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Are Mixed-Sex and Single-Sex Groups Equally Effective Across Males and Females? A Quasi-Experimental Investigation of a Cognitive Dissonance-Based Eating Disorder Prevention Program in Mixed-Sex High School Populations

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Are Mixed-Sex and Single-Sex Groups Equally Effective Across Males and Females? A Quasi-Experimental Investigation of a Cognitive Dissonance-Based Eating Disorder Prevention Program in Mixed-Sex High School Populations

by

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ABSTRACT

The *Body Project* is a cognitive dissonance-based eating disorder (ED) preventive intervention program with ample empirical support among adolescent and undergraduate female samples. Recently, community stakeholders and data suggest that preventive efforts must also target body satisfaction and increasing ED symptomatology seen in males. The current study examined the efficacy of a male-only (MO), a mixed-sex (MS), and a traditional female-only (FO) *Body Project* program compared to a minimal attention control (AC) in a community sample. Participants included adolescents male and female students ($N = 182$) aged 13-19 years across three high school sites. Participants completed self-report measures assessing body satisfaction, thin-ideal internalization, ED symptom count, psychosocial impairment secondary to weight and shape concerns, and acceptability of the *Body Project 4 High Schools* program at baseline and post-intervention. Hierarchical linear regressions and generalized linear models were used to estimate main effects of condition and examine whether sex moderated condition effects on outcome variables. In single-sex groups, girls showed greater improvement in body satisfaction compared to AC, while boys did not show significant differences from AC. For boys and girls, MS was associated with improved body satisfaction compared to AC, while its impact on other risk factors was largely non-significant. Effect sizes are presented as a measure of clinical significance. These results contribute to existing *Body Project* data and provide preliminary empirical support of the applicability of the well-established dissonance-based preventive intervention to adolescent boys.

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INTRODUCTION

Eating disorders (EDs) and related disturbances rank as the third most common chronic illness among adolescent populations (Jáuregui-Garrido & Jáuregui-Lobera, 2012; Smink, Hoeken, Oldehinkel, & Hoek, 2014; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011), affecting approximately 8 to 15% of females (Allen, Byrne, Oddy, & Crosby, 2013) and 3% of males within community samples (Allen et al., 2013; Stice, Shaw, Bohon, Marti, & Rohde, 2009). Despite sex differences in prevalence, individuals of both sexes experience the negative consequences associated with adolescent EDs. Specifically, adolescents diagnosed with an ED show higher depression scores, lower mental health scores (Allen et al., 2013), and substantially increased health service use (Swanson et al., 2011) compared to those who do not meet diagnostic criteria. ED adolescent mortality rates rank among the highest of all psychiatric disorders (Arcelus, Mitchell, Wales, & Nielsen, 2011; Crow et al., 2009; Fichter, Quadflieg, & Hedlund, 2008), with mortality rates associated with anorexia nervosa (AN) higher than those of asthma or type 1 diabetes (Powers & Cloak, 2013). One-fifth of AN-related deaths occur by suicide (Arcelus et al., 2011). Unfortunately, data suggest that the majority of individuals in community samples meeting diagnostic criteria for EDs do not enter mental health treatment (Hoek, 2006) and for the small percentage who do enter treatment, recovery often is not attained (Smink et al., 2014). In culmination, these issues underscore the need to investigate scalable,

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cost-efficient, and effective preventive interventions to reduce the occurrence and associated burdens of EDs in adolescence.

Subclinical Disordered Eating Behavior and Eating Disorder Risk Factors

To enhance preventive interventions, increased attention is being focused on determining health-compromising behaviors amenable to change (Neumark-Sztainer, Story, French, & Resnick, 1997; Neumark-Sztainer, Wall, Story, & Perry, 2003). Of particular interest to ED prevention efforts are weight-related behaviors, including subclinical disordered eating behaviors (French et al., 1997; Saekow et al., 2015). Subclinical disordered eating behaviors include extreme dieting or other weight loss behaviors, which are common practice among both male (e.g., 17.5% in a sample of 820 males; Loth, MacLehose, Bucchianeri, Crow, & Neumark-Sztainer, 2014; Ricciardelli & McCabe, 2001) and female adolescents (e.g., 29.3% of 10-14-year-old girls; Killen et al., 1996; Loth et al., 2014; McVey, Tweed, & Blackmore, 2004). Considered less impairing than clinical ED symptomatology, subclinical dieting and disordered eating behaviors show strong associations with a number of well-established ED risk factors that peak in adolescence (Jacobi, Hayward, de Zwaan, Kraemer, & Agras, 2004; Swanson et al., 2011).

A risk factor is defined as an experience (e.g., growing up in a culture or household that promotes the thin-ideal body type), event (e.g., weight- or shape-related bullying), or characteristic (e.g., gene or personality factor such as perfectionism) that precedes and increases the likelihood of an ED diagnosis (Kazdin, Kraemer, Kessler, Kupfer, & Offord, 1997; Striegel-Moore & Bulik, 2007). ED risk factors represent important intervention targets when aiming to reduce future ED development in adolescent populations (Bucchianeri et al., 2016). The most supported and successfully targeted ED risk factors include internalization of western culture's

thin-ideal standard of beauty (Thompson & Stice, 2001) and body dissatisfaction (Ohring, Graber, & Brooks-Gunn, 2002; Stice, Chase, Stormer, & Appel, 2001; Wichstrøm, 2000).

Thin-ideal internalization, which refers to an individual's acceptance and adherence to societal beauty ideals focused on thinness, represents a potent and causal risk factor for body image and eating disturbances including subclinical dieting behaviors, particularly among adolescent females (Kraemer et al., 1997; Stice, 2002; Thompson & Stice, 2001). Although female ideals of attractiveness are comprised of more than thinness, the weight component of thin-ideal internalization represents a predominate element that gives rise to ED pathology. Highly prevalent in adolescent female populations, thin-ideal internalization increases risk for participation in dieting behaviors (Stice, Mazotti, Krebs, & Martin, 1998; Thompson & Stice, 2001), experience of negative affect, and body dissatisfaction (Stice, 2001, 2002). Collectively, sociocultural models (Cafri, Yamamiya, Brannick, & Thompson, 2005; Stice, 1994), as well as correlational (Nouri, Hill, & Orrell-Valente, 2011; Vartanian & Dey, 2013) and longitudinal data (Stice, 2001), indicate that thin-ideal internalization is an important risk factor in the development of body dissatisfaction among adolescent girls.

Internalization of societal body ideals manifest differently for adolescent boys than for girls, with an increased focus on gaining muscle as opposed to attaining thinness (Cohane & Pope, 2001; McFarland & Petrie, 2012). Similar to the risk posed by thin-ideal internalization in females, research also suggests a link between body-ideal internalization and body dissatisfaction among adolescent boys (Cusumano & Thompson, 2001; Smolak, Levine, & Thompson, 2001). Additionally, data indicate that reductions in thin-ideal internalization are associated with subsequent decreases in body dissatisfaction (Stice, Mazotti, Weibel, & Agras, 2000), further

highlighting the importance of internalization as an essential preventive intervention target for both males and females.

Body dissatisfaction (BD), or the negative evaluation of the body as a whole or specific body parts (Ohring et al., 2002), represents one of the most well-established and robust risk factors associated with subclinical disordered eating behaviors within the ED literature (Ohring et al., 2002; Stice, 2001; Stice & Shaw, 2002; Wichstrøm, 2000). Rampant in adolescent populations (ages 13-16), elevated levels of BD often are associated with high levels of emotional distress, psychiatric comorbidity (e.g., depression and social anxiety; Cash, Thériault, & Annis, 2004; Stice, Hayward, Cameron, Killen, & Taylor, 2000), compulsive need for excessive exercise (White & Halliwell, 2010), medical complications (Johnson, Cohen, Kotler, Kasen, & Brook, 2002), appearance rumination, and ultimately ED onset (Rohde, Stice, & Marti, 2015; Stice, Marti, Shaw, & Jaconis, 2009). Even normative levels of body dissatisfaction show predictive associations with disordered eating behavior (Stice & Bearman, 2001), depressed mood, and low self-esteem (Paxton, Neumark-Sztainer, Hannan, & Eisenberg, 2006). Research suggests that body dissatisfaction is exhibited at dangerously high rates by adolescents of both sexes (Griffiths et al., 2016; Neumark-Sztainer, Paxton, Hannan, Haines, & Story, 2006). Due to its role as a potent risk factor for problematic eating behavior and ultimately ED development, BD represents an important intervention target for adolescent-focused preventive interventions..

The Theory of Cognitive Dissonance

Within the ED preventive intervention context, programs based in the theory of cognitive dissonance are some of the most well-validated and effective methods of reducing subclinical disordered eating behaviors, thin-ideal internalization, and BD, and ultimately preventing clinical EDs. Originally posited by Festinger (1962), the theory of cognitive dissonance (CD) suggests

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that when an individual acts in a way that contradicts their beliefs, an internal state of discomfort is generated. This internal discomfort, classified as dissonance, typically motivates the individual to implement a reduction strategy or change their beliefs to align with their actions. The precise definition of dissonance, however, has been debated for decades. While Festinger (1962) explicitly recognized dissonance as a psychological discomfort generated from misaligned cognitions and actions, he also alluded to CD manifesting as a drive-like state of arousal.

The majority of empirical research has explored dissonance as a state of arousal (Brehm & Cohen, 1962; Pallak & Pittman, 1972) likening the construct to experiences of tension or a particular drive such as hunger (Croyle & Cooper, 1983). Data utilizing both self-report (Elliot & Devine, 1994) and physiological measures (Elkin & Leippe, 1986; Losch & Cacioppo, 1990) supports the conceptualization of CD as invoking feelings of unpleasantness, holding arousal properties (see review by Fazio & Cooper, 1983; Zanna & Cooper, 1974), and influencing one's attitudes and performance. Additionally, research indicates that dissonance reduction may occur through either (1) misattribution or (2) adoption of a reduction strategy. Derived from the Schachter and Singer (1962) two-factor theory, the misattribution approach explains that dissonance is reduced following one's misattribution of their affective discomfort to some other source (Fried & Aronson, 1995; Zanna & Cooper, 1974). This conceptualization characterizes dissonance as an arousal state that is amenable to various cognitive labels. Alternatively, the reduction strategy approach explains that an individual's aversive experience provides motivation to seek and implement a reduction strategy to avoid the negative affective experience (Elliot & Devine, 1994; Losch & Cacioppo, 1990) rather than the tension originally theorized by Festinger.

In consideration of cumulative evidence, ED preventive interventions have utilized the experience of CD and associated motivation for reduction strategies to instigate behavior change, reducing the experience of ED risk factors. CD-based preventive interventions show superior efficacy and effectiveness in reducing ED risk factors, and successive ED development, compared to other theoretical models of eating disorder risk reduction (see reviews by Becker & Stice, 2017; Stice, Shaw, & Marti, 2007). Therefore, CD-based preventive interventions provide a well-supported framework through which adolescents of both sexes may benefit and experience reduction in ED risk factors, such as subclinical disordered eating behavior, ideal internalization, and body dissatisfaction. The *Body Project* represents one such CD-based ED preventive intervention.

The Body Project

The Body Project (BP) is the most well-validated and empirically supported CD-based ED prevention program to date (Becker & Stice, 2017; Cruwys, Haslam, Fox, & McMahon, 2015; Stice, Marti, Spoor, Presnell, & Shaw, 2008; Stice, Rohde, Shaw, & Gau, 2011; Stice et al., 2007). Through a number of verbal, written, and behavioral activities, the BP program utilizes CD inductions that lead participants to change their attitudes, beliefs, and behaviors in order to restore cognitive consistency (Eisenstadt & Leippe, 1994; Hinojosa, Gardner, Walker, Cogliser, & Gullifor, 2017). Based on etiologic data that reduction in thin-ideal internalization leads to decreases in the experience of ED risk factors (e.g., BD and dieting; Stice, 2001; Stice, Mazotti, et al., 2000; Thompson, Heinberg, Altabe, & Tantleff-Dunn, 1999), BP activities encourage participants to voluntarily and critically speak and act against society's thin-ideal standard of beauty (Stice et al., 2001; Stice, Trost, & Chase, 2003). Written and behavioral activities draw from the strategic self-presentation and social inoculation interventions in which

role-plays produce attitude and behavior change (Killen, 1985; Stice et al., 2001). A key component to the BP program is participants' voluntariness to take a stand against society's thin-ideal body standard as a means to reconcile their discomfort with personal pro-thin-ideal beliefs and shift their belief system to align with their behavior within the intervention setting. This cognitive shift thus reduces participants' adherence to the thin-ideal standard and their experience of associated ED risk factors (e.g., BD and disordered eating behavior).

As is seen with the majority of ED preventive interventions, the BP program has traditionally been focused on ED risk factor reductions in female populations (Becker, Smith, & Ciao, 2005; Mitchell, Mazzeo, Rausch, & Cooke, 2007; Stice, Shaw, Burton, & Wade, 2006a). Indeed, BP originally was designed to target at-risk females (Stice & Bearman, 2001; Stice, Mazotti, et al., 2000). Data suggest the BP program is efficacious (Stice, Mazotti, et al., 2000) and effective with both clinical (Stice et al., 2003) and community samples of adolescent girls (Stice et al., 2011). Specifically, efficacy trials indicate that female adolescents in dissonance-based interventions show greater and more persistent reductions in ED risk factors, ED symptomatology, functional impairment, and future onset of EDs over a 3-year follow up compared to controls (Stice et al., 2008; Stice, Mazotti, et al., 2000). Effectiveness trials with high school females show similar reductions in BD and ED symptomatology at two and three-year follow up (Stice et al., 2011).

In addition to clinical trials, the BP program has shown to be successful via a number of delivery methods and across diverse settings. Utilizing the train-the-trainer (TTT) approach (Herschell, Kolko, Baumann, & Davis, 2010; Wilson & Zandberg, 2012) and task-shifting, whereby undergraduates were trained-to-train other students in the delivery of the BP (Kilpela et al., 2014), data indicate the BP program retains efficacy and effectiveness with undergraduate

females (i.e., reductions in ED risk factors) when led by undergraduate peer facilitators (Becker, Bull, Schaumberg, Cauble, & Franco, 2008; Becker, Smith, & Ciao, 2006). Similarly, key community stakeholders including the Dove Self Esteem Project and World Association of Girl Guides and Girl Scouts (WAGGGS) have successfully disseminated the BP program on a global scale. Collectively, these organizations have advanced global dissemination of the BP program, through the Eating Recovery Foundation, Comenzar de Nuevo in Latin America, the National Eating Disorders Association, and as WAGGGS' *Free Being Me Program* (Becker, Perez, et al., 2017).

In addition to success in university and community organizational settings, research on effective female-focused ED preventive interventions has demonstrated that school-based settings are most favorable (Ben-Tovim, 2003; Berger, Sowa, Bormann, Brix, & Strauss, 2008), with increased accessibility to community samples and reduction in implementation costs. In consideration of the successful dissemination efforts and subsequent beneficial effects of the BP program with adolescent girls (Stice et al., 2008; Wilksch, 2015; Wilksch & Wade, 2014), a research gap remains in establishing the applicability of the BP program to adolescent boys in community settings.

As an initial step, the BP program has established promising efficacy in its modification and application to both undergraduate (Jankowski et al., 2017; Kilpela et al., 2016) and young adult males (Brown, Forney, Pinner, & Keel, 2017; Brown & Keel, 2015). Within both collegiate and community samples, male participants show significant decreases in BD and disordered eating behaviors compared to waitlist controls. This preliminary work supports the potential applicability of the BP program to adolescent boys, whereby disordered eating behavior and ED risk factors may be effectively targeted.

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Sex Differences

Although adolescent boys consistently report lower levels of disordered eating behaviors compared to girls (e.g., dieting; Furnham, Badmin, & Sneade, 2002; Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011; Tiggemann & Pennington, 1990), the presence of these attitudes and behaviors remain problematic. Longitudinal data from community samples indicate males partake in both problematic dieting behavior (25%) and unhealthy weight control behaviors (~33%) through adolescence and into young adulthood, while approximately 50% of females report participating in the same behaviors (Neumark-Sztainer et al., 2011). Despite prevalence rates of disordered eating behaviors in females reaching epidemic proportions (French et al., 1997; Rohde et al., 2015; Story, French, Resnick, & Blum, 1995), research suggests the disordered eating behaviors exhibited by males, albeit less, also require attention. For males, sub-clinical disordered eating behavior typically begins at younger ages (e.g., 10-14 years; Micali, Hagberg, Petersen, & Treasure, 2013) than is seen in females (15-19 years; Micali et al., 2013; Stice & Agras, 1998), underscoring the need for early, male-focused preventive intervention.

Consistent with the sex differences seen in disordered eating behaviors, data suggest males and females also experience internalization of societal body ideals and subsequent body dissatisfaction differently. For males, the body ideal emphasizes muscularity, leanness, and overall body shape (e.g., defined upper body and v-shaped torso; McFarland & Petrie, 2012; Thompson & Cafri, 2007; Tiggemann, Martins, & Churchett, 2008), whereas the female ideal focuses on thinness, low body fat, and an overall toned physique (Ahern, Bennett, Kelly, & Hetherington, 2011; Thompson et al., 1999). Social pressures demanding adherence to body ideals, commonly referred to as the "muscular-ideal" and the "thin-ideal" (Thompson, Schaefer,

& Menzel, 2012) often lead individuals to internalize these unrealistic, socially-sanctioned standards (e.g., the tripartite model: Thompson et al., 1999). For males, meeting body ideal expectations requires a loss in total body weight and a simultaneous increase in muscle mass (Cafri, van den Berg, & Thompson, 2006). Research suggests that body ideal internalization by both males and females often leads to body dissatisfaction, the most potent modifiable ED risk factor among males and females (Jacobi & Fittig, 2010; Kruger, Lee, Ainsworth, & Macera, 2008; Thompson et al., 2012). Although levels of internalization are lower in adolescent male populations compared to females (Jones, Vigfusdottir, & Lee, 2004), the sex-specific experience of ideal internalization must be addressed in preventive interventions. Additionally, the subsequent body dissatisfaction seen in both sexes requires intervention consideration.

Observed mean level differences in body dissatisfaction between adolescent boys and girls (Furnham & Calnan, 1998; Silberstein, Striegel-Moore, Timko, & Rodin, 1988) partially may be explained by the nature and experience of body dissatisfaction across sexes. Typically, females largely are focused on conforming to the thin-ideal standard of beauty and are more likely to judge themselves as being overweight, whereas males are more likely to perceive themselves as underweight (Furnham & Calnan, 1998; Silberstein et al., 1988). Therefore, perception of being "underweight" is experienced differently by both sexes, with females typically viewing an underweight status as favorable and males perceiving an underweight status as unfavorable (Furnham et al., 2002). In contrast to females, the desire to develop muscle represents a primary issue in male populations (Fisher, Dunn, & Thompson, 2002) that is associated with body dissatisfaction (Smolak et al., 2001). In culmination, the differential presentations of body ideal internalization and associated body dissatisfaction across sexes highlight the potential need for sex-specific preventive interventions.

Mixed-Sex Implementation

While sex-specific interventions may provide the best framework to effectively target disordered eating behaviors and ED risk factors in adolescent populations, community stakeholders' requests, feasibility concerns, and past research suggest that mixed-sex group implementation deserves investigation. Community stakeholders in collegiate and high school settings have increasingly requested body image interventions that can concurrently meet the needs of males and females (Becker, Perez, et al., 2017; Kilpela et al., 2016). Similarly, mixed-sex groups may represent the most feasible implementation method, with many high school settings representing shared environments in which boys and girls co-exist in both social interactions and classroom learning. Data also indicate that males play a critical role in perpetuating female societal body and beauty-ideals by performing behaviors and making statements related to feminine attractiveness (Levine & Smolak, 2006; Levine, Smolak, & Hayden, 1994). Investigators posit that the inclusion of males in interventions that combat sociocultural appearance pressures toward females may decrease this behavior (Levine et al., 1994) and thereby decrease the negative effects of body-ideal internalization and body dissatisfaction in females. Similarly, understanding the female experience of sociocultural appearance pressures may be equally important for males, suggesting that mixed-sex implementation may be most effective for male ED risk reduction. While recent research with both college (Rohde, Desjardins, Arigo, Shaw, & Stice, 2018) and middle school (Wilksch et al., 2015) samples suggests that mixed-gender implementation is effective in reducing ED risk factors in both males and females (e.g., body dissatisfaction), implementation of mixed-sex preventive interventions in high school settings has not been investigated. Therefore, mixed-sex BP intervention groups may provide an additional method to effectively target ED risk factors in

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males during the high-risk time of early adolescence. Based on existing work with mixed-sex groups (Kilpela et al., 2016), understanding the female experience of sociocultural body pressures may be essential to male ED risk factor reduction. Therefore, as has been seen with the implementation of the BP program with collegiate males, adolescent males may show greater improvement in mixed-sex groups compared to male-only. Alternatively, the traditional female-only BP is supported as an effective ED risk reduction method by a large body of literature (Rohde et al., 2015; Stice, Rohde, Shaw, & Gau, 2017; Stice et al., 2006a). Therefore, while mixed-sex implementation may result in ED risk reduction for females, research indicates that equivalent effects across female-only and mixed-sex are less likely (Kilpela et al., 2016).

Acceptability

While determining treatment effectiveness is essential, treatment acceptability provides a framework through which attitudes about interventions can be assessed and may facilitate future implementation of effective preventive efforts. Specifically, acceptability represents the degree to which individuals judge an intervention as appropriate, fair, and reasonable for the given problem or group (Kazdin, 1981). For school-based ED preventive interventions, treatment acceptability is especially important as difficulties with implementation increase when the intervention is deemed inappropriate or unreasonable by parents, schools, or participating students. Acceptability research suggests that treatments regarded as acceptable are more likely to have continued implementation (Elliott, 1988), a higher likelihood of being implemented with fidelity (Pisecco, Huzinec, & Curtis, 2001), and higher participant compliance (Reimers, Wacker, Cooper, & de Raad, 1992) when compared to treatments rated as less acceptable. Therefore, assessment of treatment acceptability for ED preventive interventions is necessary to not only optimize effectiveness, but also future implementation efforts, fidelity, and participant

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compliance. Unfortunately, acceptability is rarely examined in ED preventive intervention studies. One survey-based acceptability study found that females rated ED preventive interventions significantly higher than their male counterparts (Varnado-Sullivan & Horton, 2006). Additionally, results of a school-based obesity prevention program indicate that girls rated high acceptability and preference for all-girls physical education classes (Neumark-Sztainer, Story, Hannan, & Rex, 2003) compared to mixed-sex classes. Collectively, these findings suggest that girls may be more amenable to interventions focused on EDs and weight, which may have implications for whether same-sex or mixed-sex groups are rated as more acceptable by adolescents of either sex.

Current Study

To better understand the applicability of the *Body Project* program to adolescent populations through both sex-specific and mixed-sex interventions, the current study sought to compare ED risk factor reduction across three BP interventions (i.e., female-only, male-only, and mixed-sex) to a minimal attention control condition in a community sample of adolescent boys and girls. The *Body Project 4 High Schools* (*BP4HS*) program used existing relationships with schools to recruit, implement, and disseminate the modified version of the *Body Project* program to adolescent boys and girls. Based on previous literature, it was hypothesized that: (1) BP intervention conditions would perform better than minimal attention control (AC) across sexes such that (a) girls in female-only groups would show greater increases in body satisfaction as well as reductions in thin-ideal internalization, ED symptom count, and psychosocial impairment compared to girls in AC; (b) boys in male-only groups would show greater increases in body satisfaction and reductions in ED symptom count and psychosocial impairment compared to boys in AC; and (c) boys and girls in mixed-sex groups would show greater improvement on

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variables of interest compared to participants in AC; (2) effects of condition would vary across sexes such that (a) girls in female-only would show greater increases in body satisfaction as well as reductions in thin-ideal internalization, ED symptom count, and psychosocial impairment compared to those in mixed-sex; and (b) boys in mixed-sex would show greater increases in body satisfaction and reductions in ED symptom count and psychosocial impairment compared to those in male-only; and (3) acceptability of the program would vary across sex such that (a) girls would report higher acceptability ratings than boys; (b) girls in female-only would report higher acceptability compared to mixed-sex; and (c) boys would report higher acceptability in mixed-sex compared to male-only.

METHOD

Participants and Procedures

The study received approval from the Trinity University Institutional Review Board and all high school campus authorities. Adolescent students at three south Texas high schools participated in the study. A total of 182 individuals participated; 59% were female ($n = 107$) and ranged in age from 13 to 19 years ($M = 15.95$; $SD = 1.40$) at baseline. A total of 6 participants did not provide age and sex data. As recommended by the CDC, BMI percentiles were calculated based on participant age and sex and utilized to determine the proportion of participants with an underweight (less than 5th BMI percentile), healthy (between the 5th and 85th percentiles), overweight (between the 85th and 95th percentiles), and obese (greater than the 95th percentile; Mei et al., 2002) weight status. The majority of participants reported having a healthy weight status (46%; 47.6% female/44% male). A total of 2.7% met criteria for an underweight status (2.8% female/2.6% male), 12.6% met criteria for overweight status (14% female/10.6% male), and 14.2% met criteria for obese weight status (10.3% female/22.6% male). Due to the substantial proportion of adolescents meeting criteria for overweight/obesity (26.8%), standardized BMI z-scores as recommended by the CDC were calculated for inclusion in analyses. Of the total sample, 25% did not report one or a combination of height and weight prohibiting the calculation of BMI percentile or BMI z-score by age. Participants were instructed to indicate all racial and ethnic groups with which they identified. Two participants did not provide racial identification data. Nineteen (19.6%) identified as Caucasian, 17.4% as African

American or Black, 32.6% Hispanic, 4.3% Asian, 25% Other or Mixed (i.e., combination of two or more racial/ethnic groups).

Overview and Participant Flow

Recruitment for the study involved a layered procedure. The primary investigator (PI) first recruited three high schools to participate in the program. The particular recruitment strategy adapted for each campus was dependent on school size and therefore varied across implementation sites. Larger schools (e.g., population 4,000+ students) required approval from school district directors, while middle size (e.g., approximately 1,600 students) and smaller (e.g., approximately 80 students) schools required approval from campus wellness and guidance counselors. In alignment with Berger et al. (2008) guidelines for successful ED prevention program implementation, the *Body Project 4 High Schools* (*BP4HS*) program was offered to all high school students at each implementation site. The majority of students reported ages at or above 15 years. Still, program participation was offered to those under of the age of 15 in order to aid in the prevention of the development of EDs that commonly present between the ages of 10-18 (Micali et al., 2013; Stice & Agras, 1998; Stice et al., 2007), and to increase feasibility of scheduling the program into existing campus frameworks.

Student participants were recruited through announcements in classes (e.g., athletic, art, and English classes) and club meetings (e.g., anime and video gaming club), and campus advertisements (e.g., flyers, posters, and online social media forums). Implementation of *BP4HS* with adolescents required a layered consent process to limit feelings of coercion within this vulnerable population. First, parental consent was obtained from a guardian or parent prior to the completion of baseline assessment questionnaires. Interested students were not permitted to attend *BP4HS* group sessions or complete the voluntary questionnaire without written parental

consent. Parental consent was required for all students regardless of being 18 years or older due to IRB requirements and school policies. Second, written student assent was obtained prior to the start of session one or completion of the baseline questionnaire.

Students who showed interest in participating in *BP4HS* were given the choice to participate in either a single-sex or mixed-sex group format. A total of 48 girls chose to participate in female-only (FO) group sessions and 32 chose to participate in mixed-sex (MS) group sessions. A total of 17 boys chose to participate in male-only (MO) groups and 26 chose to participate in MS group sessions. Of the girls participating, 96% in FO groups, 100% in MS groups, and 100% in minimal attention control (AC) completed baseline assessments. Of the boys participating, 100% in MO groups, 100% in MS groups, and 100% in AC completed baseline assessments. Regarding retention, 88% of girls in FO groups, 75% in MS, and 96% in AC completed post-intervention assessments. In terms of boys, 88% in MO groups, 87% in MS, and 84% in AC completed post-intervention assessments.

Participants completed a self-report questionnaire before the start of session one and after completion of the last session (either session 4 or 6 depending on version implemented at the particular school). No other data were collected from the participants. Participants in all conditions received positive body image bumper stickers, *BP4HS* pens, and *BP4HS* stick-on pocket squares at post-intervention assessments. Healthy snacks (e.g., tangerines and apples) and candy were provided at each *BP4HS* session.

Minimal Attention Control

Participants assigned to the minimal attention control (AC) condition completed baseline and six-week (post-test) assessments. School administration and teachers determined AC condition assignments; classes selected for the AC condition were health and psychology classes.

Following assessment administration, the PI and a post-baccalaureate research assistant (RA) conducted a presentation on Photoshop techniques used in the media. The choice of AC activity was modeled after past *Body Project* studies (Stice, Rohde, Durant, Shaw, & Wade, 2013). AC condition participants were offered the opportunity to participate in the program following completion of post-test assessments.

Interventions

The *Body Project 4 High Schools* intervention consisted of either four, 1-hour or six, 45-minute small-group sessions delivered by 1-3 facilitators (post-baccalaureate and undergraduate RAs or school counselors) scheduled approximately 1 week apart. The three variants of *BP4HS* were identical in terms of program length (~6 hours), format (discussion-based and interactive), and application of cognitive dissonance activities. To maintain the essential component of participant CD, the *BP4HS* program retained the traditionally interactive format implemented in the original *BP* program. In terms of facilitation, mixed-sex (MS) groups utilized both male and female facilitators (with at least one male facilitator and one female facilitator per group), female-only (FO) utilized only female facilitators (PI, RA, and/or school counselor), and male-only (MO) utilized a mixture of male and female facilitators, as the number of male facilitators was limited (e.g., 2 RAs and 1 teacher). Each MO group that utilized a female facilitator was always accompanied by at least one male facilitator. Program activities were similar in all intervention conditions, and content differed in regards to sex-specific examples on body ideals and role-plays. For instance, MS and MO groups utilized examples specific to the male-focused muscular-ideal rather than the thin-ideal standard of beauty typically associated with girls.

Female-Only Intervention

The FO intervention was implemented in a 4- or 6-session format. The school implementation site determined number of sessions. The first, and each following session, began by obtaining verbal assent from each participant concerning their willingness to actively participate in the session. Following verbal assent, the sessions collectively included: (1) defining the female appearance-ideal through a participant-generated list of attributes and contrasting the appearance-ideal list with the healthy-ideal; (2) reviewing the origins of the female appearance-ideal and ways in which society maintains this standard of beauty (e.g., through social media advertisements and image alteration such as Photoshop); (3) creating participant-generated lists of the costs associated with pursing the appearance-ideal (e.g., money or loss of friendships and life experiences); (4) participating in role play exercises to discourage pursuit of and adherence to the appearance-ideal; (5) creating a top-10 list of ways to battle the appearance-ideal at the individual level (i.e., stop subscribing to magazines or following social media accounts that endorse the appearance-ideal); (6) identifying future pressures to pursue the appearance-ideal and ways to combat these pressures (e.g., feeling pressure to lose weight before graduation because pictures will be taken and instead concentrating on your health and the accomplishment of graduating); (7) discussion of the benefits of body acceptance; and (8) verbally committing to between-meeting exercises, including (a) writing a letter to a younger girl about the costs associated with pursuing the appearance-ideal, (b) two mirror exposures, (c) a behavioral challenge to engage in a behavior participants normally avoided due to concerns about their body, (d) participating in two forms of body activism representing things they could avoid, say, do, or learn to fight the social pressures of the appearance-ideal, (e) writing a short paragraph on the ways in which the mass media promotes the appearance-ideal, and (f) writing a

letter to their younger self about ways to avoid developing body image concerns (see www.bodyprojectsupport.org for scripts). All home exercises were read aloud by the participant or discussed as a group to induce CD (e.g., letters to a younger self were read aloud in their entirety by each participant; see www.bodyproject4hs.com).

Male-Only Intervention

The order, approximate time allotment, and format of the MO intervention mirrored those of the FO intervention. Again, implementation of the 4- or 6-session program was determined by school site. To modify the FO scripts for applicability to male populations, the PI and two undergraduate RAs conducted a male focus group with male undergraduate volunteers to seek opinions regarding the relevancy of materials to male populations (see Kilpela et al., 2016). Focus group participants suggested modifications to BP activities (e.g., behavioral challenge activity including an example of wearing a tank top that exposes their arms while working out in the gym), language (e.g., body talk statements including references to scrawny arms or lacking a v-cut in the lower abdomen), and examples for each activity and home exercise (e.g., refraining from or calling out body talk in the gym and not being able to find shoes that were large enough in stores). Three male RA's contributed additional examples to complete the MO scripts. The MO groups defined only the male appearance-ideal (muscular-ideal). Additionally, role-play exercises, mirror exposure examples, ways to battle the appearance-ideal, body activism examples, and body talk examples were adapted to be male-specific or come from a male perspective. A male-specific body talk example statement is "I was thinking of going on an all protein no carb diet, ladies love muscle."

Mixed-Sex Intervention

The MG intervention maintained all activities in the same order, approximate time allotment, and format as the FO and MO interventions. Again, the school site determined number of *BP4HS* sessions implemented for each group. Similar to the modifications made to the MO materials, all MS activities, scripts, and handouts were modified to include examples from both male and female perspectives. Male examples were based on the feedback received from the undergraduate, male focus group and three male RAs. The MS groups collectively defined both the thin-ideal for females and muscular-ideal for males, which were termed the "cultural appearance-ideals" for both sexes. Discussions naturally included both sexes' perspectives during activities, in which participants identified personal examples (e.g., behavioral challenge exercises, writing letters, future pressures to conform to the appearance-ideals, etc.).

Facilitators and Facilitator Trainings

Prior to the design of the study, the PI and undergraduate RAs had extensive experience in facilitating and training of facilitators in the *Body Project* intervention implemented with undergraduate populations (Kilpela et al., 2016). The PI and/or trained and experienced RA facilitators led all *BP4HS* intervention groups at the smaller school sites. At the largest school site (4,000+ students), 10 school guidance counselors and one male teacher volunteered to participate in *BP4HS* facilitator training sessions. School counselor and teacher facilitator volunteers self-screened for substantial body image concerns and/or disordered eating behaviors because they would model appropriate behavior for *BP4HS* participants and such behaviors would conflict with the program message. This method of self-screening has been utilized in previous *BP* research (Becker et al., 2005, 2006; Kilpela et al., 2016) with no evidence of significant problems or detriment to program efficacy. Facilitator trainings were structured

identically for all three *BP4HS* interventions, utilizing the facilitator-training format described in past research (Becker et al., 2005, 2006; Kilpela et al., 2014). Training sessions involved two, approximately 4-hour intensive experimental training sessions, one training session for each half (i.e., first three sessions) of the *BP4HS* program. Greif, Becker, and Hildebrandt (2015) found that 5-month outcomes remained similar for the two-day intensive training when compared to more controlled *BP* trials among female participants. At the training group sessions, facilitators received the intervention manuals (e.g., 4- and 6-session) and were separated into teams of 3-4 leaders. Then, the facilitators rotated taking turns leading an abbreviated version of each session of *BP4HS*, while the other facilitators acted as participants to simulate a *BP4HS* group session. The repetition also allows for increased familiarity with the script and ensures each facilitator has adequate, and appropriate, personal examples to use when facilitating group sessions with students. Each facilitator experienced leading each session at least once during the training sessions. Eleven school counselor or teacher facilitators completed 4-hour intensive training. To evaluate facilitator adherence, trained undergraduate RAs reviewed 25% of *BP4HS* intervention session audio recordings. All rated sessions evidenced high adherence to *BP4HS* scripts and procedures.

Measures

  Demographics. Demographics data including age, sex, race/ethnicity, athlete identification, height and weight, were collected via self-report. Although self-reported height and weight is not optimal, research indicates a high agreement between self-reported and objectively measured height and weight (Himes, Hannan, Wall, & Neumark-Sztainer, 2005).

  Body Mass Index. Participants self-reported height and weight at baseline. Participant weight status was calculated using BMI percentiles as recommended by the CDC for children

and adolescents aged 2-20 years old (Mei et al., 2002), indicating the proportion of participants with underweight (less than the 5th BMI percentile based on both age and sex), healthy (between the 5th and 85th percentiles), overweight (between the 85th and 95th percentiles), and obese (greater than 95th percentile) weight status. Due to the substantial proportion of adolescents meeting criteria for overweight/obesity (26.8%), BMI z-scores as recommended by the CDC were calculated for inclusion in analyses. Additionally, BMI z-scores are preferable to BMI percentiles for comparing between-group means and estimate interpretability (Must & Anderson, 2006).

Thin-ideal Internalization. For girls, thin-ideal internalization was assessed using the Ideal Body Stereotype Scale-Revised (IBSS-R; Stice & Agras, 1998). The 8-item scale measures how participants have internalized a thin-ideal body image. A sample item is "Slim women are more attractive" with responses ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Items are averaged for a scale score, with higher scores indicating a greater degree of internalization of a thin-ideal body image. The IBSS-R has demonstrated good internal consistency in previous research with adolescent girls ($\alpha = .83$; Stice, 2001; Stice & Bearman, 2001), as well as in the current sample for girls ($\alpha = .90$).

Body Satisfaction. For girls, body satisfaction was assessed with the Body Parts Satisfaction Scale-Revised (BPSS-R; Petrie, Tripp, & Harvey, 2002). The 15-item scale measures satisfaction with specific body parts and 'overall satisfaction with size and shape' of the body on a six-point scale from 1 (*extremely dissatisfied*) to 6 (*extremely satisfied*). Items are averaged for a global score; higher scores indicate greater body satisfaction. An example item is "How satisfied are you at this moment with your height?" The BPSS-R demonstrated high internal consistency in past research with females ($\alpha = .88$; Kilpela et al., 2016) as well as in the

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current sample of girls (α =.92). For boys, body satisfaction was measured with the Body Parts

Satisfaction Scale for Men (BPSS-M; McFarland & Petrie, 2012). The 25-item scale reflects

satisfaction with leanness and muscularity as well as overall satisfaction with specific body parts.

A sample item is "current level of satisfaction with leanness of arms (e.g., biceps/triceps)" with

responses ranging from 1 (*extremely dissatisfied*) to 6 (*extremely satisfied*). Items are averaged to

obtain a global score; higher scores indicate greater body satisfaction. The BPSS-M

demonstrated high internal consistency in past research with young adult males (α = .96; Galli,

Petrie, Reel, Chatterton, & Baghurst, 2014) as well as in the current sample of boys (α = .97).

       Eating Disorder Symptoms. For both boys and girls, eating disorder symptomatology

was assessed using the Eating Disorder Diagnostic Scale – DSM-5 Version (EDDS-5; Stice,

2015). The EDDS-5 is a 23-item questionnaire that measures BMI, an ED symptom count, and

diagnoses for anorexia nervosa, bulimia nervosa, and binge eating disorder, low frequency

bulimia nervosa, low frequency binge eating disorder, purging disorder, and night eating

syndrome to fit the diagnostic changes in the DSM-5. An example item is "Over the past 3

months, have you felt fat." Symptom count scores are computed via the sum of all raw scores or

average of z-scores of all items when items are positively skewed; higher scores indicated greater

ED symptomatology. Although the scale has not yet been validated with adolescent populations,

the Eating Disorder Diagnostic Scale (Stice, Telch, & Rizvi, 2000) from which the EDDS-5 was

developed demonstrated high internal consistency in past research with adolescent boys (α = .96;

Flament et al., 2015) and girls (α = .82; Stice, Telch, et al., 2000). The current study utilized the

EDDS-5 over the EDDS-4 because certain items provide relevant examples for community-

based adolescents with limited exposure to disordered eating language. Specifically, item 4

provides an example of "an unusually large amount of food (e.g., a quart of ice cream)". When

compared to clinical interview, the EDDS-5 demonstrated good accuracy ranging from 0.87 to 0.93 for DSM-5 diagnoses (Sysko et al., 2015). The EDDS-5 has also shown excellent internal consistency with an adult, mixed-sex community sample (α = .91; Becker, Middlemass, Taylor, Johnson, & Gomez, 2017) and with undergraduate males (α = .86; Ahlich, Choquette, & Rancourt, 2018). The EDDS-5 showed low internal consistency in the current girl sample (α = .56) and boy sample (α = .58).

Psychosocial Impairment. For both boys and girls, impairment in key life activities secondary to concerns about eating, weight, or shape was assessed with the Clinical Impairment Assessment Questionnaire (CIAQ; Bohn et al., 2008). The CIAQ is a 16-item questionnaire and measures the severity of psychosocial impairment due to concerns about eating, weight, or shape focusing on the past 28 days. A sample item is "over the past 28 days, to what extent have your eating habits, exercising, or feeling about your eating, shape or weight made it difficult to concentrate" with responses ranging from 0 (*not at all*) to 3 (*a lot*). Items are summed to obtain a global impairment score, with higher ratings indicating a higher level of psychosocial impairment. The internal consistency of this scale has been established with both adolescent boys (α = .72; Schlüter, Schmidt, Kittel, Tetzlaff, & Hilbert, 2016) and girls (α = .91; Jenkins, 2013). The CIAQ demonstrated high internal consistency in the current boy (α = .93) and girl sample (α = 93).

Program Acceptability. A modified version of the acceptability subscale of the Usage Rating Profile-Intervention (URP-I; Chafouleas, Briesch, Riley-Tillman, & McCoach, 2009) was administered to assess participants' acceptability of the *BP4HS* program. Questions applicable to the aims of the current study were utilized and modified. A single question was added that asked participants the degree to which they would recommend the *BP4HS* program to their friends. The

full acceptability subscale has shown high internal consistency in previous research with school-based interventions ($\alpha = .95$; Briesch, Chafouleas, Neugebauer, & Riley-Tillman, 2013). The final measure consisted of 6-items with responses ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). A sample item is "*Body Project 4 High Schools* is reasonable for the problems such as body image concerns". The modified version of the URP-I showed good internal consistency in the current girl sample ($\alpha = .93$) and boy sample ($\alpha = .89$).

Data Analytic Strategy

Ignoring nesting, post-hoc power analyses were conducted in G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) utilizing the effect sizes for body satisfaction seen in previous literature (male-only vs. waitlist control: Brown et al., 2017; mixed-sex and female only vs. waitlist control: Kilpela et al., 2016; female-only vs. brochure control: Rohde et al., 2015). Results revealed a large effect size for female-only to attention control, small to medium effect for female-only compared to mixed-sex, large effect for girls in mixed-sex compared to attention control, and small effect for male-only to attention control (Table 1). With the current sample of girls (n = 107), there was high power to detect effects when comparing FO (n = 48) to AC (n = 27) and low power to detect effects when comparing females in FO (n = 48) to MS (n = 34). Given the small sample of boys in the current study (n = 75), there was extremely low power to detect sex effects.

All data analyses were performed using SPSS 24 (IBM, 2016). Descriptive statistics were examined using bivariate correlations (Table 2) and independent samples *t*-tests (Table 3).

To verify multilevel modeling was not warranted, the design effect was calculated. Literature on multilevel modeling indicates that if the design effect is less than 2, using single-level analysis (e.g., hierarchical linear regression) is appropriate (e.g., Muthen & Satorra, 1995).

Due to the small design effect of the current sample (Design Effect < 2), clusters were deemed independent and single-level analyses of hierarchical linear regression and generalized linear models were deemed most appropriate. Additionally, there were no significant differences on outcome variables at baseline across the three school campuses (see Table 4). Therefore, school was not included as a predictor in analyses.

Intervention effect hypotheses investigating participants' level of body satisfaction, thin-ideal internalization, and psychosocial impairment at Time 2 were assessed using step-wise linear regressions controlling for BMI z-score, age, and race/ethnicity (1 = Non-minority, 0 = Minority). Similarly, intervention effect hypotheses investigating participant's ED symptom count at Time 2 were assessed using generalized linear models. Predictor variables included pre-treatment scores, sex (1 = female, 0 = male) and five contrast-coded treatment variables (attention control [AC] to female-only [FO], AC to male-only [MO], AC to mixed-sex [MS], FO to MS, MO to MS). Given low power, effect sizes were calculated for continuous dependent variables and incident rate ratios were calculated for ED symptom count dependent variable.

Hypothesis 1: The hypothesis that the BP intervention conditions would perform better than AC across sex was examined through a series of hierarchical linear regressions and generalized linear models using a negative binomial distribution for count data. Hypothesis 1a and 1b, that FO (n = 48) participants would show greater increases in body satisfaction as well as reductions in thin-ideal internalization, ED symptom count, and psychosocial impairment compared to girls in AC (n = 27), and that MO (n = 17) participants would show greater increases in body satisfaction and reductions in ED symptom count and psychosocial impairment compared to AC (n = 32), both were examined as main effects of condition. Hypothesis 1c, that participants in MS (boys n = 26; girls n = 34) would show greater improvement in the

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aforementioned constructs compared to AC (boys n = 32; girls n = 27), would be reflected in main effects of condition and a Condition X Sex interaction effect for psychosocial impairment, estimating differences between groups across sex, since both the MS and AC included male and female participants.

Hypothesis 2: Examining main effects of condition in hierarchical linear regressions tested the hypothesis that effects of the BP intervention would vary across sex. Both hypothesis 2a, that girls in FO (n = 48) would show greater improvements in outcome variables of body satisfaction, thin-ideal internalization, ED symptom, and psychosocial impairment compared to MS (n = 34), and 2b, that boys in MS (n = 26) would show greater improvement in outcome variables of body satisfaction, ED symptom count, and psychosocial impairment compared to MO (n = 17), were tested through main effects of condition.

Hypothesis 3: Hypothesis three, that acceptability of the program across all treatment groups would vary across sex such that girls would report higher acceptability ratings than boys was examined through a linear regression with sex (1 = female, 0 = male) as the predictor variable and acceptability as the outcome variable. If sex significantly predicted acceptability ratings at Time 2, hypotheses 3a (girls in FO (*n* = 48) would report higher acceptability compared to MS (*n* = 34)) and 3b (boys would report higher acceptability in MS (*n* = 26) compared to MO (*n* = 17)) would be examined through two separate main effects of condition.

RESULTS

Descriptive Statistics

The zero-order correlations, means, and standard deviations of all relevant variables are presented in Tables 1 and 2, respectively. Results indicated that boys and girls did not significantly differ in their BMI z-scores, $t(178) = -0.61$, $p = .545$ at baseline. Girls were significantly younger and reported significantly more ED symptoms and higher psychosocial impairment than boys (see Table 3). Baseline scores of body dissatisfaction and thin-ideal internalization could not be compared, as measures were sex-specific. At baseline, participants showed significant differences in ED symptom count, age, sex, and Race/Ethnicity across conditions (see Table 5). Due to concerns with low power to detect main effects of condition, Cohen's d and the incidence rate ratios were calculated for each group and each ED risk factor outcome to assess change from pre- to post-intervention (Table 6).

Hypothesis 1a: Female-Only Body Project Group vs. Attention Control.

Body satisfaction. For girls' body satisfaction, there was a significant main effect of condition ($\Delta R^2 = .105$, $p = .002$, b = .55). Compared to attention control, girls in the female-only condition showed greater increases in body satisfaction from pre-intervention to post-intervention ($p = .002$). Additionally, higher pre-intervention scores (b = .60, $p < .001$) were associated with higher levels of body satisfaction at post-intervention. For girls' body satisfaction, female-only evidenced a medium effect ($d = .70$), versus a minimal effect in attention control ($d = .13$) from pre- to post-intervention.

Thin-ideal internalization. For girls, higher pre-intervention scores (b = .62, *p* < .001) were associated with higher levels of thin-ideal internalization at post-intervention. No significant main effect of condition emerged when comparing attention control to female-only. Female-only showed a medium effect (*d* = .54), versus a minimal effect in attention control (*d* = .14) from pre- to post-intervention.

Eating disorder symptoms. For girls' eating disorder symptom count, the omnibus model was not significant, therefore estimates were not interpreted. Incident rate ratios indicated that compared to AC, girls in FO showed a 6% increase in rate of ED symptom report at post-intervention (*Exp(b)* = 1.06, 95% CI [.60, 1.86]).

Psychosocial impairment. For girls, minority status (b = 3.74, *p* = .024) and higher scores at pre-intervention (b = .50, *p* < .001) were associated with higher scores at post-intervention. No significant main effect of condition emerged when comparing attention control to female-only. Female-only showed a small to medium effect (*d* = .40), versus a minimal effect in attention control (*d* = .16) from pre- to post-intervention.

Consistent with hypotheses, compared to attention control, girls in the female-only groups showed greater improvement in body satisfaction from pre- to post-intervention. Contrary to hypotheses, there was no significant difference in girls' thin-ideal internalization, psychosocial impairment, or ED symptoms reduction across attention control and female-only groups (see Tables 7 and 8). Nonetheless, examination of effect sizes suggested greater effects across all outcomes for the FO compared to the AC group (Table 6).

Hypothesis 1b: Male-Only Body Project Group vs. Attention Control

Body Satisfaction. For boy's body satisfaction, higher pre-intervention scores (b = .80, *p* < .001) were associated with greater post-intervention scores. No significant main effect of

condition emerged when comparing attention control to male-only. Male-only showed a medium effect ($d = .60$), versus a minimal effect in attention control ($d = .08$) from pre- to post-intervention.

Eating disorder symptom count. For boys' eating disorder symptom count, the omnibus model was not significant, therefore estimates were not interpreted. Incident rate ratios indicated that compared to AC, boys in MO showed a 23% increase in rate of ED symptom report at post-intervention (1.23, 95% CI [.54, 2.77]).

Psychosocial impairment. For boy's psychosocial impairment, higher pre-intervention scores were associated with higher post-intervention scores ($b = .82, p < .001$). No significant main effect of condition emerged when comparing attention control to male-only. Male-only showed a small effect ($d = .14$), with a similarly small effect in attention control ($d = .12$) from pre- to post-intervention.

Contrary to hypotheses, boys in male-only groups and attention control did not show a significantly different change in body satisfaction, ED symptomatology, or psychosocial impairment (see Tables 7 and 8). However, larger effect sizes were observed for the male-only groups across all outcome variables (Table 6).

Hypothesis 1c: Mixed-Sex Body Project Group vs. Attention Control

Body satisfaction. For girls' body satisfaction, there was a significant main effect of condition ($\Delta R^2 = .247, p < .001, b = .95$) when comparing attention control to the mixed-sex group. Specifically, compared to girls in the attention control condition, girls in the mixed-sex condition showed greater improvement in body satisfaction ($p < .001$). Additionally, higher pre-intervention scores ($b = .41, p = .003$) were associated with higher post-intervention body

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satisfaction scores. Mixed-sex showed a large effect ($d = 1.27$) in increasing girls' body satisfaction from pre- to post-intervention.

For boys' body satisfaction, a significant main effect of condition emerged ($\Delta R^2 = .098$, $p < .001$, b = .62) when comparing attention control to mixed-sex. Specifically, compared to boys in attention control, boys in mixed-sex groups showed greater improvement in body satisfaction ($p = .006$). Additionally, higher pre-intervention scores (b = .78, $p < .001$) were associated with higher body satisfaction scores at post-intervention. Mixed-sex showed a medium effect ($d = .68$) in increasing boys' body satisfaction from pre- to post-intervention.

Thin-ideal internalization. For girls' thin-ideal internalization, higher pre-intervention scores were associated with higher post-intervention scores (b = .57, $p = .015$). No significant main effect of condition emerged when comparing attention control to mixed-sex. Mixed-sex evidenced a small to medium effect ($d = .47$) in decreasing girls' thin-ideal internalization from pre- to post-intervention.

Eating disorder symptom count. The omnibus model was not significant and estimates were not interpreted. Incident rate ratios indicated that compared to AC, boys and girls in MS showed a 25% increase in rate of ED symptom report at post-intervention (*Exp(b)* = 1.25, 95% CI [.63, 2.48]).

Psychosocial impairment. For girls' and boys' psychosocial impairment, higher pre-intervention scores were associated with higher post-intervention scores (b = .56, $p < .001$). No significant main effect of condition or condition by sex interaction emerged when comparing attention control to mixed-sex. Girls' mixed-sex evidenced a medium to large effect ($d = .79$) and boys' mixed-sex showed a small effect ($d = .18$) in decreasing psychosocial impairment from pre- to post-intervention.

Consistent with hypotheses, compared to attention control, girls and boys in mixed-sex groups showed greater improvement in body satisfaction from pre- to post-intervention. However, there were no main effects of condition for thin-ideal internalization, ED symptoms, or psychosocial impairment, suggesting that mixed-sex groups were not significantly better than no intervention at reducing these risk factors (see Tables 9 and 10). Of note, larger effect sizes were observed for mixed-sex groups across all outcome variables (Table 6).

Hypothesis 2a: Female-Only vs. Mixed-Sex Body Project Groups

Body satisfaction. For girls' body satisfaction, older age (b = .15, p = .047) and higher body satisfaction scores at pre-intervention (b = .40, p < .001) were associated with higher levels of post-intervention body satisfaction. No significant main effect of condition emerged when comparing girls in female-only to girls in mixed-sex groups. Female-only showed a medium effect (d = .70), versus a large effect in mixed-sex (d =1.27) from pre- to post-intervention.

Thin-ideal internalization. For girls' thin-ideal internalization, higher scores at pre-intervention were associated with higher scores at post-intervention (b = .51, p = .003). No significant main effect of condition emerged when comparing girls in female-only to girls in mixed-sex, suggesting that changes in thin-ideal internalization were not significantly different across the two intervention conditions. Female-only showed a medium effect (d = .54), versus a small to medium effect in mixed-sex (d = .47) from pre- to post-intervention.

Eating disorder symptom count. For girls' eating disorder symptom count, the omnibus model comparing female-only to mixed-sex was significant (χ^2 (4) = 10.41, p = .034). Higher BMI z-scores were associated with higher eating disorder symptom count at post-intervention (b = .40, p = .004). No main effect of condition emerged. Incident rate ratios indicated that

compared to FO, girls in MS showed a 8% increase in rate of ED symptom report at post-intervention ($Exp(b)$ = 1.08, 95% CI [.55, 2.13]).

Psychosocial impairment. For girls' psychosocial impairment, higher scores at pre-intervention were associated with higher scores at post-intervention (b = .36, p < .001). No significant main effect of condition emerged when comparing girls in female-only to girls in mixed-sex, suggesting that changes in psychosocial impairment were not significantly different across the two intervention conditions. Female-only showed a small effect (d = .40), versus a large effect in mixed-sex (d = .79) from pre- to post-intervention.

Contrary to hypotheses, girls' changes in body satisfaction, thin ideal internalization, ED symptoms, or psychosocial impairment were not significantly different across mixed-sex and female-only groups (see Tables 11 and 12). However, larger effect sizes were observed for the mixed-sex group compared to the female-only group for girls' body satisfaction and psychosocial impairment (Table 6).

Hypothesis 2b: Male-Only vs. Mixed-Sex Body Project Groups

Body satisfaction. For boys' body satisfaction, higher scores at pre-intervention (b = .61, p < .001) were associated with higher levels of body satisfaction at post-intervention. No significant main effect of condition emerged when comparing boys in male-only to boys in mixed-sex groups. Both the male-only (d = .60) and the mixed-sex groups (d = .68) showed medium effect sizes from pre- to post-intervention.

Eating disorder symptom count. For boys' eating disorder symptom count, the omnibus model comparing male-only to mixed-sex was significant (χ^2 (4) = 9.64, p = .047). Older age was associated with higher eating disorder symptom count at post-intervention (b = .45, p = .011). No main effect of condition emerged. Incident rate ratios indicated that compared to MO, boys in

MS showed a 6% increase in rate of ED symptom report at post-intervention ($Exp(b)$ = 1.06, 95% CI [.49, 2.28]).

Psychosocial impairment. No significant main effect of condition emerged when comparing boys in male-only to boys in mixed-sex, suggesting that changes in psychosocial impairment were not significantly different across the two intervention conditions. Male-only showed a small effect (d = .14), with a similarly small effect in mixed-sex (d =.18) from pre- to post-intervention.

Contrary to hypotheses, boys' changes in body satisfaction, ED symptom count, and psychosocial impairment was not statistically different across male-only and mixed-sex groups (see Tables 11 and 12). Additionally, effect sizes for all outcome measures were similar across male-only and mixed-sex groups (Table 6).

Hypothesis 3: Program Acceptability

Hypothesis three, that acceptability of the program across all treatment groups will vary by sex such that females will report higher acceptability ratings than males was not supported. Sex did not emerge as a significant predictor of acceptability ratings (b = 1.66, p = .162). Overall, girls and boys in intervention conditions reported high acceptability ratings (*M*'s > 31 out of possible 36 total rating), with girls reporting higher acceptability ratings in female-only groups and boys reporting higher acceptability in mixed-sex groups (see Table 13).

DISCUSSION

This study addressed a gap in the literature by examining the effectiveness of a single-sex and mixed-sex ED preventive intervention with adolescent boys and girls, incorporated into existing school systems, and delivered by low-cost providers without advanced degrees. For girls, both FO and MS showed improvement on body satisfaction compared to AC, while other risk factors were largely non-significant at post-intervention. Results also indicated that boys in MS improved compared to AC on body satisfaction, while other outcomes were non-significant. As seen in previous intervention literature (Jacobson & Truax, 1991; Stice, Becker, & Yokum, 2013), effect sizes were calculated to determine clinical and practical significance of each intervention condition. Larger effect sizes were observed for MS groups compared to FO, while, in general, comparable effect sizes were observed for MS compared to MO.

Over the past decade, researchers have called to reduce the burden of mental illness through an increase in feasible and scalable preventive interventions (Fairburn & Patel, 2014; Kazdin & Blase, 2011). Most often, evidence-based interventions are offered on a small scale, by high-cost providers, and rarely reach the large number of individuals who might benefit from services (Fairburn & Wilson, 2013). Therefore, the necessary increase in scalability is likely to result in a minor, but manageable, decrease in per person effectiveness (Kazdin & Blase, 2011). The current study provides one such example whereby a scale up in reach and feasibility may have resulted in a scale down on individual effect.

Consistent with BP intervention findings that traditional female-only groups reduce ED risk (Stice et al., 2008; Stice et al., 1998; Stice et al., 2011; Stice, Shaw, Burton, & Wade, 2006b); female-only *BP4HS* represented an effective approach to improving body satisfaction with the current sample of adolescent girls. Contrary to previous literature, girls in FO groups did not show significant decreases in thin-ideal internalization and ED symptom count compared to AC. Recent research suggests the magnitude of odds ratios, such as the incidence rate ratios reported for ED symptoms, can be interpreted as analogous to effect size magnitudes (Chen, Cohen, & Chen, 2010). Specifically, the incidence rate ratio for FO compared to AC indicates that FO may result in an extremely small effect (Cohen's $d < 0.2$) in ED symptom change. However, FO groups demonstrated medium effect sizes in all continuous outcome variables, suggesting that, with a larger sample, the modified *BP4HS* program may confer similar benefits to those seen in previous BP female-focused implementations on thin-ideal internalization reduction (Becker & Stice, 2017; Stice & Shaw, 2004). Similarly, medium effect sizes demonstrate that female-only *BP4HS* groups provide practical significance in reducing ED risk factors with community-based adolescent girls.

Still, limited thin-ideal internalization reduction may in part be due to the racial/ethnic diversity of the current sample (e.g., 79.9% minority; 17.4% African American/Black; 32.6% Hispanic or Latino). Specifically, data suggest that African American (Overstreet, Quinn, & Agocha, 2010; Poran, 2002) and Latino (Chamorro & Flores-Ortiz, 2000) cultures idealize larger and curvier, rather than thin, figures. Research also suggests that more curvaceous body ideals and ethnic identity may act as a protective factors against thin-ideal internalization (Warren, Gleaves, Cepeda-Benito, Fernandez, & Rodriguez-Ruiz, 2005). Therefore, thin-ideal

internalization reduction may have neither been culturally appropriate nor necessary for African American/Black and Latina participants.

Dissimilar to BP program adaptations with undergraduate males demonstrating decreases in a ED risk factors (e.g., body dissatisfaction and body-ideal internalization; Brown et al., 2017; Brown & Keel, 2015), boys in the MO *BP4HS* did not show significant improvement compared to AC. Similar to findings with FO, compared to AC, incidence rate ratios suggest that MO provides an extremely small effect (Cohen's $d < 0.2$) in ED symptom change (Chen et al., 2010). However, large effect sizes were observed for MO groups across all continuous outcome variables, suggesting that MO groups may confer clinically significant reduction in ED risk factors. Additionally, previous BP male-focused studies submitted drafts of the adapted program to members of the target population of males prior to intervention implementation (Brown et al., 2017; Brown & Keel, 2015). The current study may have benefitted from an initial focus group with high school boys in order to integrate feedback prior to implementation of the intervention, reducing the risk of presenting examples that did not resonate with adolescent boys. Therefore, in an effort to maximize CD induction, future studies of *BP4HS* should run adolescent focus groups prior to program implementation.

Importantly, neither intervention condition significantly influenced ED symptomatology in boys. Specifically, incidence rate ratios indicated that MO and MS both provided extremely small effects (Cohen's $d < 0.2$) in ED symptom change (Chen et al., 2010). This finding may partially be due to floor effects, which are commonly observed in studies of males participating in ED preventive interventions. Consistent with past body image literature on community-based samples (Neumark-Sztainer et al., 2006; Stice, Marti, et al., 2009), boys in the current sample showed low levels of ED symptomatology at baseline. A meta-analytic review by Stice and

Shaw (2004) indicates intervention effects are consistently and significantly larger for ED preventive programs focusing on females versus those that include males. Therefore, building upon the designs of successful male-focused BP interventions (Brown et al., 2017; Brown & Keel, 2015), future studies may benefit from assessing muscularity-orientated variables including muscle and body fat dissatisfaction (Male Body Attitudes Scale; Tylka, Bergeron, & Schwartz, 2005), drive for muscularity (Drive for Muscularity Scale; McCreary & Sasse, 2000), and muscle dysmorphia symptoms (Muscle Dysmorphia Disorder Inventory; Hildebrandt, Langenbucher, & Schlundt, 2004). Of note, MO and MS *BP4HS* groups evidenced medium effect sizes in body satisfaction increase from pre- to post-intervention ($d = .60$; $d = .68$), signaling that *BP4HS* may provide an effective option for ED preventive intervention with adolescent boys, even if it may not have addressed traditional eating disorder symptoms specifically.

Both boys and girls showed greater increases in body satisfaction when participating in MS groups, suggesting that the inclusion of both sexes in prevention groups may augment effects of group-based cognitive dissonance induction. For boys, these findings are consistent with the one mixed-sex BP trial with undergraduate males (Kilpela et al., 2016) and may partially be explained by two social psychology theories: 1) male sex role theory and 2) cross-sex communication theory. First, male sex role theory (Brannon & David, 1976) posits that the traditional male sex role requires boys and men to stigmatize emotional vulnerability, strive to be respected and admired, and keep intimate aspects of their personality private as to not appear weak. Therefore, boys in MO groups may have felt pressure to adhere to traditional male sex roles while in the presence of other boys. This adherence to traditional male sex roles often leads to less self-disclosure (Hacker, 1981; Henley, 1973; Jourard & Lasakow, 1958), limiting the likelihood of cognitive dissonance induction and subsequent ED risk factor reduction in MO

groups. Additionally, discussions about body, weight, and shape may be perceived as contrary to the male sex role (Hargreaves & Tiggemann, 2006), creating an additional barrier addressing ED risk factors in a MO group. Alternatively, cross-sex communications theories propose that when males participate in mixed-sex groups, they feel less fear and are more likely to be less adherent to traditional sex roles (Hacker, 1981). Data also indicate that males show differential interaction patterns when communicating in mixed-sex groups. Specifically, compared to those participating in male-only groups, males participating in mixed-sex groups tend to be more open about themselves and their feelings (Aries, 1976), show a greater willingness to listen, and present with less combative behavior (Piliavin & Martin, 1978). Therefore, when girls were in the room, boys participating in MS *BP4HS* groups may have been more willing to break traditional male sex roles by speaking about their body image concerns. For boys, this greater willingness to listen, participate, and be open may in a mixed-sex setting be an essential component to the cognitive dissonance induction necessary to improve body satisfaction.

Interestingly, the largest effect sizes were observed across all continuous outcome variables for girls in MS groups. As data indicate that males play a critical role in perpetuating female societal body and beauty-ideals by making statements related to feminine attractiveness (Levine & Smolak, 2006; Levine et al., 1994), it may also be true that females play a role in the perpetuation of male societal body-ideals. Therefore, the inclusion of males in traditionally female-focused interventions that combat sociocultural appearance pressures may be important in increasing girls' experience of body satisfaction, reducing girls' experience of other ED risk factors (e.g., body-ideal internalization and ED symptoms), and reducing girls' participation in behaviors and statements that promote societal body-ideals broadly. Consequently, while females may help to perpetuate male societal body-ideals, our data indicate that the presence of females

neither helps nor hinders males' improvement in ED risk factors. It is important to note, however, that girls and boys who were comfortable enough to participate in MS groups may in some way be different from those who preferred to participate in single-sex formats. While these characteristic differences were neither measured nor analyzed, future *BP4HS* implementations should investigate how participants choosing mixed-sex versus single-sex groups differ.

Design Considerations

As the current study represents an initial pilot study, a number of design limitations deserve consideration and should be addressed in future research on the BP program with mixed-sex adolescent populations.

Recruitment and Retention. First, previous male-focused BP interventions have benefitted from large samples (N = 112; Brown et al., 2017), increasing power to detect effects. Future studies of *BP4HS* should aim to recruit and retain more boys in order to have adequate power to detect effects. In order to recruit and retain more boys, continued collaboration with community stakeholders is essential. Previous BP research has maintained good retention rates by implementing the BP program within established stakeholder frameworks (e.g., student athlete organizations: Becker, McDaniel, Bull, Powell, & McIntyre, 2012; sororities: Kilpela et al., 2014). While the current study implemented the *BP4HS* program within existing school systems, further stakeholder commitment with team coaches and teachers may aid in participant recruitment and reduce attrition. Specifically, a call for continued engagement with community stakeholder communities by Becker, Perez, et al. (2017) suggests that stakeholder partnerships can be facilitated through task-shifting to lay providers. Future implementations of *BP4HS* may benefit from training coaches, along with school counselors, as BP facilitators to increase recruitment rates, participant accountability, retention, and scalability.

Similar to low recruitment of male participants, the current study had a small number of male facilitators. Future research may benefit from an increase in male facilitators whereby all male-only groups are facilitated by males rather than a mixture of males and females. Training coaches may provide one avenue to increase the number of male facilitators. Additionally, training coaches to facilitate *BP4HS* groups emphasizes traditional facets of community participatory research (CPR) by 1) acknowledging that communities consist of individual members who have a connection to the community, 2) building upon existing community strengths (e.g., cohesiveness, team structure, common goals), and 3) developing sustainability of a useful intervention (Israel, Schulz, Parker, & Becker, 1998). By approaching future *BP4HS* implementations through a CPR approach, the program may increase effectiveness by broadening the range of community stakeholders.

Study Design. In alignment with CPR approaches (Israel et al., 1998) and upon stakeholder requests, the current study integrated into existing school frameworks by implementing the *BP4HS* program as a choice intervention. Subsequently, the current quasi-experimental design did not allow for equal sample sizes across intervention and control groups, limiting the ability to compare across groups. Once stakeholder relationships are established, future research should recruit and retain equal sample sizes across groups. Similarly, due to the constraints of the current study (i.e., high school requirements of a presentation on Photoshop prior to baseline AC data collection) a matched attention control condition could not be implemented. Future trials may benefit from utilizing a matched attention control condition to limit unmeasured effects of attention on variables of interest.

Measurement. Issues with measurement surfaced predominate limitations of the current study. First, contrary to previous BP intervention studies (Stice et al., 2008; Stice et al., 1998;

Stice et al., 2011; Stice et al., 2006b) all intervention conditions showed limited reduction of female thin-ideal internalization. This lack of thin-ideal internalization reduction may be due to issues with measurement. Specifically, recent psychometric research (SATAQ-4R; Schaefer, Harriger, Heinberg, Soderberg, & Thompson, 2017) indicates that Ideal Body Stereotype Scale-Revised (IBSS-R; Stice & Agras, 1998) factor reflects appearance ideal *awareness* rather than thin-ideal *internalization*. Therefore, future research may benefit from utilizing the Sociocultural Attitudes Towards Appearance Questionaire-4R (SATAQ-4R; Thompson, Schaefer, & Dedrick, 2018) as a measure of thin-ideal *internalization* and be aware that the IBSS-R may represent a more appropriate measure of thin-ideal *awareness*. Correspondingly, the current study did not include a measure of body-ideal internalization for male participants. Recent male BP intervention research shows significant reductions in body-ideal internalization (e.g., Brown et al., 2017; Brown & Keel, 2015). Therefore, future male-only or mixed-sex *BP4HS* interventions should include a measure of body-ideal internalization to capture a more accurate understanding of ED risk factor reduction with adolescent boys. Additionally, while the EDDS-5 (Stice, 2015) shows good internal consistency with previous samples (Ahlich et al., 2018; Becker, Middlemass, et al., 2017), reliability was low in the current girl sample ($\alpha = .56$) and boy sample ($\alpha = .58$). A meta-analytic review by Stice and Shaw (2004) indicates that the use of unreliable measures may result in an underestimation of intervention effects. Designed as a diagnostic tool, the EDDS-5 accurately measures clinical levels of ED symptomatology. Therefore, the EDDS-5 may not have been positioned to detect intervention effects as the measure was not well suited or sensitive to the low levels of ED symptomatology seen in the current community sample of adolescents. Future *BP4HS* studies may benefit from using a measure that is more sensitive to the low levels of ED symptomatology seen in community-based samples. Specifically, the Eating

Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994) may be more appropriate for capturing subclinical levels of problematic disordered eating attitudes and behaviors. Lastly, given the high number of developmental changes that occur during adolescence, future studies should include measures of pubertal status, which may contribute to adolescents' body image.

Attrition. Finally, attrition both from before the start of the program and during the program may produce skewed results, as a notable percentage of participants consented, but did not participate or did not complete all *BP4HS* sessions. Reasons underlying attrition should be investigated and targeted in future trials. Anecdotally, students verbally reported a number of reasons they did not feel comfortable participating in *BP4HS* groups including: discomfort with discussing sensitive topics such as body image with classmates, fear that discussing body image concerns would provide "ammunition" for bullying or teasing, and trepidation that they may miss important class material while in *BP4HS* group sessions. Recent literature suggests that positive body image programming in after-school settings may be more effective than "convenient" school settings (Golan & Ahmad, 2018). Similarly, after-school programming may help to eliminate the participation barriers expressed by apprehensive students.

Implications

In contribution to existing BP trial data, the current study provides preliminary empirical evidence in support of the applicability of the well-established dissonance-based ED preventive intervention to adolescent girls and boys in mixed-sex, community-based settings. In alignment with previous research indicating that body dissatisfaction is the most potent modifiable risk factor in both males and females (Kruger et al., 2008; Tiggemann et al., 2008), the current mixed-sex implementation of the *Body Project* was successful in increasing body satisfaction in

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adolescents regardless of sex. Therefore, the current study builds upon exiting body image literature (Neumark-Sztainer et al., 2006; Stice, Marti, et al., 2009) and helps to clarify that the low levels of body satisfaction often seen in community-based samples of adolescent boys are amenable to change. In terms of treatment effectiveness, the ability to efficaciously and concurrently target the needs of both male and female adolescents increases likelihood of successful dissemination and implementation with fiscal efficiency. By meeting stakeholders' requests to extend the BP program to adolescent boys, these findings help to elucidate that evidence-based preventive interventions can be successfully implemented within mixed-sex high school settings.

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TABLES

Table 1.
Power Analyses

Comparison	Size of Effect	*d*	*f*	Power
FO to AC	Large	1.10	0.55	0.98
FO to MS	Small to medium	0.31	0.16	0.11
MS$_F$ to AC	Large	0.96	0.48	0.73

Note. Effect sizes from Kilpela et al. (2016) for body satisfaction. FO = Female-Only; AC = Attention Control; MS = Mixed-Sex; Mixed-Sex$_F$ = Mixed-Sex for Female Participants; *d* = Cohen's *d.*

Table 2.
Correlations of Primary and Control Variables by Sex

Variable	1	2	3	4	5	6	7	8
1. Body Dissatisfaction	–	-.41**	.	.29	.[a]	-.19	-.41**	-.13
2. Psychosocial Impairment	-.60**	–	.	.08	.25**	-.26**	.22	.14
3. Thin-Ideal Internalization	-.31**	.29**	–	.	.	.	.	.
4. Acceptability^2	.07	-.20	-.002	–	.15	-.18	-.10	-.22
5. Sex	.[a]	.25**	.[a]	.15	–	-.04	-.05	.77
6. BMI Z-Score	-.15	-.05	.02	-.17	-.04	–	.09	-.15
7. Age	.18	-.17*	-.14	.14	-.26**	.04	–	-.16
8. Race	-.07	.17	.17	.08	.77	-.14	-.21*	–

Note. Correlations of primary variables among males presented above the diagonal, and correlations of primary variables among females are presented below the diagonal. All significance tests were two-tailed. (*p < .05; **p < .01). [a] = measures were different across sexes and correlations could not be calculated. Acceptability^2 = Collected only at post-intervention

Table 3.

Baseline Descriptive Statistics for Primary Variables for Overall Sample and by Sex

	Overall		Males		Females					
	M	*SD*	*M*	*SD*	*M*	*SD*	*Test Statistic*	*df*	*p*	*d*
Body Satisfaction[1]	-	-	4.51	1.00	4.26	0.93	-	-	-	-
Psychosocial Impairment	**7.03**	**8.24**	**4.60**	**7.07**	**8.83**	**8.61**	*t* = -3.46	**163**	**< .001**	**0.54**
Thin-Ideal Internalization	-	-	-	-	3.14	0.82	-	-	-	-
ED Symptom Count[a]	**16.83**	**14.98**	**13.31**	**14.59**	**19.28**	**14.81**	*U* = 3.32	-	.001	.25
Acceptability[2]	33.17	5.43	32.17	5.76	33.83	5.15	*t* = -1.41	86	.162	0.30
BMI z-score	0.54	1.08	0.60	1.20	0.50	0.98	*t* = -0.61	162	.545	0.09
Age	**15.95**	**1.40**	**16.38**	**1.34**	**15.64**	**1.37**	*t* = 3.56	**176**	**< .001**	**0.55**

Note. All significance tests were two-tailed. Body Satisfaction[1] = different measure across sexes; ED Symptom Count[a] = Mann Whitney U Test used to compare males and females; Acceptability[2] = Collected only at post-intervention; $_M$ = mean score; *SD* = standard deviation; *t* = *t*-test; *p* = *p*-value; *U* = Mann-Whitney U; *d* = Cohen's *d*.

Table 4

Baseline Descriptive Statistics for Primary Variables for Overall Sample and by School

	School 1	School 2	School 3	
	M (SD)	*M (SD)*	*M (SD)*	*p*
Female Body Satisfaction	4.34 (0.86)	4.27 (0.61)	4.22 (1.02)	.876
Male Body Satisfaction	4.27 (0.26)	4.59 (1.11)	4.51 (1.00)	.898
Psychosocial Impairment	8.79 (10.02)	8.08 (8.76)	6.04 (7.73)	.362
Thin-Ideal Internalization	3.45 (0.69)	3.28 (0.49)	3.14 (0.82)	.091
ED Symptom Count	22.50 (14.85)	13.33 (14.15)	16.24 (14.94)	.063
BMI z-score	0.41 (0.90)	0.22 (0.73)	0.63 (1.15)	.210
Age	**15.55 (1.33)** $_a$	**14.67 (1.27)** $_b$	**16.29 (1.28)** $_c$	**< .001**
Sex (% Female)	**86.2%** $_a$	**65.4%** $_b$	**51.9%** $_b$	**.002**
Race/Ethnicity (% Minority)	**69%** $_a$	**50%** $_b$	**88.4%** $_c$	**<.001**

Note. BPSS-R = female body satisfaction; BPSSM = male body satisfaction; CIAQ = psychosocial impairment; IBSS-R = thin-ideal internalization; EDDS = eating disorder symptom count. Groups with different subscripts were statistically different (p < .05).

Table 5

Baseline Descriptive Statistics for Primary Variables for Overall Sample and by Condition

	FO	MO	MS	AC		
	M (SD)	*M (SD)*	*M (SD)*	*M (SD)*	*p*	*Effect Size*
Female Body Satisfaction	4.36 (1.08)	-	4.24 (0.80)	4.10 (0.77)	.537	.013
Male Body Satisfaction	-	4.28 (1.36)	4.52 (0.90)	4.58 (0.93)	.670	.013
Psychosocial Impairment	9.59 (10.18)	5.25 (6.14)	5.67 (7.59)	6.93 (7.49)	.106	.037
Thin-Ideal Internalization	3.26 (0.97)	-	3.05 (0.75)	3.06 (0.61)	.463	.016
ED Symptom Count	**23.21 (17.55)[a]**	**15.82 (16.28)[a]**	**13.79 (11.68)[b]**	**14.97 (14.04)[c]**	**.007**	**.066**
BMI z-score	0.45 (1.00)	0.44 (1.89)	0.45 (0.91)	0.72 (0.96)	.526	.014
Age	**15.21 (1.32)[a]**	**16.94 (1.10)[b]**	**16.39 (1.11)[c]**	**15.83 (1.44)[a]**	**<.001**	**.155**
Sex (% Female)	**100%[a]**	**0%[b]**	**56.67%[c]**	**45.76%[c]**	**<.001**	**.026**
Race/Ethnicity (% Minority)	**72.34%[a]**	**82.35%[b]**	**91.67%[c]**	**74.58%[d]**	**.045**	**.044**

Note. BPSS-R = female body satisfaction; BPSSM = male body satisfaction; CIAQ = psychosocial impairment; IBSS-R = thin-ideal internalization; EDDS = eating disorder symptom count. Effect size represented by η^2. Groups with different superscripts were statistically different ($p < .05$).

Table 6.
Means and Standard Deviations for Total Sample by Group

Construct	Baseline M(SD)	Follow-up M(SD)	Effect Size
Female Body Satisfaction			
FO	4.36 (1.08)	5.05 (0.88)	$d = 0.70$
MS_F	4.24 (0.80)	5.16 (0.63)	$d = 1.27$
AC_F	4.10 (0.77)	4.20 (0.72)	$d = 0.13$
Male Body Satisfaction			
MO	4.28 (1.36)	5.01 (1.07)	$d = 0.60$
MS_M	4.52 (0.90)	5.11 (0.83)	$d = 0.68$
AC_M	4.59 (0.93)	4.50 (1.35)	$d = 0.08$
Female Psychosocial Impairment			
FO	9.59 (10.18)	6.03 (7.39)	$d = 0.40$
MS_F	7.32 (7.01)	2.80 (4.10)	$d = 0.79$
AC_F	9.27 (7.51)	8.08 (6.91)	$d = 0.16$
Male Psychosocial Impairment			
MO	5.25 (6.14)	6.67 (12.64)	$d = 0.14$
MS_M	3.65 (7.92)	2.48 (4.59)	$d = 0.18$
AC_M	4.97 (7.01)	4.04 (8.23)	$d = 0.12$
Thin-Ideal Internalization			
FO	3.26 (0.97)	2.71 (1.07)	$d = 0.54$
MS_F	3.05 (0.75)	2.63 (1.03)	$d = 0.47$
AC_F	3.06 (0.61)	2.96 (0.83)	$d = 0.14$
Female ED Symptoms			
FO	22.00	10.00	$d = -0.23$
MS_F	13.50	10.00	$d = -0.62$
AC_F	14.00	13.00	$d = -0.24$
Male ED Symptoms			
MO	9.00	4.00	$d = -0.10$
MS_M	8.00	4.00	$d = -0.46$
AC_M	5.50	3.50	$d = -0.52$

Note. Female-Only (FO) n = 48; Mixed-Sex Female (MS_F) n = 34; Attention Control Female (AC_F) n = 27; Male-Only (MO) n = 17; Mixed-Sex Male (MS_M) = 26; Attention Control Male (AC_M) = 32. Acceptability[2] = Collected only at post-intervention. Cohen's *d* reported baseline to follow-up. Female and male ED symptoms presented as medians.

Table 7.

Regression Coefficients for Single-Sex Compared to Attention Control

	Body Satisfaction				**Thin-Ideal Internalization**				**Psychosocial Impairment**			
	b	β	p	Adjusted R^2	b	β	p	Adjusted R^2	b	β	p	Adjusted R^2
Hypothesis 1a.												
FO vs. AC	**0.55**	**0.31**	**.002**	**.562**	-0.27	-0.13	.297	.233	-2.03	-0.15	.137	.514
Age	-0.04	-0.05	.613		0.06	0.01	.951		0.97	0.18	.096	
BMI z-score	-0.11	-0.12	.246		0.03	0.03	.824		0.86	0.13	.228	
Race	0.24	0.12	.261		-0.09	-0.04	.756		**3.74**	**0.24**	**.024**	
Pre- Scores	**0.60**	**0.68**	**< .001**		**0.62**	**0.55**	**< .001**		**0.50**	**0.62**	**< .001**	
Hypothesis 1b.												
MO vs. AC	0.39	0.18	.135	.673	.	.	.	.	-1.49	-0.10	.412	.671
Age	-0.01	-0.01	.922		.	.	.		0.16	0.03	.805	
BMI z-score	0.02	0.02	.871		.	.	.		-0.06	-0.01	.925	
Race	0.24	0.09	.422		.	.	.		-0.07	-.004	.972	
Pre- Scores	**0.80**	**0.87**	**< .001**		.	.	.		**0.82**	**0.82**	**< .001**	

Note. FO = Female-Only; AC = Attention Control; MO = Male-Only. Race coded Minority = 0; Non-minority = 1. FO vs. AC coded AC = 0; FO =1. MO vs. AC coded AC = 0; MO = 1. Bolded font indicates *p* < .05.

Table 8.

Regression for Single-Sex Compared to Attention Control on Eating Disorder Symptoms

	b	*SE*	*Exp(b) (95% CI)*	*p*
Hypothesis 1a.				
FO vs. AC	.06	.29	1.06 (.60, 1.86)	.843
Age	.02	.12	1.02 (.80, 1.30)	.877
BMI z-score	**.41**	**.13**	**1.50 (1.16, 1.94)**	**.002**
Race	.42	.32	1.53 (.81, 2.89)	.193
Hypothesis 1b.				
MO vs. AC	.21	.42	1.23 (.54, 2.77)	.622
Age	.08	.19	1.09 (.76, 1.57)	.653
BMI z-score	.31	.17	1.36 (.97, 1.90)	.071
Race	.347	.59	1.41 (.45, 4.48)	.556

Note. A generalized linear model was fit using a negative binomial distribution. FO = Female-Only; AC = Attention Control; MO = Male-Only. Race coded Minority = 0; Non-minority = 1. FO vs. AC coded AC = 0; FO =1. MO vs. AC coded AC = 0; MO = 1. Bolded font indicates *p* < .05. EDDS = Eating Disorder Diagnostic Scale. *b* = Unstandardized coefficient; *SE* = Standard error; *β* = Standardized coefficient; *Exp(b)* = Exponentiated coefficients and corresponding confidence intervals.

Table 9.
Regression Coefficients for Mixed-Sex Compared to Attention Control

	Body Satisfaction				Thin-Ideal Internalization				Psychosocial Impairment			
	b	*β*	*p*	Adjusted R^2	*b*	*β*	*p*	Adjusted R^2	*b*	*β*	*p*	Adjusted R^2
Hypothesis 1c. Female												
MS vs. AC	**0.95**	**0.58**	**< .001**	**.492**	-0.32	-0.16	.384	.058	-2.34	-0.17	.058	.476
Age	-0.02	-0.03	.842		0.03	0.04	.815		0.28	0.05	.541	
BMI z-score	-0.15	-0.18	.155		-0.04	-0.04	.804		0.23	0.03	.724	
Race	0.02	0.05	.957		.001	.000	.998		2.81	0.15	.089	
Pre- Scores	**0.41**	**0.40**	**.003**		**0.57**	**0.40**	**.016**		**0.56**	**0.65**	**< .001**	
Hypothesis 1c. Male												
MS vs. AC	**0.62**	**0.33**	**.006**	**.602**	.	.	.	.	-2.34	-0.17	.058	.476
Age	-0.03	-0.03	.762		.	.	.		0.28	0.05	.541	
BMI z-score	0.02	0.02	.875		.	.	.		0.23	0.03	.724	
Race	0.23	0.09	.435		.	.	.		2.81	0.15	.089	
Pre- Scores	**0.78**	**0.77**	**< .001**		.	.	.		**0.56**	**0.65**	**< .001**	

Note. MS = Mixed-Sex; AC = Attention Control; MS vs. AC coded AC = 0; MS = 1. Bolded font indicates $p < .05$.

Table 10.

Regression for Mixed-Sex Compared to Attention Control on Eating Disorder Symptoms

	b	*SE*	*Exp(b) (95% CI)*	*p*
Hypothesis 1c.				
MS vs. AC	.22	.35	1.25 (.63, 2.48)	.525
Age	.05	.10	1.05 (.87, 1.28)	.61
BMI z-score	**.29**	**.13**	**1.34 (1.02, 1.74)**	**.032**
Race	.47	.36	1.59 (.79, 3.23)	.195
Sex	**.59**	**.30**	**1.81 (1.00, 3.27)**	**.050**
Sex*MS vs. AC	-.26	.45	.77 (.32, 1.84)	.555

Note. A generalized linear model was fit using a negative binomial distribution. MS = Mixed-Sex; AC = Attention Control; MS vs. AC coded AC = 0; MS = 1. Race coded Minority = 0; Non-minority = 1. Bolded font indicates *p* < .05. EDDS = Eating Disorder Diagnostic Scale. *b* = Unstandardized coefficient; *SE* = Standard error; *β* = Standardized coefficient; *Exp(b)* = Exponentiated coefficients and corresponding confidence intervals.

Table 11.

Regression Coefficients for Single-Sex Compared to Mixed-Sex

	Body Satisfaction				**Thin-Ideal Internalization**				**Psychosocial Impairment**			
	b	*β*	*p*	Adjusted R^2	*b*	*β*	*p*	Adjusted R^2	*b*	*β*	*p*	Adjusted R^2
Hypothesis 2a.												
FO vs. MS	0.20	0.12	.450	.369	-0.15	-0.07	.678	.100	-2.91	-0.24	.100	.393
Age	**0.15**	**0.25**	**.047**		0.09	0.12	.475		1.02	0.24	.109	
BMI z-score	-0.17	-0.20	.088		0.10	0.09	.521		0.92	0.14	.214	
Race	0.26	0.13	.330		0.02	0.01	.965		2.87	0.18	.164	
Pre- Scores	**0.40**	**0.35**	**< .001**		**0.51**	**0.41**	**.003**		**0.36**	**0.53**	**< .001**	
Hypothesis 2b.												
MO vs. MS	0.27	0.15	.290	.512	.	.	.	.	-0.99	-0.10	.608	-.046
Age	-0.01	-0.02	.907		.	.	.		-0.16	-0.04	.846	
BMI z-score	.004	0.01	.972		.	.	.		1.21	0.33	.132	
Race	0.28	0.09	.558		.	.	.		-2.98	-0.16	.446	
Pre- Scores	**0.61**	**0.55**	**< .001**		.	.	.		0.04	0.07	.740	

Note. FO = Female-Only; MO = Male-Only; MS = Mixed-Sex; FO vs. MS coded FO = 0; MS = 1. MO vs. MS coded MO = 0; MS = 1. Bolded font indicates *p* < .05.

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Table 12.

Regression for Single-Sex Compared to Mixed-Sex on Eating Disorder Symptoms

	b	SE	Exp(b) (95% CI)	p
Hypothesis 2a.				
FO vs. MS	.08	.35	1.08 (.55, 2.13)	.823
Age	-.12	.13	.89 (.69, 1.14)	.353
BMI z-score	**.41**	**.15**	**1.51 (1.13, 2.01)**	**.005**
Race	.11	.42	1.12 (.49, 2.56)	.787
Hypothesis 2b.				
MO vs. MS	.06	.39	1.06 (.49, 2.28)	.887
Age	**.39**	**.17**	**1.48 (1.05, 2.08)**	**.024**
BMI z-scores	.22	.17	1.24 (.89, 1.72)	.200
Race	**-2.10**	**1.04**	**.12 (.02, .95)**	**.044**

Note. A generalized linear model was fit using a negative binomial distribution. FO = Female-Only; MO = Male-Only; MS = Mixed-Sex; FO vs. MS coded FO = 0; MS = 1. MO vs. MS coded MO = 0; MS = 1. Bolded font indicates $p < .05$. Race coded Minority = 0; Non-minority = 1. EDDS = Eating Disorder Diagnostic Scale. b = Unstandardized coefficient; SE = Standard error; β = Standardized coefficient; $Exp(b)$ = Exponentiated coefficients and corresponding confidence intervals.

Table 13.

Means and Standard Deviations of Program Acceptability by Condition and Sex

	Females	Males
	M(SD)	*M(SD)*
Single-Sex	34.00 (3.39)	31.67 (5.96)
Mixed-Sex	32.35 (7.62)	33.62 (5.08)
Attention Control	32.00 (0.00)	28.25 (6.90)

Note. Unstandardized beta reported for sex predicting post-intervention acceptability scores.