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Bodies in Motion: An empirical evaluation of a program to support positive body image in female collegiate athletes

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ABSTRACT

Female athletes are at risk for eating disorders due to the experience and internalization of pressures regarding various aspects of their bodies, including weight and appearance. Evaluating programs that address psychosocial antecedents and may reduce female athletes' risk is critical. We examined Bodies in Motion, a program based on cognitive dissonance and mindful self-compassion principles that integrates components of social media. Female athletes across nine NCAA athletic departments were assigned to Bodies in Motion (n = 57) or a wait-list control group (n = 40). Athletic department personnel were trained in the standardized program. Data were collected at three time-points – baseline, post-program, and three to four months later. Using Holm's algorithm to control for multiple comparisons, repeated measures ANOVAs showed that, after program completion, Bodies in Motion athletes reported less thin-ideal internalization, as compared to the control athletes, over time. We also observed varying group trajectories in outcome responses upon visual inspection of profile plots. These findings serve as the basis for future research suggestions involving larger sample sizes and prolonged measurement of outcomes.

1. Introduction

Female athletes experience general sociocultural and sport-specific pressures about their body weight, shape, size, appearance, and/or eating (Lunde & Holmqvist Gattario, 2017). These pressures are communicated by family, peers, and the media, as well as sources directly in the sport environment, such as remarks from coaches about weight and having to wear athletic attire that is revealing or form-fitting (Reel, Petrie, SooHoo, & Anderson, 2013). Importantly, female athletes must often negotiate competing demands between functionality and appearance, or body duality, across different social contexts. While in their sport environment, for example, female athletes may value their athletic bodies for what they can do physically (i.e., functionality), but outside of sport, be self-critical because of how discrepant their bodies may be from societal appearance ideals (Kauer & Krane, 2006; Lunde & Holmqvist Gattario, 2017). More specifically, a swimmer may appreciate her muscular shoulders and the strength they provide her while training and competing. However, she may feel self-conscious wearing clothes that show her shoulders when out with friends socially because muscularity and bulk do not conform to societal expectations for upper body appearance in women.

Theoretically, internalizing appearance ideals, or simply being immersed in sport environments that communicate them, is expected to lead female athletes to develop negative attitudes (e.g., dissatisfaction) and emotions (e.g., shame) towards their bodies (Petrie & Greenleaf, 2012). These psychosocial factors (i.e., internalization of appearance ideals, body image concerns, and negative affect) are hypothesized to interact and increase athletes' risk of developing eating disorder (ED) symptoms and perhaps a clinical ED (Petrie & Greenleaf, 2012). In longitudinal studies with female athletes (Anderson, Petrie, & Neumann, 2012; Krentz & Warschburger, 2013; Voelker, Petrie, Neumann, & Anderson, 2016), researchers have found support for the influences of some hypothesized risk factors, such as sport-specific body pressures, body dissatisfaction, and negative affect. These findings provide empirical justification for targeting such variables to reduce ED risk in female athletes.

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Over the last two decades, researchers have extensively examined ED prevention programming with female non-athletes. The most frequently studied and empirically supported approach to prevention (see Becker & Stice, 2017) is based within principles of cognitive dissonance (Festinger, 1957). Prevention programs based on these principles were designed to help women actively and publicly question, as well as challenge, sociocultural messages about beauty, thus creating dissonance with the appearance ideals they have internalized. By actively engaging in behaviors that contest societal messages, internalizations may lessen, body image may be improved, and reductions in ED symptomatology may result over time (Stice, Shaw, & Marti, 2007). For example, in a sample of 408 college-aged women, Stice, Butryn, Rohde, Shaw, and Marti (2013) compared the effectiveness of a dissonance intervention delivered by clinicians in college mental health settings with a control group who received informational materials on ED risks and tips for developing a healthy body image. The women who completed the dissonance program reported significantly less thin-ideal internalization, body dissatisfaction, dieting, and negative affect than the controls at the completion of the intervention (moderate effect sizes) and at 1-year follow-up (small to moderate effect sizes).

There are few studies, however, that have examined the efficacy of interventions with female athletes. In one such study, Becker, McDaniel, Bull, Powell, and McIntyre (2012) compared the effectiveness of two approaches in a sample of 157 female collegiate athletes from one NCAA Division III institution. Although based on existing cognitive dissonance and "healthy weight" interventions (Stice, Shaw, Burton, & Wade, 2006), Becker et al. modified those approaches by (a) including information to address the unique experiences of athletes (e.g., female athlete triad; Nattiv et al., 2007) and (b) using trained athlete peers, instead of mental health professionals and/or psychology graduate students, to facilitate the intervention groups. Becker et al. found no group by time interactions and reported significant changes across time for athletes in both the dissonance and healthy weight groups. Specifically, from baseline to six weeks post-program, athletes in both groups reported lower levels of thin-ideal internalization, dietary restraint, and weight concerns. Bulimic symptomatology, shape concerns, and negative affect were also lower, compared to baseline, at six weeks and one year post-program. Overall effects across the study were small but significant, yet evidence of each intervention's effectiveness would be strengthened with the inclusion of a wait-list control condition.

Based on their review of ED prevention programming for athletes, Bar, Cassin, and Dionne (2016) recommended that researchers expand their work in this area because so few quality studies existed. Consistent with Bar et al., we posit that such expansion should include developing interventions that are theoretically-based, address established ED risk factors and the unique experiences of athletes, use large, diverse samples, and include control groups for comparison. Given the high percentage of female athletes who are dissatisfied with their bodies, engage in unhealthy eating, and use pathogenic weight control behaviors (e.g., Anderson & Petrie, 2012), having a range of empirically supported prevention programs can only benefit sports medicine professionals as they assist athletes under their care.

In response to this critical need for more theoretically grounded and empirically tested prevention programming for athletes, we developed and, in this study, evaluated Bodies in Motion. This program addresses the unique experiences of female athletes and teaches them to respond in more functional and healthy ways to the ubiquitous general sociocultural and sport-specific body pressures that exist. Consistent with successful nonathlete programs (Becker & Stice, 2017), Bodies in Motion is based in cognitive dissonance theory and thus provides athletes with opportunities to actively and experientially challenge societal appearance norms. Specific to their sport context, Bodies in Motion extends these opportunities by also addressing appearance ideals communicated specifically in the sport environment. Further, Bodies in Motion incorporates mindful self-compassion to help athletes become more aware of their internal reactions (e.g., thoughts, feelings) to external appearance ideals and cope more effectively with the effects of these messages. Thus, in addition to learning how to actively and experientially challenge unrealistic messages about body weight, shape, size, and appearance, the goals of the program are for female athletes to also learn how to be more present-focused in their self-awareness, nonjudgmental of their thoughts and feelings, and kind and understanding (as opposed to critical) in how they evaluate and respond to themselves when exposed to the appearance messages that surround them (Kabat-Zinn, 2003; Neff, 2003). Mindful self-compassion is being used increasingly by athletes (e.g., Gross et al., 2016) and has been linked to reductions in body dissatisfaction and unhealthy eating in college students (Moffitt, Neumann, & Williamson, 2018; Seekis, Bradley, & Duffy, 2017; Taylor, Daiss, & Krietsch, 2015) as well as decreases in anxiety, depression, and stress and improvements in well-being, life satisfaction, and happiness in adults (Neff & Germer, 2013). Thus, there is empirical support for its inclusion as an active ingredient in the Bodies in Motion program.

Bodies in Motion also was designed to incorporate positive components of social media, including the development of a platform tailored to our audience, specific to the program, and that permitted user-derived content (Korda & Itani, 2013). Through this platform, female athletes were given the opportunity to interact with each other daily, provide support as they practiced the key elements covered in each session, make statements that challenged appearance ideals and affirmed themselves and their bodies as they currently were, and build a culture of body acceptance that extended beyond the actual time they spent in session. In basing Bodies in Motion on these established psychological approaches, integrating and adapting key elements from each to meet the specific needs of female athletes, and providing a social media platform through which they could supportively interact and call into question the ubiquitous body pressures in their lives, a unique opportunity was provided for them to develop a healthier and more appreciative stance toward their bodies and themselves, both as athletes and as women.

The purpose of this study was to evaluate Bodies in Motion using a mixed-sport sample of female collegiate athletes drawn from different National Collegiate Athletic Association (NCAA) institutions. Our goal was to test the program led by a diverse set of female professionals (i.e., licensed sport psychologists, sports dietitians, athletic trainers, and advanced doctoral students in these fields) across multiple sites to determine its real-world applicability. To examine the program's effectiveness relative to a wait-list control, we assessed general sociocultural and sport-specific body pressures, internalization, body attitudes, affect, and eating concerns over three time-points (i.e., baseline, within one-week post-program, and 3- to 4-month follow-up). We hypothesized that response trajectories for each outcome of interest would significantly differ between the intervention and control groups over time and that the response trajectories would demonstrate that the intervention had positive, health-enhancing effects.

2. Method

2.1. Participants

NCAA female collegiate athletes ($N = 158$) drawn from eight Division I and one Division III university athletic departments voluntarily participated. Initially, 97 athletes were assigned to the

Table 1
Sample Characteristics.

Variable	Intervention *n*	Control *n*
Race		
Missing	0	1
Caucasian/White	45	29
Hispanic/Latino/Mexican American	1	0
African-American/Black	7	5
Asian American/Pacific Islander	0	1
Other	4	4
School Year		
Freshman	20	12
Sophomore	8	13
Junior	16	8
Senior	11	6
5th Year +	2	1
Type of Sport		
Swimming/Diving	5	11
Cross Country	11	3
Track and Field	5	5
Rowing/Crew	10	10
Gymnastics	7	1
Tennis	4	2
Volleyball	2	4
Basketball	3	1
Soccer	2	1
Softball	3	1
Ice Hockey	1	0
Skiing	2	0
Figure Skating	1	0
Cheerleading	1	1

Bodies in Motion intervention and 61 to the wait-list control. Attrition occurred at Times 2 ($n = 12$) and 3 ($n = 48$) due to athletic or academic responsibilities or unknown reasons (e.g., athletes did not respond to requests to complete Time 3 surveys). Thus, we had complete data across all three time-points for 57 athletes in the intervention group and 40 in the control group; these athletes comprised our final sample. Mean age and BMI were 19.53 years ($SD = 1.27$) and 23.68 kg/m^2 ($SD = 3.59$) for the intervention group. Mean age and BMI were 19.63 years ($SD = 1.16$) and 22.67 kg/m^2 ($SD = 3.03$) for the control group. Other group-stratified sample characteristics, including race/ethnicity, year in school, and sport can be found in Table 1.

2.2. Instruments

2.2.1. Sport-specific body pressures

The 11-item Weight Pressures in Sport for Females (WPS-F; Reel et al., 2013) examines female athletes' experience of body-related pressures along two dimensions – Pressures Regarding Appearance and Performance (Appearance) and Coach and Sport Pressures about Weight (Weight). On items such as "My coach notices if I gain weight," the athletes responded from 1 (*never*) to 6 (*always*). The total score for each dimension is the mean of those items; higher scores indicate greater perceived pressure. In female collegiate athletes, Reel et al. reported Cronbach's alphas of .86 (Appearance) and .90 (Weight); alphas for our study ranged from .84 to .89 (Appearance) and .88 to .89 (Weight). Reel et al. found that WPS-F scores were unique from measures of general sociocultural pressures and significantly related to internalization, body dissatisfaction, dietary intent, and ED symptomatology.

2.2.2. General sociocultural body pressures

A 20-item Perceived Sociocultural Pressures Scale (e.g., Anderson, Petrie, & Neumann, 2011; Stice & Agras, 1998) assesses the experience of pressures to lose weight, be thin, exercise, be attractive, and have the perfect body from four sources – friends, family, romantic partners, and the media. We also assessed pressures from teammates/coaches but did not include this source in any total score to minimize overlap with the WPS-F. From 1 (*never*) to 5 (*always*), athletes rated each source in relation to each pressure (e.g., the pressure they felt to lose weight from friends). The total score for each pressure area (e.g., to be thin) is the mean of the four sources; higher scores indicate greater perceived pressures in that area. Anderson et al. (2011) reported Cronbach's alphas from .78 to .88; alphas in our study ranged from .80 to .96. Anderson et al. found that each pressure correlated significantly with measures of internalization, body dissatisfaction, and bulimic symptomatology.

2.2.3. Internalization

Ten items from the Sociocultural Attitudes Towards Appearance Questionnaire-4 (Thompson et al., 2011) assess the internalization of sociocultural messages with regard to thin appearance ideals (five items; thinness; e.g., "I want my body to look very thin") and muscular appearance ideals (five items; muscularity; e.g., "I think a lot about looking muscular"). The athletes responded to each item from 1 (*completely disagree*) to 5 (*completely agree*). The total score for each subscale is the mean of those items; higher scores indicated greater internalization of that ideal. Among female undergraduates, Thompson et al. reported Cronbach's alphas of .86 to .92 (thinness) and .91 to .92 (muscularity); alphas ranged from .78 to .87 (thin) and .84 to .88 (muscularity) in our sample. Regarding construct validity, Thompson et al. found that thinness and muscularity scores were related significantly to ED symptomatology and more negative views of one's body.

2.2.4. Body attitudes

We used the Concerns about Weight (five items) and Concerns about Shape (eight items) subscales from the Eating Disorder Examination Questionnaire (EDE-Q; Fairburn & Beglin, 1994). Each item, such as "Have you had a definite desire to have a totally flat stomach?" is scored on a 7-point forced choice rating scheme that evaluates attitudes and behaviors over the past 28 days. The total score for each subscale is the mean of the items; higher scores indicate greater concerns. Two-week test-retest reliability was reported at .89 (Weight) and .92 to .93 (Shape; Luce & Crowther, 1999). Cronbach's alphas from our study ranged from .83 to .88 (Weight) to .91 to .93 (Shape). The validity of the EDE-Q and its subscales is well-established (Fairburn & Beglin, 1994).

A four-item Body Shame Scale (Andrews, 1995; Tripp & Petrie, 2001) assesses individuals' feelings of shame experienced in relation to their bodies. On items such as "I feel ashamed of my body or some part of it," the athletes responded from 1 (*definitely disagree*) to 5 (*definitely agree*). The total score is the mean of the four items; higher scores indicate more shame. Tripp and Petrie (2001) reported Cronbach's alpha of .90 among female undergraduates; alphas for this study ranged from .89 to .90. Tripp and Petrie found that body shame scores were associated significantly with measures of ED symptomatology and body image concerns.

The 10-item Body Appreciation Scale-2 (Tylka & Wood-Barcalow, 2015) assesses individuals' acceptance of and respect for their bodies. On items such as "I respect my body," athletes responded from 1 (*never*) to 5 (*always*). The total score is the mean of the items; higher scores indicate greater appreciation. Tylka and Wood-Barcalow reported Cronbach's alpha of .94 for college women; alphas were .95 in our study. They also reported positive correlations with intuitive eating and inverse associations with ED symptomatology.

Seven items from the Body Parts Satisfaction Scale-Revised (Petrie, Tripp, & Harvey, 2002) assess women's satisfaction with their body (7-items; e.g., hips, stomach). Athletes rated each body part from 1 (*extremely dissatisfied*) to 6 (*extremely satisfied*). Total score is the mean of those items; higher scores indicate greater satisfaction. Petrie et al. reported Cronbach's alphas of .90 and found

that the body factor correlated significantly with independent measures of body dissatisfaction and bulimic symptomatology. Alphas from our study were .88 to .92.

2.2.5. Affect

Eight single items from the Positive and Negative Affect Schedule (Watson & Clark, 1992) were used to assess negative (i.e., anxious, angry, ashamed, and sad) and positive (i.e., confident, happy, proud, and enthusiastic) affect. Athletes responded how they generally feel with regards to each mood state item from 1 (*very slightly/not at all*) to 5 (*extremely*). We created a negative affect subscale score and positive affect subscale score based on the summation of single item indicators in each category. Higher scores indicate greater affect. Cronbach's alphas in this study were .85 and .80 for the negative affect and positive affect subscales, respectively.

2.2.6. Eating concerns

Based on recent research (Becker et al., 2012), we computed a composite bulimic symptomatology score from nine items on the EDE-Q (Fairburn & Beglin, 1994). Items that were not already measured on the 7-point forced choice rating scheme (e.g., "Over the past 28 days, how many times have you made yourself sick (vomit) as a means of controlling your shape or weight?") were transformed into the scale consistent with Becker et al. (2012). The total bulimic composite score is the mean of the nine items and can range from 0 (*no symptoms*) to 6 (*high level of symptoms*). Becker et al. reported Cronbach's alphas of .83 for female collegiate athletes; alphas from our study ranged from .77 to .83. In support of its validity, Becker, Bull, Schaumberg, Cauble, and Franco (2008) found that composite scores were significantly higher among undergraduate sorority members with higher, versus lower, risk for body dissatisfaction.

The 9-item Dietary Intent Scale (DIS; Stice, 1998) assesses intentions to restrict caloric intake. On items such as "I take small helpings in an effort to control my weight," athletes responded from 1 (*never*) to 5 (*always*). Total score is the mean of the items; higher scores indicate a stronger intent. Stice and Agras (1998) reported Cronbach's alpha of.94; alphas ranged from .90 to .91 in our sample. Anderson et al. (2011) reported significant correlations between the DIS and measures of general and sport-specific weight pressures, internalization, body dissatisfaction, and bulimic symptomatology, which offered support for the scale's validity in female collegiate athletes.

2.2.7. Mindfulness

The 14-item Frieberg Mindfulness Inventory-Short Form (FMI-S; Walach, Buchheld, Buttenmüller, Kleinknecht, & Schmidt, 2006) assesses present moment awareness, warmth and friendliness, and acceptance and non-judgment. On items such as "I am open to the experience of the present moment," athletes responded from 1 (*rarely*) to 4 (*almost always*). The total score is the sum of the 14 items and can range from 14 (*never mindful*) to 56 (*almost always mindful*). Walach et al. reported Cronbach's alphas of .79 to .86 in non-clinical and clinical samples, respectively; alphas ranged from .85 to .88 in our sample. Walach et al. also found that FMI-S scores were related to, but not identical with, self-awareness and disassociation, inversely related to psychological distress, and significantly improved following meditation practice.

2.2.8. Self-compassion

The 12-item Self-Compassion Scale-Short Form (Raes, Pommier, Neff, & Van Gucht, 2011) assesses the extent to which individuals treat themselves with understanding and kindness and feel connected to others. On items such as "I try to see my failings as part of being human," athletes responded from 1 (*almost never*) to 5 (*almost always*). The total score is the sum of the 12 items; higher scores indicate greater self-compassion. Raes et al. reported Cronbach's alphas at or above .86 among university students; alphas ranged from .84 to .90 in our sample. Among college students receiving psychotherapy, self-compassion scores were inversely related to mental health issues, including eating concerns, depression, and generalized anxiety (Hayes, Lockard, Janis, & Locke, 2016).

2.3. Procedures

Following approvals from Institutional Review Boards for Human Subjects Research, female professionals (i.e., licensed sport psychologists, sports dietitians, athletic trainers, and advanced doctoral students in these fields) who were employed by, or students at, nine NCAA member institutions participated in a standardized, six-hour Program Leader training led by the authors. Training encompassed (a) independent review of the standardized Bodies in Motion Leader Guide, Participant Workbook, and session materials; (b) a two-hour video-conference session during which the authors shared best practices in facilitating the program and answered questions; and (c) independent review of a video-recorded, 75-minute mock session from the Bodies in Motion program. All Program Leaders reported having completed the independent reviews and engaged in individual discussion via email and/or phone with the authors regarding their training and facilitation of the program at their institutions.

Program Leaders and Research Assistants (RA) at each participating school disseminated standardized descriptions of Bodies in Motion to the female athletes in their athletic departments through emails, in-person team meetings, individual referrals (e.g., from the sports dietitians), and fliers that were posted within the athletic departments (e.g., study halls). Athletes who enrolled in Bodies in Motion were then invited by each school's RA to participate in data collection for the research study. Specifically, the RA provided details regarding the study's purpose (i.e., to evaluate the program's effectiveness), time commitment, and their rights as research participants; all athletes who enrolled in the program also chose to participate in the data collection. Although random assignment was the primary approach used to determine group membership, in some instances assignment to the intervention versus control group had to be based on the athletes' sport and/or academic schedules. Each group of athletes (intervention and control) were informed of their status by the week prior to the intervention. Because the intervention began at different times throughout the fall semester at each institution and because of the athletes' sport and/or academic schedules, athletes in the control group were told they would have the opportunity to participate in the program during the subsequent spring semester.

The RAs administered the questionnaires to athletes in both the intervention and control groups during the week prior to the start of the intervention (Time 1 – baseline); the questionnaires were coded only by a specific identifier so data could be matched for each athlete across time. During the week immediately following program completion (Time 2 – post-program) as well as 3–4 months following the program's end (Time 3 – follow-up), the RAs administered the same set of questionnaires to both the intervention and control groups. Athletes provided consent prior to Time 1 questionnaire administration and were informed that their data would be confidential as defined within the consent. Each data collection took approximately 30 min and occurred either individually or in small groups in the absence of Program Leaders and athletic department personnel (e.g., coaches), but in the presence of the RA. RAs administered surveys in person, in paper-pencil format; athletes earned $10.00 at each data collection.

2.4. Bodies in Motion

The program consists of a 35-min introductory session, followed by four, 75-min sessions, all led by the Program Leaders; intervention groups consist of four to eight athletes. Informed by best practices (e.g., Stice et al., 2007), sessions were designed to be highly interactive and experiential. In the introductory session, members complete an acquaintanceship activity, discuss expectations for participation, and enroll in the social media platform. In Session 1, athletes continue to build supportive relationships through a structured activity (i.e., in dyads participants interview each other and introduce their partner to the larger group) and then discuss the origins of appearance ideals in both society and sport and how these ideals are socially constructed. "Body duality" and the challenges in negotiating ideals across sport and non-sport contexts are discussed. Mindfulness is introduced, and the athletes practice mindful breathing to manage their thoughts and feelings specifically in relation to the body pressures they experience. In Session 2, athletes identify the environmental situations, both within and beyond their sport context, that trigger negative thoughts and feelings about themselves and their bodies. They are introduced to self-compassion and experience giving and receiving affirmations rooted in kindness and positivity. Tailored to athletes' general affinity for kinesthetic-based activity, mindful walking is introduced and practiced to further develop their mindfulness skills.

In Session 3, athletes discuss the psychological consequences associated with the general sociocultural and sport-specific appearance ideals to which they are exposed, identify ways to advocate for their psychological health and well-being (i.e., commit to engage in 1–2 behaviors that actively challenge pressures about beauty found in sport and non-sport contexts and post their experiences doing so on the social media platform), and practice being mindful and self-compassionate while viewing popular media that communicates appearance ideals for women and female athletes. They also are introduced to a third mindfulness exercise (i.e., integrating mindful breathing into a self-compassion-based imagery). In Session 4, athletes discuss their experiences in being self-compassionate and practice taking that perspective in relation to how they evaluate their bodies (i.e., examining themselves in a mirror, in attire specific to their sport if they choose, while using the mindful self-compassion strategies learned). They also discuss how the knowledge and skills learned may transfer to other life domains and make a public commitment to each other to continue being mindful, kind, and compassionate in relation to themselves and their bodies and actively celebrating all that their bodies can do for them.

At the end of each session, athletes are assigned exercises to complete during the upcoming week. Each exercise is then integrated into the next session through discussion and review. For example, at the end of Session 3, athletes are asked to choose different mindful self-compassion exercises they have learned and practice them throughout the week in formal (i.e., with the guidance of an audio file) or informal settings (e.g., while walking on campus, during breaks in practices or games), particularly in response to any body pressures they experience. Athletes are also asked to write or video-record a one-minute body celebration blurb in which they express compassion and kindness towards themselves and appreciation for what their bodies can do for them. Athletes are encouraged to discuss their experiences in completing the exercises in session and/or on the social media platform. Importantly, athletes are invited to interact with each other through this platform both during and after the program ends, which serves as a vehicle for promoting supportive, positive, and instrumental views of women and female athletes. For example, athletes may post comments related to the exercises they are doing and provide feedback and support to each other about themselves and their activities. Program Leaders also interact with athletes through the platform by commenting on athletes' posts and providing standardized media (e.g., articles, videos) that are relevant to the topics covered in each session, challenge appearance norms, and promote the empowerment of women and female athletes.

2.5. Data analysis

We checked and screened data for missing values and replaced missing data using maximization procedures. Using data collected from each of the measures, we created composite scores using summations of subscale responses for the analysis of certain sub-constructs in the interest of preserving statistical power and reducing the number of tests conducted. Specifically, we created composite scores to capture sport-specific body pressures using the Appearance and Weight subscales of the WPS-F measure (scores range from 2 to 12); general sociocultural body pressures using the lose weight, be thin, exercise, be attractive, and have the perfect body subscales of the PSPS measure (scores range from 5 to 25); shape and weight concerns using the shape and weight concern subscales of the EDE-Q (scores range from 0 to 12); negative affect using the anxious, angry, ashamed, and sad items from the PANAS measure (scores range from 4 to 20); and positive affect using the confident, happy, proud, and enthusiastic items from the PANAS measure (scores range from 4 to 20). We analyzed thin-ideal internalization, muscular-ideal internalization, body satisfaction, body appreciation, body shame, dietary intent, and bulimic symptoms as originally measured.

We began by computing means and standard deviations for each outcome measure of interest at each time-point. We then examined all outcome measures for baseline differences between the intervention and control groups, as well as between participants who completed all three measurements and those who did not, using t-tests for group comparisons. We also conducted a z-test to test for difference in the proportion of dropouts in the intervention and control groups. As a manipulation check, we examined changes in mindfulness and self-compassion scores from Time 1 to Time 2 (the period over which the intervention occurred). Given that mindfulness and self-compassion were two active ingredients in the program, we expected that the intervention group athletes' mindfulness and self-compassion scores would increase; we expected no changes for the control athletes. To test these hypotheses, we conducted paired sample t-tests with bootstrapping based on 1000 bootstrap samples and 95% Confidence Intervals.

To answer our research question, we examined differences in the response trajectories for each outcome between the intervention and control group. For each defined variable (i.e., composite or original), we examined the response trajectories through profile plots and tested differences in the response trajectories between the intervention and control groups over time using repeated measures ANOVAs, with a targeted evaluation of the group $\times$ time interaction. Due to the number of outcome measures involved, we used a Holm's algorithm (Holms, 1979) to determine the cut-off for assessing statistical significance. The Holm's procedure is characterized by sequential null hypothesis testing based on the rank order of probability values obtained from a series of hypothesis tests. Determinations regarding specific hypotheses (reject or fail to reject) are made based on test-specific cut-off values, which account for the total number of final hypothesis tests conducted. Therefore, we present the observed p-value as well as the Holm's estimated cut-offs against which it was compared for each repeated measures ANOVA. Preliminary analyses (e.g., baseline comparisons, manipulation checks) were not part of our primary hypotheses and thus not included in the Holm's algorithm. We also present effect sizes associated with each repeated measures ANOVA based on partial eta squared values (i.e., <0.0099 is small, <0.0588 is medium,

and <0.1379 is large; Richardson, 2011). We conducted data cleaning, management, and generation of plots in SPSS Statistics for Windows, version 20 (IBM Corp., Armonk, NY, USA); we conducted all other analyses in SAS 9.4 (SAS Institute, Cary NC, USA).

2.6. Program Leader training and program fidelity

Given the multi-site nature of the study, the authors were unable to attend the sessions led by the Program Leaders. However, we were able to confirm the following, which provide partial support for the fidelity of the intervention's implementation. First, all Program Leaders confirmed verbally or through email that they completed the independent study portions of the training (e.g., review of the mock video). Second, all Program Leaders participated in the 2-h training session via video-conferencing with the authors. Third, we contacted each Program Leader regularly across implementation of the intervention to provide support, answer questions, as well as inquire and provide reminders about adherence to the standardized protocol. Fourth, a designated manager of the social media component for the Bodies in Motion program had access to each school's platform and monitored daily the participant and Program Leaders' postings. Because there was a standardized schedule for Program Leader postings, we could determine if any Program Leader was not following the protocol. In the few instances where we noted a Program Leader was behind on her postings, the manager made immediate contact to discuss and develop solutions so postings could be made in accordance with the schedule.

3. Results

3.1. Preliminary analyses

First, we observed no differences between the intervention and control groups in age ($M_{intervention}$ = 19.53, SD = 1.27; $M_{control}$ = 19.63, SD = 1.15, p = .696), BMI ($M_{intervention}$ = 23.68, SD = 3.59; $M_{control}$ = 22.67, SD = 3.03, p = .148), or any of the outcome measures at baseline (ps > .09; see Table 2 for means and SDs). Second, a total of 21 out of 61 control group members dropped out (34.4%) and 39 out of 97 intervention group members dropped out (40.2%). An additional participant was excluded from the analytical dataset due to missing subscales at Time 2 and Time 3. Based on z-tests for differential proportions, we observed no differences in the proportion of dropouts in each condition (alpha = .05, two-sided, z-statistic = 0.70, p = .47). Third, in comparing participants who completed measures at all three time-points and those who did not complete the study, there were no group differences in age, BMI, or any of the baseline outcome measures (ps >.06).

3.2. Manipulation check

As expected, the intervention group athletes' scores on self-compassion ($M_{difference}$ = 0.36, 95% CI = 0.22 to 0.50, t[56] = 5.10, p < .0001; Time 1 M = 3.03, SD = 0.63 and Time 2 M = 3.38, SD = 0.74) and mindfulness ($M_{difference}$ = 2.09, 95% CI = 0.90 to 3.28, t[56] = 3.51, p = .001; Time 1 M = 39.65, SD = 6.21 and Time 2 M = 41.74, SD = 6.62) increased from Time 1 to Time 2. The control athletes' scores did not significantly change across the same timeframe for self-compassion ($M_{difference}$ = 0.12, 95% CI = −0.002 to 0.24, t[39] = 1.99, p = .053; Time 1 M = 3.02, SD = 0.75 and Time 2 M = 3.14, SD = 0.83) and mindfulness ($M_{difference}$ = 0.93, 95% CI = −0.44 to 2.29, t[39] = 1.37, p = .18; Time 1 M = 38.88, SD = 7.62 and Time 2 M = 39.80, SD = 7.29).

3.3. Bodies in Motion intervention effects

We present estimated means and standard deviations for each outcome variable of interest at each measured time-point in Table 2. From the repeated measures ANOVAs, we observed significant group differences in response trajectories only for thin-ideal internalization (see Fig. 1), $F(2) = 6.09$, p = .0038, partial η^2 = .060, based on the cut-off value established through the Holm's algorithm (p < .0042). Although not statistically significant based on the respective Holm's-estimated cut-off values, we visually observed group differences in response trajectories (i.e., instances in which the trajectories for the intervention and control groups crossed and thus demonstrated the expected variability between groups over time) for eight other outcome measures: body appreciation, body satisfaction, shape and weight concerns, bulimic symptomatology, negative affect, muscular-ideal internalization, positive affect, and sport-specific body pressures (see Figs. 1 and 2).

4. Discussion

4.1. Preliminary analyses and manipulation

We evaluated Bodies in Motion, a cognitive dissonance and mindful self-compassion-based program, with a mixed-sport sample of female collegiate athletes drawn from nine NCAA member institutions. Although we had a larger sample at the beginning of the study, we examined only those athletes who provided data from Time 1 through Time 3. Because there were no significant differences in the baseline measure scores between those athletes who provided complete data versus those who did not and because there were no significant differences in the proportion of athletes who dropped out of each condition, we considered the 98 included athletes as representative of the entire sample who started the study. Further, the intervention and control groups did not differ significantly in their baseline scores on age, BMI, or any of the outcome measures, which suggests that the two groups were comparable even though we were unable to apply random assignment across all the participants. As we predicted based on the Bodies in Motion content, there were significant increases in the intervention group's mindfulness and self-compassion from Time 1 to Time 2; no significant changes occurred over the same time-period for the control group's scores on these measures. These results suggest that two of the key psychological constructs in the intervention were successfully delivered to the athletes.

4.2. Bodies in Motion intervention effects

Our analytic approach to control the family-wise error rate (i.e., application of the Holm's algorithm) was indeed stringent. Coupled with the smaller number of athletes that comprised our final sample, it is not surprising that only one outcome (i.e., thin-ideal internalization) reached statistical significance. Although we cannot reject the null hypothesis for other outcome variables of interest, we observed visual evidence of varying, and crossing, group trajectories for body appreciation, body satisfaction, shape and weight concerns, bulimic symptomatology, and negative affect that would be considered statistically significant under traditional cut-off values (ps <.05); these outcomes demonstrate the most potential for more robust effects with a larger sample size and prolonged measurement of outcomes. However, when interpreting response trajectories for muscular-ideal internalization, positive affect, and sport-specific body pressures, it is important to acknowledge the discrete nature of the outcome measures and consider the relative scales and magnitudes of observed changes over time

Table 2
Interaction Effects for Intervention (n = 57) and Control (n = 40) Groups Sorted by p-values in Ascending Order.

Measures	Time 1 *M* (*SD*)	Time 2 *M* (*SD*)	Time 3 *M* (*SD*)	*F*	Partial-η^2	*p*-value	Holm's algorithm cut-off
Thin-Ideal Internalization							
Intervention	3.71 (0.79)	3.51 (0.93)	3.26 (1.01)	6.09	.060	.0036	.0042*
Control	3.46 (0.81)	3.47 (0.75)	3.48 (0.82)				
Body Appreciation							
Intervention	3.63 (0.79)	3.91 (0.76)	3.94 (0.83)	5.46	.006	.0055	.0045
Control	3.87 (0.81)	3.86 (0.77)	3.89 (0.74)				
Body Satisfaction							
Intervention	3.67 (1.07)	4.01 (1.18)	4.04 (1.24)	5.30	.006	.0058	.0050
Control	4.04 (1.04)	4.00 (1.04)	3.98 (1.02)				
Shape and Weight Concerns							
Intervention	4.63 (2.87)	3.48 (2.83)	3.22 (2.81)	4.97	.077	.0102	.0056
Control	3.67 (3.05)	3.26 (2.90)	3.30 (3.24)				
Bulimic Symptoms							
Intervention	1.51 (0.86)	1.07 (0.87)	.96 (0.84)	3.47	.035	.0380	.0063
Control	1.23 (0.95)	.96 (0.83)	.98 (0.94)				
Negative Affect							
Intervention	8.75 (2.73)	8.02 (3.06)	7.51 (2.65)	3.19	.046	.0457	.0071
Control	7.85 (3.31)	7.65 (3.00)	7.88 (3.60)				
Muscular-Ideal Internalization							
Intervention	3.86 (0.72)	3.75 (0.88)	3.50 (0.95)	2.26	.111	.1114	.0083
Control	3.68 (0.79)	3.77 (0.66)	3.59 (0.75)				
Positive Affect							
Intervention	14.16 (2.81)	14.70 (2.99)	14.60 (3.28)	1.85	.019	.1627	.0100
Control	14.70 (3.30)	14.25 (2.95)	14.20 (3.25)				
Sport-Specific Body Pressures							
Intervention	5.87 (2.32)	5.69 (2.44)	5.57 (2.31)	1.23	.013	.2914	.0125
Control	5.54 (2.10)	5.45 (2.10)	5.63 (2.16)				
Body Shame							
Intervention	2.96 (1.05)	2.61 (1.05)	2.46 (1.14)	0.59	.006	.5437	.0167
Control	2.74 (1.14)	2.52 (1.08)	2.41 (1.27)				
Dietary Intent							
Intervention	2.21 (0.81)	2.08 (0.75)	2.08 (0.82)	0.43	.006	.6212	.0250
Control	2.03 (0.72)	1.95 (0.73)	2.00 (0.76)				
General Socio. Body Pressures							
Intervention	10.58 (4.06)	10.04 (3.96)	9.79 (3.88)	0.22	.002	.7843	.0500
Control	10.83 (4.47)	10.06 (4.44)	10.20 (4.24)				

Note.
* Decision to reject the null was determined based on Holm's cutoff $p < .0042$.

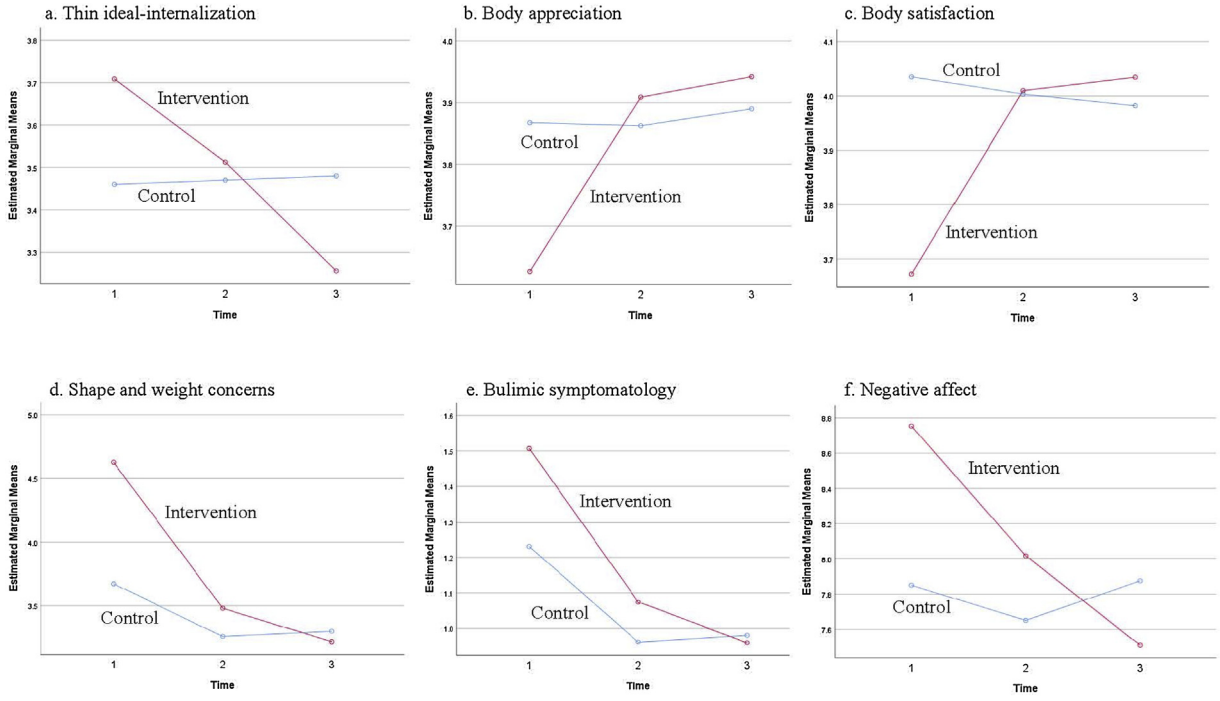

Fig. 1. Group-stratified mean profile plots of outcome scores demonstrating crossing group trajectories.

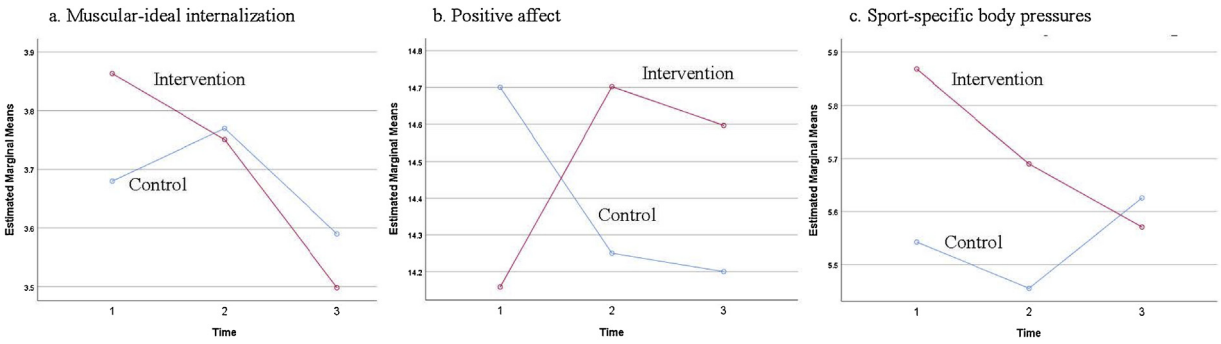

Fig. 2. Group-stratified mean profile plots of outcome scores demonstrating crossing group trajectories.

for each. Thus, we treat these results as having limited inferential capacity.

4.2.1. Body pressures

Given the ubiquity of societal messages about body, weight, and appearance, and the unique, powerful, and direct influence of sport-specific ones (Anderson et al., 2012), it is unsurprising that the interactions for the general sociocultural and sport-specific body pressure measures were not significant. Diminishing these pressures, which often originate from coaches, teammates, friends, family, and the media, likely requires macro-level interventions that target the pressure sources and positively shift beliefs and communications about weight and appearance (Buchholz, Mack, McVey, Feder, & Barrowman, 2008). Further, throughout our study, the athletes remained actively involved in their sports and continued to be exposed to the pressures within those environments. Thus, the athletes' consistent scores over time may have simply reflected their reality – sport-specific body pressures were a constant in their lives.

4.2.2. Internalization

Although perceptions of the athletes' general sociocultural and sport-specific body pressures did not change, the interaction for internalization of thin appearance ideals was significant. Consistent with results of other mindfulness (e.g., Atkinson & Wade, 2015) and dissonance-based programs (e.g., Becker et al., 2012), the effect for thin-ideal internalization in our study was moderate. A visual inspection of the profile plot revealed that thin-ideal internalization scores for the intervention group declined over the four to five months of the study, whereas the control group's scores remained consistent. Despite that all the athletes experienced similar levels of body pressures in their environments, those who completed Bodies in Motion minimized the extent to which they adopted such pressures as their own, even up to three to four months after program completion. One of the program's objectives was to help athletes adopt strategies, such as mindful self-compassion, to eschew appearance ideals and appreciate themselves and their bodies despite the ubiquitous body pressures in their environments. Our findings suggest that this objective was met and that athletes, even when immersed in environments that communicate potentially deleterious ideas about body weight, shape, size, and appearance, can begin to separate themselves from those ideals when given specific psychological tools. Importantly, similar findings were not identified for muscular-ideal internalization, which may speak to measurement concerns. Specifically, three of the questions on this subscale refer to looking "athletic." Thus, the measure may not be sufficiently sensitive to differentiate in a sample of women who likely perceive themselves as athletic already.

4.2.3. Body attitudes and affect

Although we cannot reject the null hypothesis when applying Holm's procedure, visual inspection of response trajectories for several body attitude measures, as well as negative affect, demonstrated the expected variability between groups over time. Over the course of the four to five months over which the female athletes were evaluated, those in the intervention group appeared to feel more satisfied with and appreciative of their bodies, feel less concerned with their body shape and weight, and experience fewer negative feelings generally, relative to the control group. Notably, similar trends were not identified for positive affect in the present study. It is possible that positive affect may be experienced primarily in relation to one's body initially (i.e., improvements in satisfaction and appreciation) and only generalizes to overall emotional states over longer periods of time.

Overall, these observations are consistent with other mindfulness (Atkinson & Wade, 2015) and dissonance-based (Becker et al., 2012) programs, which have demonstrated improvements in these constructs over time. For example, research on brief meditative self-compassion interventions has shown positive effects in decreasing body shame and increasing body appreciation among multi-generational women (Albertson, Neff, & Dill-Shackleford, 2015) and reducing body image distress in female undergraduates (Moffitt et al., 2018; Seekis et al., 2017; Toole & Craighead, 2016). Becker et al. (2012) reported decreases in thin-ideal internalization, shape concern, and negative affect from baseline to post-program and six weeks later for athletes in both their cognitive dissonance and healthy weight conditions.

4.2.4. Eating pathology

For the direct measures of eating pathology, our results were equivocal. We found no significant interaction with respect to the athletes' intentions to restrict their caloric intake nor their report of bulimic symptoms. However, like the body attitude and negative affect measures mentioned previously, the group trajectories for bulimic symptomatology scores varied over time in the expected manner. Specifically, the intervention group's reported level of bulimic symptomatology appeared to consistently decrease over the course of the study whereas the control group appeared to decrease and then increase between the second and third timepoints. Becker et al. (2012) reported changes in both measures at post-program across a combined set of athletes who had been assigned to either a cognitive dissonance or healthy weight condition. In each of these conditions, athletes received information about the female athlete triad, which includes disordered eating as one of its components, and this exposure may have facilitated improvements on both measures of eating pathology. Bodies in Motion does not address eating pathology in any of its sessions directly, and this difference in focus may be one reason we did not find immediate and robust changes in this area. Further, because

eating pathology is a downstream variable in most ED risk models (Stice et al., 2007), it would be expected to be one of the last constructs to change, particularly with respect to improvements in actual behaviors.

4.3. Strengths, limitations, and suggestions for future research

Establishing the effectiveness of programs that are time-limited is critical for student-athletes because their schedules are already maximized with training, travel, competitions, and school. Further, task-shifting to endogenous providers, versus using expert interventionists, has been identified as a critical consideration in wide-scale dissemination of mental health interventions (Fairburn & Patel, 2014). Our results suggest that a wide range of professionals endogenous to collegiate athletic departments can be trained in Bodies in Motion and successfully lead groups. Such Program Leaders already have established relationships with the female athletes in their departments, which may assist in developing strong leader-group alliances and creating a safe environment in which athletes can fully engage in each session. Time for training has been identified as a barrier to task-shifting approaches (Stice et al., 2007), but the time-limited nature of the Program Leader training and the availability for ongoing consultation with the authors appeared to ease this burden.

Due to the field-based nature of this study, and the time demands and realities of the collegiate sport environment, we were limited in our ability to fully implement random assignment across conditions at each institution. In some instances, athletes were assigned to condition based on their availability (e.g., an athlete might have been assigned to the control condition because of competitive travel over the month during which the program was being offered) and not due to randomization. We recognize that this reality was less than ideal in terms of experimental control. We did test the groups on their Time 1 outcome scores and found no differences between the intervention and control athletes, which suggests that the groups were comparable at the start of the study despite lack of random assignment. Further efforts to implement random assignment should be taken in future research to improve internal validity. Finally, although we assessed some aspects of the program's fidelity, we were limited in our ability to implement more stringent measures in this study, such as reviewing a randomly selected session from each facilitator to ensure that she was following the standardized protocol. In future studies, implementing such fidelity checks will be important to more fully assess the extent to which the program's content was delivered as intended.

Given the approach we took in conducting our analyses to control the family-wise error rate (i.e., application of the Holm's algorithm) and the smaller number of athletes that comprised our final sample, improvement in thin-ideal internalization over time, as compared to controls, is indeed a robust finding. However, due to our adjustment for multiple comparisons, our approach in preserving overall family-wise error rate may have also made us vulnerable to inflated likelihoods of Type II error, which is to reject an otherwise significant and meaningful finding. Future research conducted across even more sites and more athletes with random assignment across groups is needed to verify initial findings.

4.4. Conclusion

Bodies in Motion is a program based in cognitive dissonance and mindful self-compassion developed to improve body image and psychosocial well-being in female collegiate athletes. Our examination of the program across nine NCAA athletic departments indicates that it can be successfully implemented using a school's existing personnel and delivered to female athletes despite their busy schedules and the realities of their multiple obligations. Athletes who completed Bodies in Motion reported statistically significant decreases in the extent to which they internalized thin appearance ideals as compared to controls. Further, our results suggest that athletes who complete Bodies in Motion may also experience positive changes in their emotional well-being (decreases in negative affect) and in their relationship with their bodies (increases in body appreciation and satisfaction and decreases in concerns about their body shape and weight) compared to controls. Although our initial, field-based test of Bodies in Motion provides preliminary support, additional testing is necessary to further establish its efficacy as a mechanism for helping female athletes develop a healthier and more positive relationship with themselves, their bodies, and ultimately, eating.

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