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The relationship between substance use, body image, and social physique anxiety among school-aged adolescents on the Texas/Mexico border

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ABSTRACT

Background: Marijuana and alcohol use are higher in Hispanic youth in the U.S. compared with their non-Hispanic peers. Among adolescents, negative body image (BI) is associated with risky behaviors including substance use. Few studies have looked at the link between BI and substance use among adolescents, particularly along the US-Mexico border. The purpose of this study was to examine the relationship between BI and substance use among 6th-12th-grade students living along the south Texas-Mexico border. **Methods:** Using a cross-sectional design, 556 Mexican-American students (44.9% male, M age = 13.22 years) from randomly selected schools representing 6th-12th grades near the south Texas/Mexico border self-reported age, gender and substance use behaviors, and completed measures of social physique anxiety (SPA), perceived and ideal BI. BI dissatisfaction, SPA, and substance use were compared by gender and grade level. Prevalence ratios were calculated to assess the likelihood of students using alcohol, tobacco or marijuana. **Results:** No differences in BI dissatisfaction or social physique were found across grades. Girls had higher SPA scores compared to boys ($P = 0.006$), but no differences were found for BI dissatisfaction. Older students reported smoking and drinking more than younger students. As SPA increased the prevalence of drinking decreased. **Conclusions:** Future public health efforts to reduce substance use among Hispanic youth may start before or during middle school. Consideration of physical self-presentation might be important given the timing of first use coincides with growth and maturation.

KEY WORDS: Alcohol, adolescent, Latino, physical self-presentation

INTRODUCTION

Body-related perceptions are known determinants of disordered eating [1,2], depression [3,4] and anxiety among youth [3]. Body image (BI) dissatisfaction - desiring a body figure different from a person's current shape and size, and social physique anxiety (SPA) - anxiety about presenting one's body in front of others, are well-documented correlates of these mental health disorders. More specifically, BI dissatisfaction also is associated with detrimental behaviors including personal harm, such as eating disorders and substance abuse [5,6].

In addition, there are racial and ethnic disparities in substance use and BI satisfaction [7]. BI dissatisfaction is greater among Hispanic women than other minority groups in the United States [8]. Similarly, more Hispanic adolescents try alcohol and marijuana before the age of 13 relative to their non-Hispanic White peers [9]. A limitation to existing studies of BI dissatisfaction and health behaviors is that the samples almost exclusively include adolescent girls, rarely examining racial or ethnic differences or BI among boys [10] or in diverse, non-athletic samples. Moreover, these data mostly reflect high school age populations, ignoring the timing of growth and maturation as potential correlates of substance use. Although the relationships among BI perceptions and other mental health disorders are well-documented, what is less well known is whether BI dissatisfaction and SPA are concurrently associated with risky behaviors such as substance use among Hispanic adolescents including those of middle school age. Inclusion of stage of social and educational status is important because of its temporal vicinity to physical changes (i.e., increases in height and weight associated with the adolescent growth spurt) that are documented to occur later in Mexican American youth [11,12].

Theories of youth and adolescent development suggest that the social and environmental contexts are important for health and wellbeing. One example is Lerner's theory of positive youth development (PYD) [13,14]. The interaction of context with physical development can impact a child's physical self-perceptions and health behaviors [15,16]. Physical changes related to growth and maturation are associated with health behaviors such as disordered eating, physical inactivity [17], as well as BI dissatisfaction [18] and SPA [19]. However, few studies look beyond physical activity and nutrition behaviors and consider other risky behaviors among adolescents.

One of the few studies to examine BI and adolescent health behavior among Latinos assessed the relationship between weight perception and substance use among a sample of 1, 343 Latino and non-Latino white adolescents (52% male, M age = 14 years) in eighth grade [6]. Results indicated that negative weight perception, or being dissatisfied with one's weight versus one's looks, was a risk factor for substance use. Acculturated Latino youth with poor BI were at the greatest risk for substance use [6]. Emery *et al.* [5] found similar results when they analyzed results from a survey administered to 400 6th-grade students. They reported that the more glo bal self-perception construct of self-esteem was inversely related to tobacco, alcohol, and other drug use. Regardless of the substance used, students reporting substance use had lower self-esteem scores than students who had never used substances [5].

The use of alcohol and marijuana among Hispanic youth in the United States exceeds rates nationally for non-Hispanic adolescents; the rate of marijuana use for youth in the United States is 23.1% [20] compared with 24.4% in the Hispanic population [21]. Even more striking is the disparity for alcohol consumption. The prevalence in the Hispanic population is 42.3% [21], nearly four percentage points higher than for non-Hispanic youth [20]. These findings highlight the need for a closer look at more precise underlying factors like body-related perceptions involved in initiating dangerous behaviors such as alcohol, tobacco and drug use with the goal of pinpointing the nature and timing of intervention targets.

The aim of this study was to examine the relationship between BI related self-perceptions and substance use among a sample of Mexican American youth living along the US-Mexico border. To this end, after norm comparisons, comparisons between gender and across middle school grades and two high school age groups were made for BI dissatisfaction, SPA and the frequency of alcohol, tobacco and marijuana use. Next, BI dissatisfaction and SPA differences between participants reporting use and having never used each substance were compared. Finally, the association between BI perceptions and estimate risk by grade controlling for gender and body mass index (BMI) were calculated.

METHODS

Participants

Cross-sectional data were collected in 2010-2011 from 826 Mexican-American students from a school district near the south Texas/Mexico border as part of a larger project to better understand student perceptions of the physical education program and identify health-related risky behaviors among the student population. Participants were recruited from elementary (n = 236 participants), middle (n = 434 participants) and high schools (n = 156 participants) identified as representing the district based on geography and socioeconomic status. The population of interest for this study includes only the middle and high school students (n = 555) from the larger Texas study (n = 826) that included elementary school students. Almost all (99%) of the students were Hispanic, and the vast majority (80.5%) of Mexican origin according to 2010 census data. This sample size provided sufficient power to detect a small effect size (0.15) in the prevalence rate ratios (PRRs), where $\alpha = 0.05$ and $\beta = 0.94$.

PROCEDURE

All students in grades 4 through 12 at the participating schools were eligible to participate in the study and completed child assent, and parents returned signed written informed consent prior to participation. Procedures were approved by the Committee for the Protection of Human Subjects at the University of Texas Health Science Center Houston. Participants received an age-appropriate incentive valued at $5 for participating. Elementary school students (n = 236) did not complete measures of substance use and were therefore excluded from the present analyzes.

MEASURES

Demographic and anthropometric measures. Participants self-reported their gender and age. After completing the survey, trained study personnel measured participants' height in centimeters using a portable stadiometer (ShorrBoard, Olney, MD) and weight in kilograms using a Seca digital scale (Hanover, MD). Students were measured in light clothing. Intra-rater reliability was assessed for height using the technical error of measurement. The technical error of measurement was 1.85 mm, within the acceptable range for all age groups included in the study [22,23]. Each participant was weighed and measured twice, and the mean value was taken. If the two values were different by more than 0.2 centimeters or 0.2 kg, a third height or weight were measured, and median taken. To adjust for weight of clothing, 0.6 kg were subtracted from the total weight. BMI was calculated as weight (kg) divided by height (m^2). BMI percentiles were defined using established growth charts [24].

Alcohol, tobacco and marijuana use. Participants self-reported frequency of use and age of first use for alcohol, tobacco, and marijuana. Items were derived from the Youth Risk Behavior Surveillance System 2009 questionnaire [25]. Onset was assessed by asking participants, "how old were you when you" had your first drink, smoked a whole cigarette for the first time, and first tried marijuana. The response options included a "never" option and ages ranging from 8 to 17 years of age. Because of small cell sizes, responses were collapsed to "ever had a drink/smoked cigarettes/used marijuana" or "never used."

BI dissatisfaction. Students were also asked to respond to BI items using the Stunkard Figural Stimuli [26]: Nine gender specific silhouettes were shown that represented a range of BMIs from underweight (scored as 1) to morbidly obese (scored as 9). Participants recorded their perceived (Which picture best shows who you are now in everyday clothing?) and ideal BI (Which picture best shows who you would like to look to be in everyday clothing?) with a possible range of 1 through 9. BI dissatisfaction was calculated by subtracting ideal from perceived BI responses. Higher scores indicate wanting to be smaller in body size.

SPA the 9-item scale [27] was used to assess SPA where items are rated on a scale of 1 (not at all) to 5 (extremely). The single factor structure for the 9-item version has been confirmed in adolescent populations [28,29]. In the present sample Cronbach's $\alpha = 0.85$. Mean SPA values were calculated at the individual level. Higher scores represent a greater anxiety about physical self-perceptions in social situations.

Analysis

The analyzes, conducted in 2014, are part of a secondary analysis of data from the Texas project described in the participants section ($n = 826$). The present sample includes middle and high school students only ($n = 555$). Numeric variables for BI dissatisfaction and SPA approximated a normal distribution. Descriptive statistics were calculated for gender, proportion in the 95th% for BMI (i.e., overweight), perceived and ideal BI, BI dissatisfaction, and SPA. One-way Analyses of Variance were conducted to examine differences in BMI percentile, perceived BI and ideal BI and BI dissatisfaction by grade in school at the time of survey administration. Similarly, independent samples *t*-tests were calculated to examine physical self-perception variables by gender and self-reported substance use. Pearson correlation coefficients were calculated for BMI percentile, SPA, and BI dissatisfaction. Chi-square tests of proportion by grade in school and gender were calculated for gender and whether a student had ever tried alcohol, smoking or marijuana. One-way Analyses of Variance also was conducted for SPA and BI dissatisfaction by gender, use of tobacco, alcohol and marijuana (ever using vs. never used). To determine the association between BI dissatisfaction with substance use and estimate risk by grade, separate PRR models were calculated, one for each substance using PROC GENMOD in SAS version 9.3. Models controlled for potential confounders including gender and BMI percentile. PRR was selected over odds ratio analyzes due to the cross-sectional study design [30]. Prevalence rate ratio was also chosen because odds ratios may overestimate risk; the PRRs bias toward the null, suggesting more conservative results.

RESULTS

Differences in Demographic, BI, and Substance Use Variables by Grade Level

A summary of participant characteristics ($n = 555$; 55.3% female) can be found in Table 1. Participants' ages range from 12 to 19 years (M = 13.25, standard deviation = 2.05). The majority of students were in middle school (72.6%). The most prevalent risky behavior reported was drinking alcohol (22.7%), followed by smoking (10.3%) and marijuana use (6.0%). There were no differences by grade level in gender ($P = 0.713$) or proportion in the 95th% for BMI ($P = 0.304$). Students in grades 6 and 7 reported significantly lower (i.e., thinner) perceived ($P = 0.024$) and ideal BI ($P < 0.001$) compared to 11th and 12th grade students. Similarly, 6th-grade participants had significantly lower ideal BI than students in the 9th/10th grade group. As anticipated, more students in high school grades had tried alcohol, smoking and marijuana than students in middle school ($P < 0.0001$ for all behaviors). However, there were no differences in the proportion of students reporting BI dissatisfaction by grade ($P = 0.302$). Similarly, there were no differences by grade in mean BI dissatisfaction ($P = 0.170$) [Table 1] or SPA ($P = 0.782$).

There were no differences by gender in ever smoking ($P = 0.203$) or ever using marijuana ($P = 0.125$). More boys (26.6%) than girls (19.5%) reported ever drinking ($P = 0.048$). There were significant correlations among SPA, BI dissatisfaction and BMI (all $P < 0.0001$). BI dissatisfaction was moderately and positively associated with SPA ($r = 0.40$) and BMI ($r = 0.34$). As BI dissatisfaction increased, so too did SPA. Similarly, SPA and BMI were moderately and positively correlated ($r = 0.32$). As BMI increases, so do SPA and BI dissatisfaction. These correlations are in the expected direction.

BI, SPA, SUBSTANCE USE AND GENDER

Table 2 presents comparisons of BI dissatisfaction and SPA by gender and type of substance use. No differences were detected in BI dissatisfaction by gender, for "ever smoking" or

Table 1: Summary of characteristics by grade level for BI and SPA variables

	6th grade *n*=202%	7th grade *n*=111%	8th grade *n*=90%	9th/10th grade *n*=74%	11/12th grade *n*=78%	*P*
Gender (% female)	55.0	50.5	60.0	58.1	55.1	0.716
% 95th percentile for BMI (overweight)	29.8	20.9	29.4	23.0	16.2	0.135
	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)	
Perceived BI	3.90 (1.33)	3.83 (1.23)	4.03 (1.20)	4.03 (1.40)	4.41 (1.25)	0.024
Ideal BI	3.12 (0.94)	3.15 (0.83)	3.32 (0.85)	3.50 (1.22)	3.55 (0.75)	0.001
BI dissatisfaction[1]	1.16 (0.96)	0.93 (0.92)	0.93 (0.81)	1.15 (1.18)	1.12 (1.07)	0.170
SPA	2.63 (0.82)	2.72 (0.88)	2.62 (0.77)	2.68 (0.98)	2.75 (1.02)	0.782

BI: Body image, SPA: Social physique anxiety, BMI: Body mass index, [1]perceived BI-ideal BI; positive scores indicate desire to be smaller, Note: Grades 9 and 10 and Grades 11 and 12 were collapsed due to small sample sizes in the separate groups, SD: Standard deviation

Table 2: Mean BI dissatisfaction and SPA scores by gender and substance use reporting

	BI dissatisfaction[1]			SPA		
	M (SD)	*t*	*P*	M (SD)	*t*	*P*
Gender		0.35	0.730		−2.76	0.006
Female (*n*=307)	1.05 (1.01)			2.76 (0.92)		
Male (*n*=248)	1.08 (0.94)			2.56 (0.81)		
Ever smoked		−0.97	0.336		−1.46	0.148
Yes (*n*=57)	1.21 (1.21)			2.86 (1.06)		
No (*n*=498)	1.05 (0.95)			2.65 (0.85)		
Ever had a drink of alcohol		−1.21	0.228		−2.54	0.011
Yes (*n*=126)	1.17 (1.09)			2.84 (0.96)		
No (*n*=429)	1.04 (0.95)			2.62 (0.85)		
Ever tried marijuana		−2.71	0.011		−1.10	0.277
Yes (*n*=33)	1.70 (1.40)			2.88 (1.15)		
No (*n*=522)	1.03 (0.93)			2.66 (0.86)		

SPA: Social physique anxiety, BI: Body image, SD: standard deviation, [1]perceived BI – ideal BI; positive scores indicate desire to be smaller

"ever drinking." Students who reported ever using marijuana had significantly greater BI dissatisfaction than students who did not report using marijuana ($P = 0.011$), such that students who reported ever trying marijuana wanted a smaller body size than students who did not try marijuana. Girls reported greater SPA than boys ($P = 0.006$), indicating greater concern over physical self-perceptions in social settings. Students who reported ever drinking had greater SPA than students who had never had a drink of alcohol ($P = 0.011$). No significant differences were detected for SPA by smoking or marijuana use.

There was a trend of increasing the likelihood for ever smoking as grade in school progressed. Participants in the 9th/10th (PRR = 2.88, $P = 0.000$) and 11th/12th grades (PRR = 3.69, $P < 0.0001$) had a greater prevalence of ever smoking after adjusting for BI dissatisfaction, SPA, gender and BMI percentile. A similar trend was seen for ever drinking where students in the 9th/10th (PRR = 1.72, $P < 0.0001$) and 11th/12th grades (PRR = 2.03, $P < 0.0001$) were more likely to report ever drinking. Neither SPA nor BI dissatisfaction were significant predictors in the smoking model. How ever, SPA was significantly associated with ever drinking such that as SPA increases, the prevalence of drinking decreases (PRR=0.170, $P = 0.021$).

DISCUSSION

The findings for substance use in this sample differ from national data trends regarding the Hispanic population. The prevalence of smoking in the present sample (10.3%) is lower than for Hispanics nationally (17.5%), as was alcohol use at 22.7% compared to 42.3% nationally [21]. Marijuana use in the present sample was nearly one-quarter that of national surveillance estimates at 6.0% compared with 24.4% [21]. One potential reason for these discrepancies is that our sample consisted of both middle and high school students, whereas the youth behavioral risk survey data reported from the youth risk behavior survey (YRBS) is high school students only. When the rates from high school students in this sample are compared to high school students in the YRBS, the rates in this sample for ever trying alcohol (52.0% vs. 42.3%) and tobacco (29.7% vs. 17.5%) are higher than national averages, but marijuana (19.9% vs. 24.4%) is still lower. Comparisons between the middle school age group (i.e., grades 6-8) and those representative of high school contexts (i.e., grades 9-12) helped to identify initial intervention target age periods reflecting transition times from no use to substance use initiation. Examining age at which students first use substances is important for education and prevention programming. Because middle school aligns with the timing of the preadolescent growth spurt, considering the growth and maturational timing in relationship to substance use initiation may be important for future studies; substance use may vary systematically with maturational timing and begin at especially younger ages of those who mature early.

Results relating to BI dissatisfaction and substance use were mixed. BI dissatisfaction was not significantly associated with substance use after adjusting for grade, gender, and measured BMI. However, increased SPA was related to a decrease in prevalence of ever drinking alcohol. One possible explanation for these results is that SPA describes how an individual feels about their body in social settings, as opposed to wanting to be thinner or larger. SPA was related to BI dissatisfaction in this sample, but the correlation was not strong ($r = 0.40$). Students who have greater self-presentation concerns may not engage in social interactions where alcohol is present [31]. An alternative explanation may be that students with increased SPA may restrict their diet[2] and not want the additional calories from alcohol.

Negative self-perceptions are associated with anxiety and depression [3,4,32]. In Mexican American adults, anxiety has been linked to higher rates of smoking [33]. Anxiety and depression also are linked with poorer management of chronic conditions [34] among Mexican Americans living in South Texas. Improving SPA and physical self-perceptions among youth may improve mental health outcomes as well as contribute to decreased substance use in adolescence and adulthood. Lerner's theory of PYD may be a useful framework for understanding prevention of negative physical self-perceptions and substance use in youth. PYD suggests that when young people have mutually beneficial relationships with

people and institutions in their community, they will be guided toward a future noted by positive contributions to themselves, their families, communities, and societies [13,14].

Further exploration of BI dissatisfaction, SPA, and substance use will allow a clearer focus for prevention efforts, especially with regard to understanding an adolescent's rationale for substance use. Substance use may be linked not just to age and educational context, but also with growth and maturational timing as correlates of BI dissatisfaction and SPA. Results in the present study suggest that as SPA increases, the prevalence of ever drinking alcohol decreases. The need for additional research in this area also has been noted in school-based studies. One of which found significant gender differences in 4th and 5th grades for use of "minor" substances such as cigarettes, alcohol, and marijuana [35]. Further research is needed, particularly within group variations in the substance use of singular ethnic groups [35]. In addition, Weller and colleagues found that health risk behavior patterns of at-risk youth often differ by demographic subgroup, where older adolescents belonging to minority subgroups, particularly Blacks and Hispanics, frequently display higher prevalence of risk behaviors [36]. The national research council report emphasizes providing support where young people spend their time, specifically mentioning schools and training programs, which relates back to our previous suggestion of a multi-level community approach. From a PYD perspective, family, community, and schools need to be aligned in their support of PYD and supportive environments for children and adolescents [13,14].

Early prevention that begins in schools and community programs may be designed to improve physical self-perceptions among Mexican American youth. A complicating factor in understanding substance use among Hispanic youth is geography. According to the 2010 census, the counties with the greatest proportion of Hispanics are along the US-Mexico border [37]. The geographical significance of this border population warrants recognition. The reputation of the US-Mexico border as an illegal drug transportation hot spot heightens the need for prevention research. Youth from this geographical location may have an increased exposure to substance use. Therefore, understanding the determinants of substance use among Hispanic youth is necessary, particularly in vulnerable geographic locations. School-aged adolescents will continue to make crucial health-related decisions that have life-long consequences, prompting the need for school-based interventions and curriculum as a foundation for substance use prevention. The lower rates of substance use found in this sample from south Texas may be influenced by families and community that rally around children and adolescents to create healthier environments. The heightened awareness of substances because of their geographic context may contribute to an increase in family, community, and school engagement for creating positive environments for youth. Using PYD as a framework, it makes sense that dissatisfaction in one area of life, such as BI, can lead to risky behavior [13]. Developing supportive environments that reduce BI dissatisfaction and SPA may lead to decreases in risky behaviors.

There were several limitations of this study. The study may have benefitted from a greater number of participants at the high school level, particularly to detect associations with marijuana use. However, by high school many students have already tried smoking and alcohol [38]. Therefore, prevention programs may need to be inclusive of younger students and those who may not have experienced their growth spurt or puberty, and therefore implemented in middle school. Very few middle schools students reported trying smoking, drinking or marijuana. The smaller proportion of students engaging in risky behaviors limited the analyzes to only first-time use. Not enough students in the sample reported current use of cigarettes, alcohol or marijuana to tease out the associations between ongoing use and self-perceptions. There has also been some criticism of the use of the figural rating scales to measure BI [39]. Whereas the silhouettes may have some methodological challenges, they do allow for direct comparison with BMI [24] and therefore comparisons across studies of weight status and substance use. Finally, the cross-sectional study design limited the available analytic techniques.

CONCLUSION

The cross-sectional design used in this study allows us to examine this population at a fixed point in time, but it limits the ability to determine causality in relationships. We are also not able to observe any long-term developments in our study variables. This study expands upon previous studies [6,35,36,40] by examining BI as a correlate of substance use among a sample of Mexican American middle and high school students living along the United States-Mexico border. The growing body of evidence suggests that negative physical self-perceptions may be linked to risky behaviors among adolescents. A multi-level approach including behavioral health and youth development practitioners, policy makers, community advocates, etc., should focus on three features linked to the most thriving outcomes of adolescents. These features include: positive and sustained adult-youth relationships (for at least 1 year), skill-building activities, and opportunities to use these skills by participating in and leading community-based activities [13].

Finally, and perhaps most importantly, the causality of the association between physical self-perceptions and initiation of substance use is still unknown. In the present sample, SPA was associated with lower rates of reporting drinking, but in another study of Latino and White adolescents, perceptions of weight status were correlated with greater substance use [6]. Future research may consider the temporality of the associations between physical self-perceptions and substance use.

Primordial prevention of substance use starts early with school and community programs. For youth living along the United States-Mexico border, prevention programs may need to start in middle school or earlier. Identifying program components that are effective with boys may be needed given the consistent evidence that substance use rates are higher in adolescent boys. To do this, more research and efficacy trials are needed on the relevant psychosocial correlates of consuming alcohol,

smoking cigarettes and using marijuana. Interventions aimed at reducing substance use and rising the age of initiation may consider including messages about healthy weight perceptions in addition to targeting interventions by grade level.

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