathers, siblings, or peers in the past 6 months. A representative item is "In the past 6 months, how often have your brothers or sisters teased you or made negative comments about your weight or body shape?" This four-item measure utilizes a 5-point scale, with responses ranging from 1 (*never*) to 5 (*all the time*). Responses were averaged to generate a total score. This measure has been used widely for eating and weight behavior studies in adolescents and demonstrates good psychometric properties (Stice & Bearman, 2001). The Cronbach's alpha coefficient was .75 in this sample. The appearance-related teasing score was positively skewed (skew = 2.02; kurtosis = 5.07), so a logarithmic transformation was applied to achieve normality (skew = 1.04; kurtosis = 0.18).

Substance use. The Substance Use Survey (Ohannessian, Finnan, Schulz, & Hesselbrock, 2015) assessed adolescents' alcohol and marijuana use patterns over the past 6 months. Adolescents were asked to rate the frequency with which they had consumed alcohol on an 8-point scale ranging from 0 (*never*) to 7 (*every day*). The quantity of alcohol consumed on a typical occasion/day was assessed on a 10-point scale ranging from 0 (*drank no alcohol*) and 9 (*more than 8 drinks per day*). Quantity and frequency scores were multiplied to obtain a total alcohol consumption score (Sobell & Sobell, 1995). Adolescents also reported the number of times they engaged in binge drinking (five or more alcoholic drinks per

occasion). Marijuana use frequency was assessed using an 8-point scale ranging from 0 (*never*) to 7 (*every day*). The substance use items were positively skewed (skew = 3.09–64.64; kurtosis = 13.75–36.97), and therefore logarithmic transformations were applied to achieve normality (skew = 0.49–1.61; kurtosis = 2.32–5.06).

Covariates. A demographic questionnaire assessed adolescents' gender, age, race or ethnicity, and parental education status. The MacArthur Scale of Subjective Social Status (Goodman et al., 2001) assessed adolescents' perceptions of their family's standing within society in relation to indicators of socioeconomic status, including wealth, occupation, and education. Adolescents self-reported their height and weight, which were used to calculate body mass index (BMI) standard scores (z scores) adjusted for age and gender (Kuczmarski et al., 2002). Depressive symptoms and general peer victimization frequency were included as covariates given their known associations with appearance-related teasing and substance use (Eisenberg, Neumark-Sztainer, Haines, & Wall, 2006; Hong et al., 2014; Lunde, Frisén, & Hwang, 2006). Depressive symptoms were assessed with the widely used Center for Epidemiological Studies Depression Scale for Children (M. M. Weissman, Orvaschel, & Padian, 1980; $\alpha = .91$ in this sample). Peer victimization frequency was assessed with 10 items reflecting overt and relational forms of victimization from the reliable and valid Revised Peer Experiences Questionnaire (Prinstein, Boergers, & Vernberg, 2001; $\alpha = .87$ in this sample).

Analytic Plan

The structural equation modeling (Byrne, 2016) approach was utilized with IBM SPSS AMOS 24.0. The primary model included T1 appearance-related teasing as the exogenous predictor variable and T2 total alcohol consumption, binge-drinking frequency, and marijuana use frequency as the endogenous outcome variables. Predictor variables serving as covariates included T1 age, gender (1 = girls, 0 = boys), race or ethnicity (1 = non-Hispanic White, 0 = other race or ethnicity), average parental education attainment, perceived socioeconomic status, BMI z scores, depressive symptoms (at both T1 and T2), and general peer victimization frequency. In addition, T1 total alcohol consumption, binge-drinking frequency, and marijuana use frequency were included as covariates for their respective T2 outcome variables. Covariances among the exogenous variables and covariances among the residual variances of the endogenous variables were estimated.

Multiple-group analyses and chi-square likelihood ratio difference tests comparing nested models were conducted to evaluate whether there were significant moderation effects in the associations between appearance-related teasing and substance use (Vandenberg & Lance, 2000). The two sets of grouping variables (i.e., moderators) were gender (coded as girls and boys) and weight status (coded as overweight/obese and nonoverweight). Parameters were estimated simultaneously, but separately, for girls and boys, with one set of goodness-of-fit indices being generated for the overall multiple-group model. An initial unconstrained model was estimated that allowed all parameters to vary in both groups (i.e., girls and boys, youth who are overweight/obese and nonoverweight), followed by additional nested models estimated under increasingly restrictive constraints that set parameters to be equal across groups. The parameters were constrained in the following

order: structural paths and covariances. Chi-square difference tests compared the fit of the unconstrained model to the more constrained models. If the constrained model provided a significantly worse fit to the data relative to the unconstrained model, the parameter of interest was deemed not equivalent across groups (i.e., significant gender and/or weight status differences in the parameter of interest was observed).

Relative to adolescents with complete data ($n = 1,183$), adolescents with missing data at T2 ($n = 161$) were older, were more likely to be boys (vs. girls), and had parents with lower educational attainment ($ps < .05$). No differences based on missingness were observed for other T1 study variables ($ps > .05$). Missing data were handled using full information maximum-likelihood (FIML) estimation (Wothke, 2000). Notably, FIML utilizes all available data to yield unbiased parameter estimates under both data missing at random and data missing completely at random assumptions (Wothke, 2000). Follow-up sensitivity analyses revealed the same pattern and magnitude of results when estimating models with only adolescents who had complete data at T1 and T2.

Results

In the overall sample, 55% of participants reported experiencing appearance-related teasing, 16% reported consuming alcohol, 9% reported binge drinking, and 7% reported using marijuana at T1. The sample had a broad range regarding weight status (BMI z scores: $M = 0.34$, $SD = 1.08$), with 3% underweight, 69% average weight, 16% overweight, and 12% obese. As shown in Table 1, more frequent appearance-related teasing was cross-sectionally associated with older age ($r = .08$, p), lower perceived socioeconomic status ($r = -.10$, $p < .01$), lower parental education attainment ($r = -.15$, $p < .01$), higher BMI z scores ($r = .21$, $p < .001$), and higher levels of depressive symptoms ($r = .42$, $p < .001$). More frequent appearance-related teasing was also cross-sectionally associated with lower perceived socioeconomic status ($r = -.10$, $p < .01$) and lower parental education attainment ($r = -.15$, $p < .01$). There was no difference in the frequency of appearance-related teasing between girls and boys ($p > .05$). Adolescents identifying as Hispanic/Latino and multiracial or ethnic reported more frequent appearance-related teasing than those identifying as non-Hispanic White or Black did ($ps < .01$).

Main Effect Model

Fit indices suggested that the parameters for the model provided a good fit to the data, $\chi^2(17, N = 1,183) = 168.81$, $p < .001$, comparative fit index (CFI) = .97, Tucker–Lewis index (TLI) = .96, root-mean-square error of approximation (RMSEA) = .06, 90% confidence interval [CI: .05, .07]. As for cross-sectional relationships, inspection of the T1 covariances suggested that more frequent appearance-related teasing was significantly associated with higher concurrent levels of total alcohol consumption ($cov = .01$, $SE = .002$, $r = .19$, $p < .001$), binge drinking ($cov = .02$, $SE = .003$, $r = .26$, $p < .001$), and marijuana use ($cov = .01$, $SE = .002$, $r = .19$, $p < .001$). Longitudinally, as seen in Table 2, more frequent appearance-related teasing at T1 significantly predicted greater increases in total alcohol consumption ($b = 0.20$, $SE = 0.09$, $p = .024$) and binge-drinking frequency ($b = 0.21$, $SE = 0.11$, $p = .047$) at T2. To interpret the clinical relevance of these

Table 1
Cross-Sectional Bivariate Correlations Among Study Variables

| Variable | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 |
|------------------------------|---------|---------|---------|--------|--------|--------|-------|--------|--------|--------|--------|--------|--------|
| 1. Age (T1) | — | | | | | | | | | | | | |
| 2. Perceived SES (T1) | -.01 | — | | | | | | | | | | | |
| 3. Parental education (T1) | -.12*** | .17*** | — | | | | | | | | | | |
| 4. BMI z scores (T1) | .01 | -.10** | -.16*** | — | | | | | | | | | |
| 5. Depressive symptoms (T1) | .06* | -.19*** | -.14*** | .10** | — | | | | | | | | |
| 6. Appearance teasing (T1) | .08** | -.10** | -.15*** | .21*** | .42*** | — | | | | | | | |
| 7. Peer victimization (T1) | .02 | -.14*** | -.07* | .06 | .50*** | .42*** | — | | | | | | |
| 8. Alcohol use (T1) | .12*** | -.06 | -.05 | .14*** | .17*** | .17*** | .06 | — | | | | | |
| 9. Binge drinking (T1) | .15*** | -.02 | -.08** | .19*** | .17*** | .27*** | .08* | .62*** | — | | | | |
| 10. Marijuana use (T1) | .13*** | -.08** | -.01 | .15*** | .11** | .19*** | .08** | .60*** | .63*** | — | | | |
| 11. Depressive symptoms (T2) | .04 | -.15*** | -.13*** | .10** | .64*** | .33*** | .38** | .14** | .14** | .12*** | — | | |
| 12. Alcohol use (T2) | .13*** | .02 | -.04 | .09** | .09** | .16*** | .03 | .46*** | .46*** | .42*** | .14*** | — | |
| 13. Binge drinking (T2) | .12*** | .07* | -.04 | .14*** | .17*** | .22*** | .05 | .48*** | .56*** | .41*** | .18*** | .76*** | — |
| 14. Marijuana use (T2) | .11*** | -.04 | -.09** | .07* | .08* | .11** | .03 | .36*** | .31*** | .50*** | .16*** | .68*** | .61*** |

Note. T1 = Time 1; T2 = Time 2; SES = socioeconomic status; BMI = body mass index (standard scores adjusted for age and gender).
* $p < .05$. ** $p < .01$. *** $p < .001$.

findings, we back-transformed the unstandardized parameter estimates because the alcohol use variables in the model were logarithm-transformed. For every one-unit increase in the frequency of appearance-related teasing at T1, adolescents reported nearly two additional occasions of binge drinking ($b = 1.62$) at T2. However, T1 appearance-related teasing was unrelated to T2 mar-

ijuana use frequency ($b = 0.03$, $SE = 0.07$, $p = .699$). A model output summary is available in the online supplemental materials.

Moderation Effects

Table 3 depicts results from the multiple-group analyses. Nested model comparisons indicated that there were gender and weight status differences across all types of estimated parameters, including structural paths and covariances, ($ps < .05$). As such, results from the unconstrained models that freely estimated parameters across groups are presented.

Gender. The unconstrained model in girls and boys provided an acceptable fit the data, $\chi^2(32, N = 1,183) = 183.19$, $p < .001$, CFI = .96, TLI = .96, RMSEA = .06, 90% CI [.05, .07]. Among girls, more frequent appearance-related teasing at T1 predicted significantly greater increases in total alcohol consumption ($b = 0.25$, $SE = 0.11$, $p = .025$) and binge-drinking frequency ($b = 0.21$, $SE = 0.10$, $p = .047$) at T2. By contrast, appearance-related teasing at T1 was unrelated to subsequent changes in total alcohol consumption ($b = 0.13$, $SE = 0.14$, $p = .345$) or binge-drinking frequency ($b = 0.23$, $SE = 0.16$, $p = .145$) among boys. Appearance-related teasing at T1 did not predict marijuana use frequency at T2 in either girls ($b = -0.09$, $SE = 0.09$, $p = .318$) or boys ($b = 0.17$, $SE = 0.12$, $p = .142$). Similar to the longitudinal findings, the cross-sectional associations for appearance-related teasing with total alcohol consumption and binge-drinking frequency were significant and positive for both girls and boys but were larger in magnitude for girls (total alcohol consumption: $cov = .01$, $SE = .003$, $r = .24$, $p < .001$; binge-drinking frequency: $cov = .02$, $SE = .003$, $r = .30$, $p < .001$) compared to boys (total alcohol consumption: $cov = .01$, $SE = .003$, $r = .15$, $p < .001$; binge-drinking frequency: $cov = .02$, $SE = .004$, $r = .23$, $p < .001$). By contrast, the magnitude of the positive cross-sectional association between appearance-related teasing and marijuana use was not different for girls ($cov = .01$, $SE = .002$, $r = .19$, $p < .001$) and boys ($cov = .01$, $SE = .003$, $r = .21$, $p < .001$).

Weight status. The unconstrained model freely estimating all parameters in adolescents who were overweight/obese and non-overweight, provided a good fit the data, $\chi^2(32, N = 1,183) =$

Table 2
Regression Analyses for Time 1 Study Variables Predicting Adolescent Substance Use

| Variable | b | SE | β | t | p |
|--------------------------------|-------|------|------|-------|-------|
| Total alcohol consumption (T2) | | | | | |
| Appearance-related teasing | 0.20 | 0.09 | .08 | 2.26 | .024 |
| Age (years) | 0.06 | 0.02 | .09 | 3.08 | .002 |
| Gender | -0.03 | 0.03 | -.03 | -1.07 | .283 |
| Race/ethnicity | -0.01 | 0.03 | -.01 | -0.38 | .701 |
| Socioeconomic status | 0.02 | 0.21 | .08 | 2.59 | .010 |
| BMI z score | 0.02 | 0.01 | .04 | 1.21 | .227 |
| Depression | 0.00 | 0.00 | .03 | 0.97 | .330 |
| Peer victimization | -0.03 | 0.02 | -.04 | -1.18 | .239 |
| Total alcohol consumption | 0.45 | 0.03 | .36 | 14.83 | <.001 |
| Binge drinking (T2) | | | | | |
| Appearance-related teasing | 0.21 | 0.11 | .08 | 1.99 | .047 |
| Age (years) | 0.05 | 0.02 | .07 | 2.07 | .038 |
| Gender | -0.02 | 0.03 | -.02 | -0.60 | .551 |
| Race/ethnicity | 0.01 | 0.03 | .01 | 0.29 | .771 |
| Socioeconomic status | 0.04 | 0.01 | .13 | 3.90 | <.001 |
| BMI z score | 0.03 | 0.02 | .07 | 1.72 | .085 |
| Depression | 0.00 | 0.00 | .10 | 2.38 | .017 |
| Peer victimization | -0.05 | 0.03 | -.07 | -1.76 | .079 |
| Binge drinking | 0.36 | 0.03 | .32 | 10.56 | <.001 |
| Marijuana use (T2) | | | | | |
| Appearance-related teasing | 0.03 | 0.07 | .01 | 0.39 | .699 |
| Age (years) | 0.03 | 0.02 | .06 | 2.04 | .042 |
| Gender | -0.04 | 0.02 | -.05 | -1.67 | .096 |
| Race/ethnicity | -0.01 | 0.02 | -.01 | -0.42 | .675 |
| Socioeconomic status | 0.01 | 0.01 | .04 | 1.22 | .224 |
| BMI z score | 0.00 | 0.01 | .01 | 0.29 | .775 |
| Depression | 0.00 | 0.00 | .07 | 2.11 | .035 |
| Peer victimization | -0.02 | 0.02 | -.03 | -0.86 | .390 |
| Marijuana use | 0.48 | 0.03 | .42 | 17.33 | <.001 |

Note. T2 = Time 2; BMI = body mass index.

Table 3
Nested Model Comparisons Examining Moderation Effects of Gender and Weight Status

| Grouping variable | Model parameters | | Chi-square difference test ^a | | |
|---|------------------|-----------|---|-------------|----------|
| | χ^2 | <i>df</i> | $\Delta\chi^2$ | Δdf | <i>p</i> |
| Gender ^b | | | | | |
| Assuming unconstrained model to be correct | | | | | |
| Unconstrained model | 183.19 | 32 | | | |
| Structural weights constrained | 225.40 | 60 | 42.21 | 28 | .041 |
| Covariances constrained | 493.15 | 141 | 309.96 | 109 | <.001 |
| Assuming structural weights model to be correct | | | | | |
| Structural weights model | 225.40 | 60 | | | |
| Covariances constrained | 493.15 | 141 | 267.75 | 81 | <.001 |
| Weight status ^c | | | | | |
| Assuming unconstrained model to be correct | | | | | |
| Unconstrained model | 119.88 | 32 | | | |
| Structural weights constrained | 169.15 | 60 | 49.27 | 28 | .008 |
| Covariances constrained | 538.67 | 141 | 418.79 | 109 | <.001 |
| Assuming structural weights model to be correct | | | | | |
| Structural weights model | 169.15 | 60 | | | |
| Covariances constrained | 538.67 | 141 | 369.52 | 81 | <.001 |

^a Data reflect nested model comparisons of the unconstrained model with the increasingly constrained models. ^b Girls vs. boys. ^c Overweight or obese vs. nonoverweight.

119.88, $p < .001$, CFI = .97, TLI = .96, RMSEA = .06, 90% CI [.05, .07]. Weight status did not significantly moderate the longitudinal relationship between appearance-related teasing at T1 and subsequent alcohol consumption, binge drinking, or marijuana use at T2 ($ps > .05$), because the parameter estimates for these structural paths were identical among adolescents who were overweight or obese and those who were nonoverweight. However, there were weight status differences in the structural weights for general peer victimization and binge drinking. Specifically, more frequent general peer victimization predicted greater decreases in binge drinking among youth who were overweight or obese ($b = -0.16$, $SE = 0.07$, $p = .021$), but there was no such relationship found among youth who were nonoverweight ($b = -0.03$, $SE = 0.04$, $p = .339$).

However, inspection of the covariances suggested that the cross-sectional associations between appearance-related teasing and alcohol use were stronger among adolescents who were overweight or obese (total alcohol consumption: $cov = .02$, $SE = .006$, $r = .21$, $p = .003$; binge-drinking frequency: $cov = .04$, $SE = .008$, $r = .33$, $p < .001$) relative to those who were nonoverweight (total alcohol consumption: $cov = .01$, $SE = .002$, $r = .15$, $p < .001$; binge-drinking frequency: $cov = .01$, $SE = .002$, $r = .23$, $p < .001$). The cross-sectional association between appearance-related teasing and marijuana use frequency was equivalent across weight status groups (overweight/obese: $cov = .02$, $SE = .006$, $r = .22$, $p < .01$; nonoverweight: $cov = .01$, $SE = .002$, $r = .22$, $p < .001$).

Discussion

This longitudinal study examined whether appearance-related teasing predicted substance use in a large, diverse community sample of early adolescents (11–14 years). Confirming the pervasiveness of appearance-related teasing during early adolescence, the majority (55%) of youth reported some form of appearance-related teasing perpetrated by parents, siblings, or peers in the 6

months prior to assessment. Overall, small-to-moderate relationships were observed between more frequent appearance-related teasing and substance use, both cross-sectionally and prospectively. These findings underscore the role that appearance-related teasing may play in the origins of alcohol use during early adolescence.

Results from this study indicate that more frequent appearance-related teasing was concurrently linked to higher total alcohol consumption, binge drinking, and marijuana use. More frequent appearance-related teasing also predicted greater increases in total alcohol consumption and binge-drinking frequency 6 months later. These effects persisted beyond demographic factors, weight status, depressive symptoms, and general peer victimization frequency, suggesting a unique and salient relationship. The findings are consistent with self-medication and interpersonal risk models of victimization and substance use (Hong et al., 2014; Sher & Slutske, 2003), which posit that adolescents who are victims of bullying turn to substances as a maladaptive means of coping with negative affect and/or as a result of trying to gain acceptance from deviant peers in the face of teasing at home and in school. Of note, appearance-related teasing may not have predicted increased marijuana use over time due to the young sample age and the relatively low frequency of marijuana use (7% at T1; Hopfer, 2014).

The bullying and substance use literatures, as well as tenets of sociocultural body image theories, suggest that during adolescence, girls may be at greater risk for substance use after victimization experiences, in comparison to boys (Hong et al., 2014; R. S. Weissman, 2019). Indeed, findings from this study suggest that the positive longitudinal and cross-sectional relationships between appearance-related teasing and total alcohol consumption (both longitudinal and cross-sectional) and binge-drinking frequency (cross-sectional only) were stronger among girls compared to boys. Sociocultural theories suggest that, as a result of the internalization of body image ideals, adolescent girls may be

relatively more sensitive to appearance-related feedback, placing them at greater risk for negative affective responses to appearance-related teasing (R. S. Weissman, 2019). Therefore, girls may be more likely than boys to consume alcohol in response to appearance-related teasing (Puhl & Luedicke, 2012) and likely to use avoidant behaviors to cope with stress (Lee-Winn et al., 2018). However, there were no gender differences found in the degree to which appearance-related teasing predicted marijuana use. Developmental differences may account for the inconsistency with prior work, which has largely focused on middle-to-late adolescents.

Regarding weight status as a moderator, appearance-related teasing was associated cross-sectionally with greater total alcohol consumption and more frequent binge drinking among adolescents who were overweight and obese than among adolescents who were not overweight. These findings were not observed in the longitudinal analyses. As such, these findings are partially consistent with self-medication models (Sher & Slutske, 2003), which propose that adolescents who are overweight and obese may be at higher risk for substance use following appearance-related teasing, and support existing evidence that obesity may increase the risk for substance use in adolescents (Lanza et al., 2015). It is plausible that appearance-related teasing may exacerbate existing issues with body image and negative affect in adolescents who are overweight or obese, increasing the likelihood that they may turn to substance use to cope with appearance-related teasing and victimization in the short term. In addition, more frequent general peer victimization predicted decreases in binge drinking among adolescents who were overweight or obese, but this relationship was not observed among youth who were nonoverweight. Notably, this finding is consistent with that of previous research (Gearhardt et al., 2018), which suggests that youth who are overweight and obese have lower rates of substance use than their nonoverweight peers do. However, these findings suggest that peer victimization-driven social avoidance or social exclusion mechanisms do not extend to appearance-related teasing. It is possible that adolescents who are overweight and obese who experience appearance-related teasing find alternative ways to acquire alcohol and use it alone or in smaller peer groups rather than in larger social settings.

In sum, this study provided novel information about appearance-related teasing experiences and substance use outcomes of early adolescents. The sample age, size, and diversity and the longitudinal design are study strengths, addressing significant gaps in the bullying literature. The assessment of appearance-related teasing from parents, siblings, and peers and the inclusion of both weight and shape in the definition of appearance-related teasing are additional strengths. Notably, all constructs were self-reported, which may bias responses about sensitive topics such as body weight and substance use. Future studies should replicate findings from this study with reports from parents, peers, and teachers and objective body composition measures. Finally, the longitudinal findings may have exhibited small effect sizes and null moderation effects, in part, because the follow-up interval only was 6 months; therefore, it would be important for future studies to examine long-term substance use outcomes of appearance-related teasing. To increase generalizability, this study should be replicated in clinical settings and geographical areas outside of the New England region of the United States. In addition, future studies would benefit from assessing a broader range of substances (e.g., vaping, prescription drug misuse).

Future work is needed to examine the mechanisms that may account for the relationships between appearance-related teasing and substance use, such as internalizing problems, avoidant coping motives, deviant peer affiliation, and body image dissatisfaction (Hong et al., 2014), to establish a more comprehensive theoretical framework and to inform substance use prevention programs. Future research should also examine potential differences in substance use outcomes associated with the source of appearance-related teasing (e.g., peer, close friend, sibling, or parent). Given the high prevalence of appearance-related teasing and links to substance use observed in this study, it seems crucial that schools and communities explicitly address appearance-related teasing and bullying in antibullying policies and substance use interventions. Although school administrators and policymakers have made great strides in preventing general bullying in schools, few states address appearance-related teasing in these policies (Puhl, Latner, et al., 2016). By improving current understandings of risk and resilience factors for potential appearance-related teasing victims, as well as identifying likely substance use outcomes for at risk youth, providers, schools, and communities may be able to develop strong prevention and education programs aimed at reducing future victimization and early substance use.

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