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Effectiveness of a dissonance-based eating disorder prevention program for ethnic groups in two randomized controlled trials

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ABSTRACT

Objective: As young women from certain ethnic minority groups have reported less pursuit of the thin ideal and body dissatisfaction than European American young women we tested whether a dissonance-based prevention program designed to reduce thin-ideal internalization among women with body dissatisfaction is less effective for the former relative to the later groups. We also tested whether intervention effects are larger when participants from minority groups worked with a facilitator matched versus not matched on ethnicity.
Method: In Study 1, 426 female undergraduates (*M* age = 21.6, *SD* = 5.6) were randomized to clinician-led *Body Project* groups or an educational control group. In Study 2, 189 female undergraduates were randomized to peer-led *Body Project* groups or a waitlist control condition.
Results: Although there was some variation in risk factor scores across ethnic groups, ethnic minority participants did not demonstrate consistently higher or lower risk relative to European American participants. Intervention effects did not significantly differ for participants from minority groups versus European American participants in either trial. There was no evidence that effects were significantly larger when minority participants and facilitators were matched on ethnicity.
Conclusions: Results suggest that the *Body Project* is similarly effective for African American, Asian American, European American, and Hispanic female college students, and when participants and facilitators are matched or not on minority ethnicity status, implying that this prevention program can be broadly disseminated in this population.

Eating disorders, which afflict 10–13% of young women (Hudson, Hiripi, Pope, & Kessler, 2007; Stice, Marti, & Rohde, 2013), are marked by chronicity, relapse, distress, impairment, and future obesity, depression, suicide attempts, anxiety disorders, substance abuse, and mortality (Arcelus, Mitchell, Wales, & Nielsen, 2011; Crow et al., 2009; Stice, Marti, & Rohde, 2013; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Thus, a public health priority is to develop eating disorder prevention programs that are effective for most adolescent girls and young women so that they can be widely disseminated.

Certain prevention programs have reduced eating disorder symptoms in a single trial (e.g., Jones et al., 2008; McVey, Tweed, & Blackmore, 2007; Neumark-Sztainer, Butler, & Palti, 1995), but multiple trials conducted by independent teams have provided support for a dissonance-based eating disorder prevention program for young women at risk for eating disorders due to body dissatisfaction (Stice, Shaw, Burton, & Wade, 2006). In the *Body Project* intervention participants engage in verbal, written, and behavioral exercises in which they critique the thin ideal espoused for women. These activities theoretically produce cognitive dissonance that motivates participants to reduce pursuit of this ideal, which decreases body dissatisfaction, unhealthy weight control behaviors, negative affect, and eating disorder symptoms. In support of the intervention theory for this program, reductions in thin-ideal internalization mediate the effects of the *Body Project* on change in the other outcomes (Seidel, Presnell, & Rosenfield, 2009; Stice, Presnell, Gau, & Shaw, 2007). In line with the thesis that dissonance induction contributes to intervention effects, participants assigned to versions of this intervention designed to maximize dissonance induction, versus content-matched versions designed to minimize dissonance induction, showed greater eating disorder symptom reduction (Green, Scott, Diyankova, Gasser, & Pederson, 2005; McMillan, Stice, & Rohde, 2011).

Efficacy trials show that this prevention program produces greater reductions in risk factors (e.g., thin-ideal internalization,

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body dissatisfaction, negative affect), eating disorder symptoms, functional impairment, and future eating disorder onset over a 3-year follow-up versus control conditions or alternative interventions (Becker, Smith, & Ciao, 2005; Becker et al., 2010; Halliwell & Diedrichs, 2013; Matusek, Wendt, & Wiseman, 2004; Mitchell, Mazzeo, Rausch, & Cooke, 2007; Stice, Marti, Spoor, Presnell, & Shaw, 2008; Stice et al., 2006). Effectiveness trials have confirmed that this intervention produces similar effects when high school and college counselors recruit and deliver the intervention to at-risk young women with body image concerns under ecologically valid conditions, including significant eating disorder symptom reductions that persist through 3-year follow-up (Stice, Butryn, Rohde, Shaw, & Marti, 2013; Stice, Rohde, Shaw, & Gau, 2011).

Although the efficacy and effectiveness trials included participants from multiple ethnic groups, it is unclear whether this prevention program is similarly effective for various ethnic groups. This is crucial to expressly test before broadly disseminating the *Body Project* because there is evidence that relative to European American young women, African Americans and Hispanic young women report less subscription to the thin ideal and body dissatisfaction (Grabe & Hyde, 2006; Roberts, Cash, Feingold, & Johnson, 2006; Shaw, Ramirez, Trost, Randall, & Stice, 2004; Warren, Gleaves, Cepeda-Benito, Fernandez, & Rodriguez, 2005). Although these effects are not large or consistently observed, these findings imply that the *Body Project* may be less effective for minority groups because it focuses on critiquing the thin ideal among young women with body dissatisfaction. The finding that the *Body Project* produces significantly stronger effects for young women with higher versus lower thin-ideal internalization (Stice, Marti, Shaw, & O'Neil, 2008) suggests that if members from certain minority groups report less subscription to this ideal, the intervention might be less effective for those groups. If this eating disorder prevention program is less effective for certain ethnic groups, it may be necessary to create alternative versions of this prevention program that are tailored for different ethnic groups to maximize intervention effects.

To date, only one study has tested whether the *Body Project* produced significantly weaker effects for participants from certain ethnic groups relative to European American participants (Rodriguez, Marchand, Ng, & Stice, 2008). There were no significant differences in the effects of the *Body Project* on eating disorder risk factors or symptoms for European American, Asian American, and Hispanic participants. However, this study did not test whether the effects of the *Body Project* were significantly different for African American versus European American participants. Further, this initial trial examined only pre-to-post effects. Thus, the aim of Study 1 was to test whether the *Body Project* produced similar intervention effects for African American, Asian American, and Hispanic participants relative to European American participants through 1-year follow-up. The evidence that compared to European American participants, African American and Hispanic participants report less subscription to the thin ideal and body dissatisfaction suggests that the *Body Project* may be less effective for the former participants because the intervention strives to reduce pursuit of this unrealistic beauty ideal among women with body dissatisfaction.

Scholars have also argued that psychological treatments may be more effective for members from ethnic minority groups if a clinician from the same ethnic group delivers the intervention (Maramba & Nagayama Hall, 2002; Shin et al., 2005; Sue, Fujino, Hu, Takeuchi, & Zane, 1991). Theoretically a match between the ethnicity of the client and clinician results in a greater similarity in worldviews and credibility (Byrne, 1971; Simons, Berkowitz, & Moyer, 1970; Zane et al., 2005). However, meta-analytic reviews have found minimal effects of ethnic matching on premature termination of clients, number of sessions attended, functioning at termination, or treatment effects (Cabral & Smith, 2011; Maramba & Nagayama Hall, 2002; Shin et al., 2005). Yet we were unable to locate research that has tested whether ethnic matching is related to the magnitude of effects of prevention programs. Thus, the first aim of Study 2 was to test whether intervention effects are larger for ethnic minority group members when they matched the ethnicity of at least one of the facilitators versus when they did not. Data for Study 2 were drawn from a pilot trial of peer-led *Body Project* groups; the fact that more peer leaders were from minority groups relative to the clinician-leaders involved in Study 1 makes this trial well suited to evaluating the effects of ethnic matching. A second aim of Study 2 is to provide a test of whether the *Body Project* produced similar intervention effects for African American, Asian American, and Hispanic participants relative to European American participants when this eating disorder prevention program is facilitated by peer-leaders versus clinicians, as this question has not been addressed previously. Given that peer-leaders are currently delivering the *Body Project* at over 100 universities in the US, it is crucial to test whether intervention effects are similar for different ethnic groups.

Study 1 methods

Participants and procedures

Participants were 437 young women (*M* age = 21.6, *SD* = 5.6; *M* BMI [kg/m^2] = 24.4, *SD* = 5.0) recruited from seven universities in Oregon, Pennsylvania, and Texas. Participants were assigned to *Body Project* groups, an educational brochure control condition, or a video control condition. Given that there were no significant differences in change in outcomes for the two control conditions, we combined them to increase sensitivity of the analyses. We classified participants into four major ethnic groups: African American, Asian American/Pacific Islander, European American, and Hispanic. Because there were not enough Native American participants to test the effects of this intervention for this ethnic group, they were excluded from analyses, reducing the intervention and control groups to 197 and 229 participants respectively. The control group consisted of 41 Asian Americans, 14 African Americans, 151 European Americans, and 23 Hispanics; the intervention group consisted of 31 Asian Americans, 13 African Americans, 124 European Americans, and 29 Hispanics. Average parental education was 14% high school graduate or less, 24% some college, 34% college graduate, and 29% advanced graduate/professional degree.

From October 2009 to October 2011 college clinicians recruited participants using e-mails and posters inviting women with body image concerns to participate in a trial designed to improve body acceptance. We provided text for recruitment e-mails, which were distributed through list-serves, and recruitment fliers, which were posted around campus. Participants had to answer yes when asked, "*Do you have body image concerns?*" during phone screening with research staff. Assessors collected informed written consent. Research staff excluded students who met criteria for DSM-IV anorexia nervosa, bulimia nervosa, or binge eating disorder at pretest. The 4 students who met criteria for these disorders were encouraged to seek treatment because these interventions were not sufficient for them and given referrals. Fig. 1 provides data on participant flow through this trial. Participants were randomly assigned to condition using a random number table. The *Body Project* consisted of 4 weekly 1-h group sessions with 5–9 participants of various ethnicities. Facilitators delivered the intervention using a scripted manual.

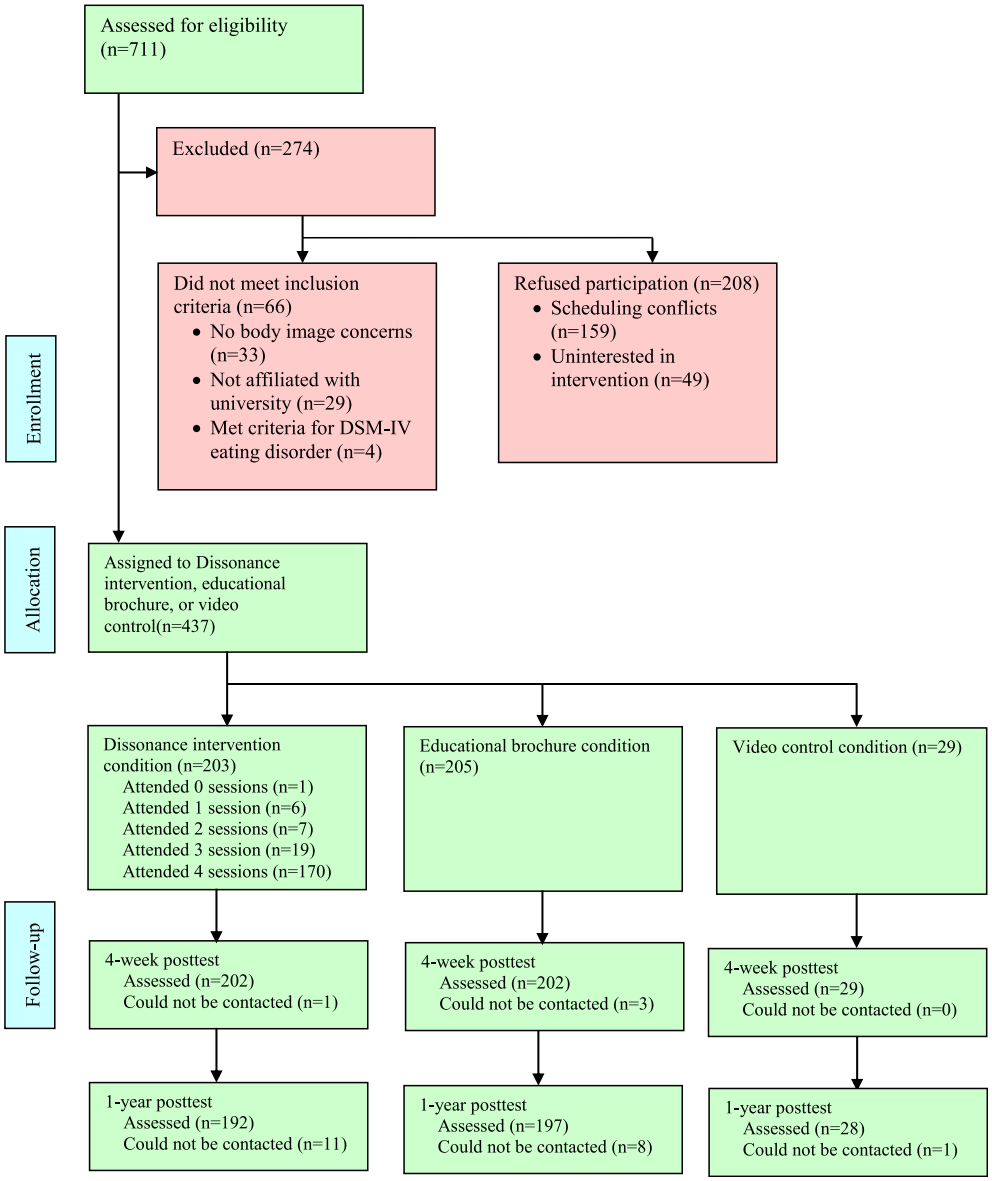

Fig. 1. Participant flow throughout Study 1.

The 27 facilitators held bachelors, masters, or doctoral degrees in psychology, counseling, nutrition, or a related field. Most were female (89%), European American (97%), and between the ages of 26–35 (59%). Facilitator training involved reading key trials of the *Body Project* (Stice, Marti, Spoor, et al., 2008; Stice et al., 2006) and the scripted manual, and attending a 4-h workshop to learn the intervention rationale and supporting evidence, role-play intervention components, and discuss process issues (e.g., homework compliance and retention).

Participants completed assessments at pretest, posttest, and 1-year follow-up, receiving $30, $35, and $40 (respectively) for completing these assessments. Female assessors, who had a B.A. or M.A. in psychology, were blinded to condition. Assessors attended 24 h of training, wherein they received instruction in interview skills, reviewed eating disorder diagnostic criteria, observed simulated interviews, and role-played interviews. They also attended annual refresher trainings. They had to demonstrate inter-rater agreement (kappa [k] > .80) with supervisors using 12 audio-recorded interviews conducted with individuals with and without eating disorders before collecting data. Weekly consensus meetings resolved diagnostic ambiguities. The institutional review board at each campus approved this project.

Body Project

In this trial we evaluated a new enhanced dissonance version of the *Body Project* that incorporated elements to maximize dissonance-induction (e.g., we underscored the voluntary nature of participation in the sessions, increased the public accountability of counter-thin-ideal statements, and made exercises more difficult). In session 1 participants volunteer to verbally participate in the session, collectively define the thin-ideal, discuss costs of pursuing this ideal, and are assigned home exercises (e.g., write an essay about the costs associated with pursuing the thin-ideal). In session 2 participants discuss each home exercise, dissuade facilitators from pursuing the thin-deal in role-plays, and are assigned more exercises (e.g., generate a top-10 list of things young women can do to challenge the thin-ideal). In session 3 participants discuss home

exercises, conduct role-plays challenging thin-ideal statements, discuss personal body image concerns, and are assigned home exercises (e.g., engage in a behavior that challenges their body image concerns). In session 4 participants discuss home exercises, plan for future pressures to be thin, discuss perceived benefits of the group, and are assigned exit home exercises (e.g., write a letter to a younger adolescent girl about avoiding development of body image concerns).

Educational video control condition

Participants were asked to view *Dying to be Thin*, a 55-min documentary on eating disorders, body dissatisfaction, and body acceptance. They were sent the link to a web page where they could view the video for free. The documentary features topics such as the cultural pressures to be thin, physical and emotional consequences of subscribing to this ideal, and treatment/recovery from eating disorders. Expert presentations and personal stories of survivors of eating disorders cover these topics.

Educational brochure control condition

Participants received a 2-page brochure produced by the National Eating Disorders Association in 2002 that describes negative and positive body image, notes that negative body image is associated with increased risk for eating disorders, and offers 10 steps for achieving a positive body image. Participants were mailed the brochures after randomization, which occurred after the baseline assessment. Participants in this and the other conditions were referred to treatment if they met criteria for threshold or subthreshold anorexia nervosa, bulimia nervosa, or binge eating disorder.

Supervision, fidelity ratings, and competence ratings

Supervisors reviewed video-recordings of the first group conducted by facilitators and a randomly selected 50% of the sessions for their second group; facilitators were sent supervisory e-mail messages that generally praised them for good group management skills and adherence to the script and offered constructive suggestions as necessary. The supervisors also independently coded a randomly selected 50% of the sessions for implementation fidelity and facilitator competence. Details regarding fidelity and competence ratings are provided in the report describing the main effects of the *Body Project* in this effectiveness trial (Stice, Butryn, et al., 2013).

Measures

Thin-ideal internalization

The 6-item Ideal-Body Stereotype Scale-Revised assessed thin-ideal internalization (Stice et al., 2006) using a response format ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Items were averaged for this scale and those described below. It has shown internal consistency (α = .91), 2-week test-retest reliability (r = .80), predictive validity for bulimic symptom onset, and sensitivity to detecting intervention effects (Stice, Marti, Spoor, et al., 2008). The Cronbach's α was low at pretest (α = .65); the item, *Shapely women are more attractive*, did not elicit responses consistent with the other items and was thus dropped. The remaining 5 items exhibited higher internal consistency (α = .72 at pretest). Table 1 provides the α values for each scale separately for each ethnic group, combining across samples when possible.

Body dissatisfaction

Items from the Satisfaction and Dissatisfaction with Body Parts Scale (Berscheid, Walster, & Bohrnstedt, 1973) assess satisfaction with nine body parts using a response scale ranging from 1 = *extremely satisfied* to 6 = *extremely dissatisfied*. This scale has shown internal consistency (α = .94), 3-week test-retest reliability (r = .90), predictive validity for bulimic symptom onset, and sensitivity to intervention effects (Stice, Marti, Spoor, et al., 2008); α = .82 at pretest.

Dieting

The 10-item Dutch Restrained Eating Scale (DRES; van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986) assessed dieting behaviors using a response scale ranging from 1 = *never* to 5 = *always*. It has shown internal consistency (α = .95), 2-week test-retest reliability (r = .82), convergent validity with self-reported, but not objectively measured caloric intake, predictive validity for bulimic symptom onset, and sensitivity to intervention effects (Stice, Marti, Spoor, et al., 2008; van Strien et al., 1986); α = .92 at pretest.

Negative affect

The 21-item Beck Depression Inventory (BDI; Beck, Steer, & Garbin, 1988) assessed negative affect; response options ranged from 0 = no symptoms present to 3 = severe symptoms. It has shown internal consistency (α = .73–.95), test–retest reliability (r = .60–.90), and convergent validity with clinician ratings of depressive symptoms (M r = .75; Beck et al., 1988); α = .91 at pretest.

Eating disorder symptoms

Eating disorder symptoms were assessed with the semi-structured Eating Disorder Diagnostic Interview (EDDI), which assesses symptoms of DSM-IV eating disorders. Reports of symptoms in the past month were summed to form a composite, which has shown internal consistency (α = .92), inter-rater agreement (ICC r = .93), 1-week test-retest reliability (ICC r = .95), sensitivity to prevention and treatment interventions, and predictive validity for future onset of depression (Burton & Stice, 2006; Stice, Rohde, Gau, & Shaw, 2009). The symptom composite showed internal consistency at pretest (α = .69), inter-rater agreement for 77 randomly selected participants (ICC = .84), and 1-week test-retest reliability for 75 randomly selected participants (ICC = .95). The 1-week test–retest reliability was ICC = .98 for Asian American, ICC = .97 for African American, ICC = .96 for European American, and ICC = .88 for Hispanic participants.

Table 1
Average of pre- and post-intervention Cronbach's α by ethnic group.

Outcome	European American	African American	Asian American	Hispanic
Thin-ideal internalization	0.75	0.77	0.79	0.83
Body dissatisfaction	0.87	0.82	0.91	0.88
Dieting	0.92	0.91	0.93	0.92
Negative affect	0.91	0.93	0.93	0.92
Eating disorder symptoms (EDDI)[a]	0.75	0.64	0.75	0.73
Eating disorder symptoms (EDDS)[b]	0.69	0.80	0.69	0.74

[a] Study 1 only.
[b] Study 1 subsample and Study 2 only.

Statistical methods

Missing data

Multiple imputation was used to replace missing values following best-practice recommendations for handling missing data (Graham, 2009). Values for missing data were imputed with the Amelia package developed for the R project (Honaker, King, & Blackwell, 2011), which uses available data to impute missing values via a bootstrapping approach. The observed and imputed data were compared to ensure they showed similar distributions (Abayomi, Gelman, & Levy, 2008). Missing data were replaced with imputed values in 20 data sets and each data set was analyzed separately. Model parameters and standard errors from models fit to each of the twenty data sets were combined following Rubin (1987). For likelihood ratio statistic model comparisons used to estimate multi-parameter effects (e.g., the ethnicity main effect), Schafer's (1997) method for combining χ^2 statistics was implemented to compute an F test. Effect size estimates for interactions were estimated in a Cohen's d standard deviation metric using formulas from Friedman (1982) and Lipsey and Wilson (2001).

Preliminary analyses

We tested whether conditions and ethnicities differed at pretest on demographic variables to test whether randomization created equivalent groups and whether there were baseline differences across ethnic groups using a general linear model. In the event of a significant F test for ethnicity effects, we examined contrasts between European Americans and each other ethnic group. We examined the distribution of variables and evaluated potential sources of non-independence. In the event of skewed or kurtotic distributions, we transformed data so that distributions better approximated normal distributions.

Model building

All models were fit using linear mixed effects models, which accommodate multilevel data structures, using the lmer function in the lme4 package from the R project (Bates, Maechler, & Bolker, 2013; Gelman & Hill, 2007). Models tested whether the *Body Project* produced similar reductions in outcomes across ethnic groups with a time × condition × ethnicity interaction. Intercept coefficients were random on participant to account for non-independence across repeated measurements within participants. We also evaluated two other potential sources of variability: intervention groups and study site. In the event of significant variability attributable to group or site random effects, we included these in the models. The group random effect was modeled using a partially clustered design (Baldwin, Bauer, Stice, & Rohde, 2011), which accommodates designs in which participants in one condition are clustered (e.g., intervention groups) and participants in the other condition are not (e.g., control group participants). For each model, we followed longitudinal model building recommendations from Singer and Willett (2003) in which unconditional conditional growth models are fit to determine the best model of change prior to adding other independent variables to the model. The best model was selected using Akaike Information Criterion (AIC) values following Burnham and Anderson (2002). We assessed a differential elevation change model (i.e., mean difference) in which time was modeled as pretest versus follow-up time points (posttest and 1-year follow-up). Longitudinal change in this model is dummy coded (pretest = 0, posttest time points = 1), which contrasts pretest values with the follow-up time points. The longitudinal elevation and slope change model added a slope parameter to the previous model that represented change in the outcome following the intervention. We also tested whether time was better represented with a natural-log and quadratic change terms.

Effect sizes

We assessed raw change effect sizes (d) for each ethnicity (e.g., [M eating disorder symptoms at post − M eating disorder symptoms at pre for the intervention participants] − [M eating disorder symptoms at post − M eating disorder symptoms at pre for control participants]/eating disorder SD at pre for control participants) to evaluate whether intervention effect sizes differed across ethnicities.

Results

Preliminary analyses

The distributions of outcomes were approximated normal, with the exceptions of negative affect and eating disorder symptoms. We applied natural log transformations to these variables to reduce positive skew. Intervention versus control participants did not significantly differ on demographics or outcomes at pretest with the exception of eating disorder symptoms ($t[424] = 2.13$, $p = .034$, $d = 0.21$) for which the *Body Project* participants reported higher scores. Analyses testing for effects on this outcome control for baseline levels of eating disorder symptoms.

Ethnic groups did not differ on age, but did differ on BMI ($F[3, 420] = 8.24$, $p < .001$); relative to European American participants, Asian American participants had lower BMI ($t[420] = -2.95$, $p = .003$, $d = -0.43$), Hispanic participants had higher BMI ($t[420] = 2.89$, $p = .004$, $d = 0.44$), and African American did not differ on BMI ($p = .059$, $d = 0.37$). Ethnic groups also differed on parental education ($F[3, 422] = 12.03$, $p < .001$); European American participants had higher average parental education than Hispanic participants ($t[422] = -5.95$, $p < .001$, $d = -0.88$), but did not differ from African American ($p = .135$, $d = -0.34$) or Asian American participants ($p < .179$, $d = -0.18$). Ethnic groups did not differ on pretest body dissatisfaction, dieting, or negative affect, but differed on thin-ideal internalization ($F[3, 422] = 11.43$, $p < .001$) and eating disorder symptoms ($F[3, 422] = 2.85$, $p = .037$). For thin-ideal internalization, compared to European American participants, African American participants had lower scores ($t[422] = -4.00$, $p < .001$, $d = -0.80$), while Asian American ($t[422] = 3.19$, $p = .002$, $d = 0.44$) and Hispanic ($t[422] = 2.12$, $p = .035$, $d = 0.33$) participants had higher scores. For eating disorder symptoms, Hispanic participants had higher symptoms than European American participants ($t[422] = 2.92$, $p = .004$, $d = 0.44$); African American ($p = .573$, $d = 0.11$) and Asian American participants ($p = .637$, $d = 0.06$) did not differ from European American participants.

Data were complete at pretest, 1% were missing at posttest, and 7% were missing at 1-year follow-up. For Asian Americans attrition was 1% at posttest and 11% at 1-year follow-up, for African Americans attrition was 0% at posttest and 4% at 1-year follow-up, for European Americans attrition was 1% at posttest and 3% at 1-year follow-up, and for Hispanics attrition was 0% at posttest and 4% at 1-year follow-up. The average attendance rate across the four sessions was .80 ($SD = .33$) for Asian Americans, .81 ($SD = .23$) for African Americans, .87 ($SD = .22$) for European Americans, and .84 ($SD = .24$) for Hispanics. Means and SD for outcomes at each condition at each time point are presented in Table 2.

Table 2
Means and standard deviations for outcomes by ethnicity by condition at pretest, posttest, and 1-year follow-up.

Outcome/Race	Control			Body Project		
	Pretest	Posttest	1-year follow-up	Pretest	Posttest	1-year follow-up
Thin-ideal internalization						
Asian American	4.00 (0.47)	3.88 (0.48)	3.82 (0.53)	4.17 (0.57)	3.63 (0.75)	3.77 (0.53)
African American	3.26 (0.65)	3.33 (0.63)	3.26 (0.91)	3.58 (0.81)	3.09 (0.81)	3.29 (0.84)
Hispanic	4.11 (0.60)	3.99 (0.72)	3.93 (0.77)	3.94 (0.57)	3.43 (0.78)	3.41 (0.66)
European American	3.82 (0.51)	3.78 (0.52)	3.69 (0.62)	3.88 (0.49)	3.43 (0.60)	3.53 (0.57)
Body dissatisfaction						
Asian American	3.09 (0.65)	2.86 (0.72)	3.00 (0.81)	3.53 (0.87)	2.97 (0.93)	2.81 (0.77)
African American	3.11 (0.59)	2.84 (0.73)	3.05 (0.64)	3.31 (0.69)	2.82 (0.72)	2.63 (0.59)
Hispanic	3.62 (0.87)	3.47 (0.95)	3.30 (0.83)	3.56 (0.67)	2.76 (0.69)	2.75 (0.87)
European American	3.32 (0.72)	3.20 (0.69)	3.11 (0.74)	3.33 (0.72)	2.78 (0.73)	2.82 (0.80)
Dieting						
Asian American	2.92 (0.87)	2.51 (0.88)	2.65 (0.84)	2.92 (0.93)	2.33 (1.12)	2.22 (0.92)
African American	2.39 (0.97)	2.39 (0.93)	2.68 (1.25)	2.87 (0.73)	2.27 (0.85)	2.24 (0.86)
Hispanic	2.56 (1.08)	2.35 (0.95)	2.52 (0.92)	3.07 (0.85)	2.29 (0.86)	2.31 (0.85)
European American	2.75 (0.83)	2.61 (0.88)	2.54 (0.85)	2.81 (0.90)	2.24 (0.87)	2.28 (0.84)
Negative affect						
Asian American	8.85 (7.36)	7.97 (7.92)	5.70 (6.24)	14.84 (10.49)	10.58 (10.98)	9.37 (10.67)
African American	13.36 (12.59)	12.00 (11.19)	12.90 (9.69)	12.15 (8.32)	8.42 (7.45)	11.18 (9.52)
Hispanic	14.28 (11.43)	12.87 (10.69)	13.81 (12.70)	13.83 (8.44)	7.03 (7.03)	7.36 (8.19)
European American	11.29 (7.76)	9.75 (7.61)	9.42 (8.56)	11.48 (8.74)	7.16 (7.77)	7.49 (7.37)
Eating disorder symptoms						
Asian American	9.88 (7.54)	6.90 (5.12)	9.16 (9.02)	13.42 (10.41)	8.39 (8.98)	17.89 (50.41)
African American	9.93 (7.50)	11.93 (12.09)	11.00 (12.67)	12.31 (6.14)	10.46 (11.16)	9.25 (5.86)
Hispanic	11.43 (7.66)	10.61 (9.33)	10.52 (9.80)	18.28 (15.35)	7.69 (7.21)	9.90 (9.51)
European American	10.80 (9.69)	9.14 (10.62)	9.75 (9.60)	11.23 (9.32)	6.93 (8.50)	9.27 (13.46)

Ethnic differences in intervention effects

In our assessment of unconditional growth models, the pretest to posttest elevation change model consistently exhibited the smallest AIC values and was thus implemented in all longitudinal models and is henceforth simply referred to as time. There were no significant ethnicity × intervention × time interactions for thin-ideal internalization ($F[3, 844] = 0.17$, $p = .913$, $d < 0.01$), body dissatisfaction ($F[3, 844] = 0.39$, $p = .759$, $d < 0.01$), dieting ($F[3, 844] = 1.32$, $p = .268$, $d = 0.07$), and negative affect ($F[3, 844] = 1.78$, $p = .150$, $d = 0.11$), or eating disorder symptoms ($F[3, 844] = 0.95$, $p = .414$, $d < 0.01$), suggesting similar effects for the ethnic groups. Table 3 reports pre- to post-intervention effect sizes (Cohen's *d*) for each ethnic group.

Study 2

Participants and procedures

Participants were 192 young women (*M* age = 20.9, *SD* = 3.8; *M* BMI [kg/m^2] = 23.5, *SD* = 4.4) recruited from two universities in Texas. Participants were randomized to peer-led *Body Project* groups or a waitlist control condition. We used a waitlist control condition because staff from the peer-leader programs at the universities wanted to offer the prevention program to all interested students. Ethnicity was classified participants into the same four major racial/ethnic groups used in Study 1: African American, Asian American/Pacific Islander, European American and Hispanic. There were not enough Native American participants for analyses, so we excluded participants reporting this ethnicity, reducing the intervention and control groups to 123 and 66 participants respectively. The control group consisted of 18 Asian Americans, 7 African Americans, 30 European Americans, and 11 Hispanics; the intervention group consisted of 38 Asian Americans, 6 African Americans, 50 European Americans, and 29 Hispanics. Although we had limited sensitivity for the analyses involving African American participants, we thought it useful to determine whether the effect sizes involving this groups were similar in magnitude from Study 1. Average parental education was 18% high school graduate or less, 19% some college, 28% college graduate, and 35% advanced graduate/professional degree.

Table 3
Study 1 pre- to post-intervention change effect sizes (Cohen's *d*) by ethnic group.

Outcome	European American	African American	Asian American	Hispanic
Thin-ideal internalization	−0.80	−0.85	−0.89	−0.65
Body dissatisfaction	−0.59	−0.39	−0.52	−0.76
Dieting	−0.52	−0.62	−0.21	−0.52
Negative affect	−0.43	−0.31	−0.48	−0.86
Eating disorder symptoms	−0.46	−0.44	−0.30	−0.98

From January 2011 to October 2012, participants were recruited using the same procedures as used in Study 1. Fig. 2 provides information on participant flow through Study 2. Participants were randomly assigned to peer-led *Body Project* groups ($n = 80$) or a waitlist control condition ($n = 68$). We also included an additional 44 participants who were randomly assigned to peer-led *Body Project* groups from a second trial (see Stice, Rohde, Durant, Shaw, & Wade, 2013 for details). The recruitment procedures were similar in the two pilot trials. Thus, in total there were 124 participants in the *Body Project* condition for these analyses. Pairs of peer facilitators delivered the intervention, which consisted of 4 weekly 1-h group sessions with 6–8 participants of various ethnicities.

The 24 peer leaders were advanced undergraduates interested in learning how to deliver this prevention program (*M* age = 21.3, range 18–25; 8% African American; 38% European American, 29% Asian American, 25% Hispanic, 92% female, 8% male). Nineteen of the 21 groups had at least one ethnic minority facilitator and two groups had only European American facilitators. Peer leaders in Study 2 received a slightly longer 6-h training that involved more role-plays of delivering the intervention activities and additional

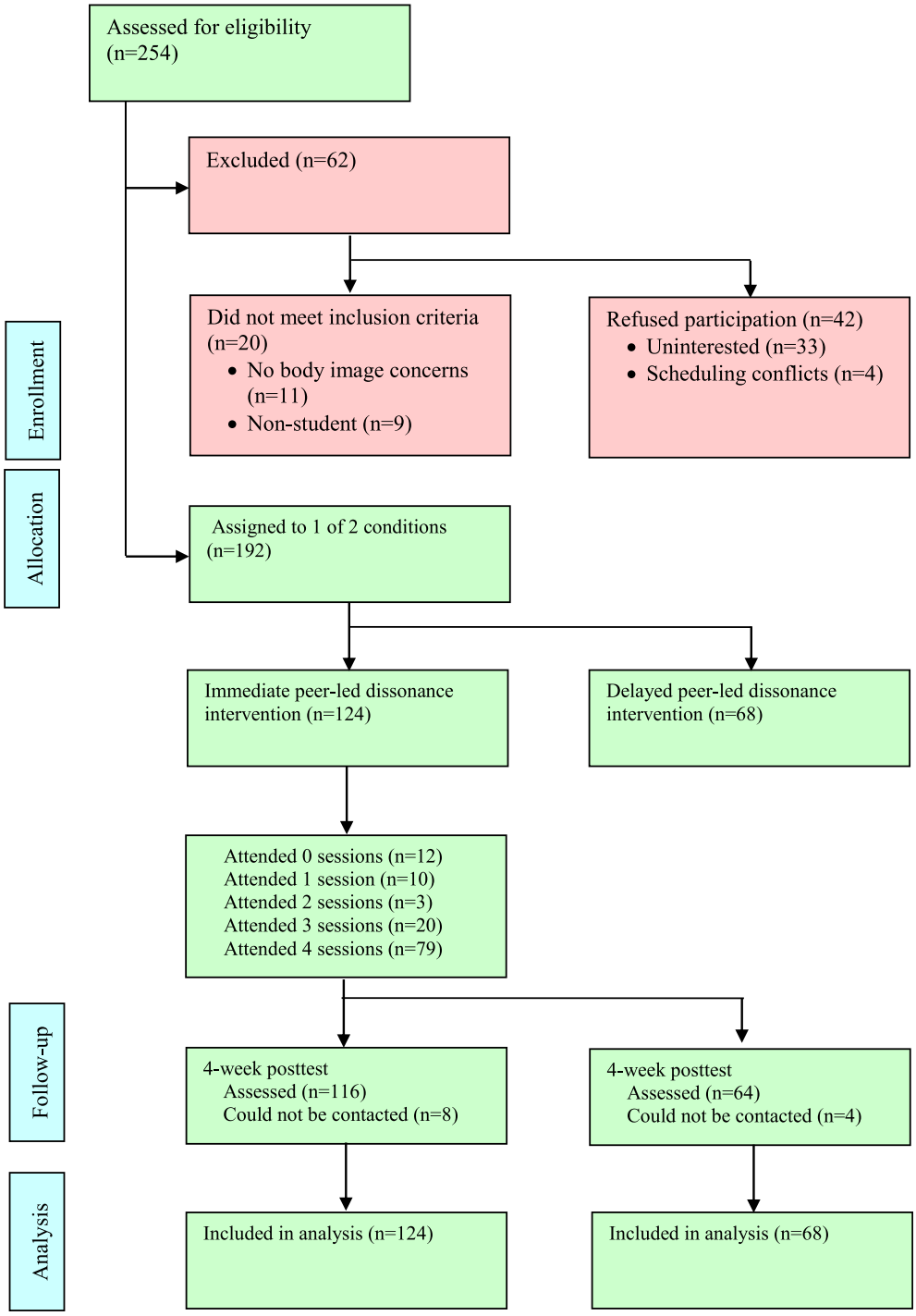

Fig. 2. Participant flow throughout Study 2.

instruction regarding group facilitation skills. All group sessions were video-recorded. Fidelity and competence ratings were again used to provide email supervision.

Participants completed surveys at pretest and 4-week posttest. The surveys used in Study 1 were used in Study 2 to assess thin-ideal internalization (pretest $\alpha = .73$), body dissatisfaction ($\alpha = .82$), dieting ($\alpha = .88$), and negative affect ($\alpha = .90$). The self-report Eating Disorder Diagnostic Survey (EDDS, Stice, Melissa & Martinez, 2004; Stice, Telch, & Rizvi, 2000) assessed eating disorder symptoms using questions adapted from EDDI. The EDDS symptom composite has shown internal consistency ($\alpha = .89$), 1-week test–retest reliability ($r = .87$), and convergent validity with the symptom composite from the EDDI ($r = .82$); eating disorder diagnoses from the EDDS have shown convergent validity with EDDI diagnoses ($\kappa = .78$–$.83$) (Stice et al., 2000, 2004); $\alpha = .81$ at pretest.

Statistical methods

Missing data were imputed using multiple imputation and inferential tests based on the analysis of imputed data were performed following procedures used in Study 1. Preliminary analyses

examining intervention group and ethnic differences in demographics and examination of distributions were also performed following procedures used in Study 1.

Model building

Models for Aim 1 in Study 2 were fit in a manner similar to the models from Study 1. The only difference in the model-building sequence was in the unconditional growth model. Because the study had only pre- and post-intervention assessments, time was dummy coding pre- and post-intervention (pretest = 0, posttest = 1). For Aim 2, a dummy variable was computed that indicated whether minority participants were in a group that was conducted by at least one facilitator of the same ethnic group or not. Aim 2 models were fit for *Body Project* participants using mixed models constructed in the same manner as used in Aim 1. Models included time (i.e., pre- to post-intervention change), facilitator-participant matched on ethnicity, time × facilitator-participant matched on ethnicity, and the a mean-centered baseline assessment of the outcome.

Results

Preliminary analyses

The distributions of our dependent variables indicated that distributions were approximated normal, with the exceptions of negative affect and eating disorder symptoms. We applied natural log transformations to these variables. Participants in the intervention condition did not significantly differ from control conditions on demographics or pretest versions of the outcomes with the exception of age ($t[187] = 2.43$, $p = .016$, $d = 0.37$) for which *Body Project* participants exhibited a significantly lower average. Age was thus included as a covariate in models testing for intervention effects.

There was no significant ethnic difference for baseline age. There was a significant ethnic difference in BMI ($F[3, 181] = 8.70$, $p < .001$); relative to European American participants, Hispanic ($t[181] = 2.03$, $p = .044$, $d = 0.44$) and African American participants had higher BMI scores ($t[181] = 4.41$, $p < .001$, $d = 1.26$), but Asian American participants did not differ on BMI ($p = .465$, $d = -0.14$). There were ethnic differences in parental education ($F[3, 185] = 7.72$, $p < .001$); relative to European American participants Hispanic participants had lower average parental education ($t[185] = -4.71$, $p < .001$, $d = -0.88$), but African American ($p = .067$, $d = -0.73$) and Asian American participants did not differ from European Americans ($p < .152$, $d = -0.28$). There were no significant ethnic differences in pretest measures of thin-ideal internalization, body dissatisfaction, negative affect, or eating disorder symptoms. There was a significant ethnic difference for dieting ($F[3, 185] = 2.70$, $p = .047$); relative to European American participants Asian American participants reported lower dieting ($t[185] = -2.81$, $p = .005$, $d = -0.49$), but African American ($p = .276$, $d = -0.32$) and Hispanic participants ($p = .238$, $d = -0.24$) did not differ from European Americans.

Data were complete at pretest with the exception of eating disorder symptoms, which was missing for 5% of cases. Another 5% of the participants did not complete the posttest assessment. Attrition at posttest was 5% for Asian Americans, 0% for African Americans, 2% for European Americans, and 12% for Hispanic participants. The average attendance rate was .70 ($SD = .36$) for Asian Americans, .75 ($SD = .22$) for African Americans, .74 ($SD = .36$) for European Americans, and .79 ($SD = .33$) for Hispanics. Means and SD for outcomes at each condition at each time point are presented in Table 4.

Table 4
Means and standard deviations for outcomes by ethnicity by condition at pretest and posttest.

Outcome/Race	Control		Body Project	
	Pretest	Posttest	Pretest	Posttest
Thin-ideal internalization				
Asian American	3.97 (0.39)	4.01 (0.47)	4.02 (0.62)	3.34 (0.90)
African American	3.80 (0.49)	3.77 (0.48)	3.40 (0.47)	2.97 (0.54)
Hispanic	3.93 (0.54)	3.88 (0.53)	3.82 (0.52)	3.08 (0.62)
European American	3.98 (0.53)	3.97 (0.61)	3.91 (0.52)	3.35 (0.65)
Body dissatisfaction				
Asian American	3.63 (0.82)	3.57 (0.96)	3.38 (0.67)	2.81 (0.82)
African American	3.47 (0.58)	2.81 (0.91)	2.77 (0.69)	2.10 (0.61)
Hispanic	3.20 (0.40)	3.09 (0.22)	3.39 (0.76)	2.39 (0.65)
European American	3.27 (0.50)	3.19 (0.71)	3.26 (0.70)	2.72 (0.77)
Dieting				
Asian American	2.87 (0.76)	2.92 (0.77)	2.72 (0.84)	2.09 (0.76)
African American	2.81 (0.89)	2.37 (0.90)	2.98 (1.04)	1.88 (0.81)
Hispanic	3.29 (0.76)	3.14 (1.00)	2.85 (0.70)	2.01 (0.71)
European American	3.18 (0.63)	2.93 (0.85)	3.13 (0.83)	2.31 (0.74)
Negative affect				
Asian American	12.33 (8.44)	11.94 (10.21)	9.50 (8.23)	6.00 (7.13)
African American	18.00 (8.79)	11.14 (8.17)	11.33 (6.59)	3.00 (5.14)
Hispanic	10.27 (7.76)	11.00 (8.91)	12.78 (7.91)	5.72 (6.45)
European American	10.77 (8.05)	11.07 (10.19)	12.42 (8.56)	7.08 (7.52)
Eating disorder symptoms				
Asian American	24.83 (12.67)	21.91 (15.14)	20.82 (12.33)	12.46 (11.17)
African American	26.00 (9.42)	31.43 (35.95)	22.00 (14.57)	8.50 (5.86)
Hispanic	23.64 (14.02)	16.60 (11.34)	26.25 (10.09)	13.27 (10.57)
European American	23.03 (10.32)	20.00 (11.49)	24.65 (13.76)	17.19 (13.08)

Ethnic differences in intervention effects

There were no significant ethnicity × intervention × time interactions for thin-ideal internalization ($F[3, 181] = 0.30$, $p = .828$, $d < 0.01$), body dissatisfaction ($F[3, 181] = 2.30$, $p = .079$, $d = 0.29$), dieting ($F[3, 181] = 0.05$, $p = .984$, $d < 0.01$), negative affect ($F[3, 181] = 0.44$, $p = .728$, $d < 0.01$), or eating disorder symptoms ($F[3, 181] = 0.04$, $p = .990$, $d < 0.01$), suggesting no differences in effects across ethnic groups. Pre-to-post effect sizes for each ethnic group are presented in Table 5.

Effects of ethnic matching

There were no time × participant-facilitator shared ethnic non-majority status interaction effects for thin internalization ($t[113] = 0.65$, $p = .516$, $d = 0.12$), body dissatisfaction ($t[115] = 1.40$, $p = .165$, $d = 0.26$), dieting ($t[111] = 1.61$, $p = .110$, $d = 0.31$), negative affect ($t[111] = 1.43$, $p = .157$, $d = 0.27$), or eating disorder symptoms ($t[113] = -0.05$, $p = .964$, $d = 0.01$). Thus, there was no evidence that intervention effects were larger for ethnic minority group members when they matched the ethnicity of at least one of the facilitators versus when they did not.

General discussion

The first aim of these studies was to test whether the *Body Project* eating disorder prevention program produced significantly

Table 5
Study 2 pre- to post-intervention change effect sizes by ethnicity.

Outcome	European American	African American	Asian American	Hispanic
Thin-ideal internalization	−1.04	−0.83	−1.86	−1.28
Body dissatisfaction	−0.91	−0.02	−0.62	−2.20
Dieting	−0.90	−0.75	−0.90	−0.90
Negative affect	−0.82	−1.35	−0.89	−1.36
Eating disorder symptoms	−0.46	−1.67	−0.76	−0.65

weaker effects for participants from ethnic minority groups relative to European American participants. This is an important objective given that certain minority groups report less pursuit of the thin ideal and body dissatisfaction, which is relevant because the *Body Project* seeks to reduce pursuit of the thin ideal among young women with body dissatisfaction. In both Study 1 and Study 2 there was no evidence of significantly different intervention effects for African American, Asian American, or Hispanic participants relative to European American participants. The average effect size for interactions between condition and ethnicity was $d = 0.04$ for Study 1 and $d = 0.06$ for Study 2. Indeed, effect sizes for at least one minority group were as large or larger than parallel effect sizes for European Americans for all outcomes in both studies (Tables 3 and 5).

The largest (non-significant) interaction from Study 1 ($d = 0.11$) suggested some variation in effect sizes for negative affect across ethnic groups. Table 3 indicates that the intervention effects on negative affect for Hispanic American participants were nearly twice as large as the effect for European American participants. The largest (non-significant) interaction from Study 2 ($d = 0.29$) suggested that there was variation in intervention effects for body dissatisfaction across ethnic groups. Table 5 indicated that compared to European Americans, the intervention effect for body dissatisfaction was markedly smaller for African American participants but markedly larger for Hispanic American participants. Although differences in a single outcome in each study suggest that there was some variation in intervention effects across ethnic groups, a similar pattern of findings did not emerge in the two studies, suggesting that the variation in effect sizes, particularly in Study 2 may have resulted from the small cell sizes for some ethnic groups. Our finding that the *Body Project* produced similar effects for various ethnic groups converges with a prior report that found that intervention effects did not differ significantly for Asian American, European American, and Hispanic participants (Rodriguez et al., 2008). These results echo evidence from an uncontrolled study that found that a universal eating disorder prevention program for female 5th grade students that integrated relaxation, educational interactive discourse, and yoga was associated with similar pre-post reductions in outcomes for European American participants and participants from various non-majority ethnic groups (Cook-Cottone, Jones, & Haugli, 2010).

Despite the absence of significant differences in intervention effects across ethnic groups, it is important to consider alternative explanations for the non-significant differences. It is possible that due to the small sizes of certain ethnic groups in these studies, we did not have adequate power to detect variation in outcomes. Power analyses indicated that for Study 1, we were only powered to detect an effect of a $d = 0.57$ or larger for comparison involving the smallest non-majority ethnic group (i.e., 27 African American versus 275 European American participants). For Study 2 we were only powered to detect an effect of a $d = 0.80$ or larger for comparison involving the smallest non-majority ethnic group (i.e., 13 African American versus 80 European American participants). The fact that we had limited sensitivity for certain contrasts is the reason we focused greater attention on effect sizes than on statistical significance. However, the magnitude of the average effect sizes for the interactions between condition and ethnicity ($d = 0.04$ in Study 1 and $d = 0.06$ in Study 2) suggest that the differences in outcomes in general were small. Indeed, we would have needed an average of 2451 participants in each non-majority group to be able to detect effects of this magnitude.

Because prior research show that African American and Hispanic young women report less subscription to the thin ideal and body dissatisfaction, it is also possible that the participants who volunteer for trials comparing body acceptance interventions may not be representative of the larger population of individuals from minority ethnic groups. Although we were primarily interested in determining if the *Body Project* produced differential effects for participants from various ethnic groups who elect to enroll in a body acceptance intervention, the present results may not generalize beyond the sampling frame. Consistent with this notion, in Study 1 Asian American and Hispanic participants reported greater thin-ideal internalization than European Americans, and Hispanic participants reported greater eating disorder symptoms than European Americans, though these differences did not replicate in Study 2. Perhaps the *Body Project* was similarly effective for participants from these minority groups compared to European Americans because the former showed stronger pursuit of the thin idea and greater body dissatisfaction. A related possibility is that participants who enrolled in these trials were relatively homogeneous in terms of acculturation, potentially because they are all attending competitive 4-year colleges, which might have attenuated ethnic differences in response to the prevention program. However, we found no evidence that the *Body Project* was differentially effective across ethnic groups in our earlier trial (Rodriguez et al., 2008), in which 75% of the participants were from public high schools, which is a population that may have greater diversity in acculturation.

We previously theorized that the reason the *Body Project* is similarly effective for various ethnic groups is because the participant-driven nature of the discussions may make this prevention program naturally culturally adapting (Rodriguez et al., 2008). For instance, in the sessions participants report pressures they have experienced to look a certain way and the personal reasons they have for signing up for a body acceptance intervention. Video recordings from sessions indicate that minority participants often bring up different examples than European American participants and there are often discussions about how appearance pressures differ across ethnic groups. There may be value in designing other prevention programs to be naturally culturally adapting in this fashion. However, it is also possible that because the thin ideal portrayed in the mass media is so ubiquitous that members from many ethnic groups subscribe to the thin ideal, making the content of the *Body Project* relevant for various ethnic groups.

The second aim was to test the hypothesis that participants from ethnic minority groups might show greater improvements on outcomes if they are in groups led by at least one facilitator who matched their ethnicity versus groups lead by facilitators who did not match their ethnicity. Results yielded no evidence that intervention effects were significantly larger if participants from a minority group had at least one facilitator who matched their ethnicity. These null results largely echo evidence from meta-analytic reviews suggesting that matching the ethnicity of clients and therapists is not associated with differences in premature termination of clients, number of sessions attended, functioning at termination, or intervention effects for psychological treatment (Cabral & Smith, 2011; Maramba & Nagayama Hall, 2002; Shin et al., 2005). To our knowledge, this is the first study to test whether

ethnic matching is associated with greater improvements from a prevention program. However, it is important to acknowledge that we had limited sensitivity to detecting effects in these analyses. A power analyses for the smallest group comparison (i.e., 33 non-majority participants had a facilitator of the same ethnicity versus 91 who did not) indicated that we were powered to detect effect sizes of $d = 0.57$ or greater. The average effect was a $d = 0.19$, indicating that we were unable to detect small effects that were present in the data. The largest effect emerged for dieting ($d = 0.31$), which reflected the fact that, counter to expectations, the dieting effect was slightly weaker when minority participants were the same ethnicity as the facilitator ($d = 0.74$) than otherwise ($d = 0.99$). Thus, it seems unlikely that we missed clinically significant effects in the hypothesized direction with regard to any benefits of ethnic matching between minority participants and the facilitators.

Limitations

It is important to consider the limitations of this study when interpreting the findings. First, as noted, we had limited sensitivity, due to the small cell sizes for African Americans. However, the effect sizes were generally small and the few ethnic differences that were small in magnitude did not replicate across the two studies, suggesting it is unlikely that we missed clinically meaningful differences in intervention effects across ethnic groups. Nonetheless, additional research on this question with larger and more ethnically diverse samples seems warranted. Second, we were unable test whether the internal consistency of the scales differed significantly across ethnic groups (i.e., measurement invariance). However, Table 1 confirmed that the internal consistency coefficients were roughly similar across ethnic groups. Third, ethnic differences does not always equate to cultural differences, which may play a more important role in moderating the effects of this prevention program. Fourth, results from these studies should be generalized with caution to different populations. For instance, most of the universities in these studies were predominantly European American, with only one university having predominantly ethnic-minority students. It is possible that students at universities that have a more diverse student population will show lower subscription to the thin-ideal, which might reduce the efficacy of this prevention program that focuses primarily on reducing this risk factor.

Implications for prevention and future research

As the demographics of America diversify, it is important to test whether preventive and treatment interventions are effective and culturally sensitive for various ethnic groups. Culture influences one's subjective experience, expression, and interpretation of one's mental illness (Castillo, 1997). For eating disorders specifically, cross-cultural studies have found that exposure to the Western thin ideal in non-Western cultures is associated with increased body image and eating disturbances (Becker, Burwell, Herzog, Hamburg, & Gilman, 2002; Watters, 2010). Results from the two trials described herein and one previous trial (Rodriguez et al., 2008) suggest that the *Body Project* eating disorder prevention program produces similar reductions in eating disorder risk factors and symptoms for African American, Asian American, European American and Hispanic young women who voluntarily enroll in trials of body acceptance interventions. Further, the present results provided no evidence that intervention effects were larger for participants from minority ethnic groups when the prevention program is facilitated by someone from the same ethnic group versus when minority participants did not match the ethnicity of at least one facilitator. These findings collectively suggest that the *Body Project* prevention program produces similar effects for various ethnic groups, implying that can be disseminated on a broad basis in the US.

Findings also have implications for future research. First, research should test whether the *Body Project* produces significantly smaller intervention effects for participants who report lower acculturation, as those participants may not have been well represented in the samples examined previously in trials with high school and college students. Second, research has found that ethnic minority members are more likely to be unsatisfied with health services, report higher perception of health care provider biases, and perceive greater disrespect or unfair treatment because of their English proficiency, which all may affect treatment outcome (Johnson, Saha, Arbelaez, Beach, & Cooper, 2004). Thus, future studies should examine minority participants' treatment satisfaction and perception of bias. Third, despite the evidence that this prevention program produces similar effects for various ethnic groups, it would be interesting to test whether this prevention program could produce even larger effects for ethnic minority groups if the intervention were specifically tailored for specific ethnic groups. Finally, future research should test whether the *Body Project* produces similar effects in other countries outside the US. Although this prevention program has been shown to be effective in the England (Halliwell & Diedrichs, 2013) and Iceland (Danielsdottir, Agustsdottir, Thorsdottir, & Jonsson, 2012), it has not been evaluated in other countries to our knowledge, including non-Western nations.

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