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Clinician-Led, Peer-Led, and Internet-Delivered Dissonance-Based Eating Disorder Prevention Programs: Effectiveness of These Delivery Modalities Through 4-Year Follow-Up

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Objective: Independent trials have found that the dissonance-based *Body Project* eating disorder prevention program is efficacious and effective; the present trial provided the first test of whether delivery could be task-shifted from clinician-delivery to peer educator-delivery or Internet-delivery without loss of effectiveness through 4-year follow-up. ***Method:*** Young women at high-risk for eating disorders because of body image concerns ($N = 680$, $M_{age} = 22.2$) recruited at 3 colleges were randomized to clinician-led *Body Project* groups, peer-led *Body Project* groups, the Internet-based *eBody Project*, or educational video control. ***Results:*** Participants in clinician- and peer-led *Body Project* groups and the *eBody Project* generally showed larger reductions in risk factors and eating disorder symptoms versus controls through 1- and 2-year follow-up ($d = .16–.59$), with some effects persisting through 3- and 4-year follow-ups ($d = .28–.58$). Peer-led *Body Project* participants showed greater reductions in some risk factors than *eBody Project* participants ($d = .18–.19$), but no other contrasts between *Body Project* interventions differed. Eating disorder onset over 4-year follow-up was significantly lower for peer-led *Body Project* participants (8.1%) than control participants (17.6%) and clinician-led *Body Project* participants (19.3%), and marginally lower than *eBody Project* participants (15.5%). ***Conclusions:*** The evidence that all three *Body Project* interventions outperformed educational video controls, peer-led groups outperformed the Internet-based intervention, and peer-led groups showed lower eating disorder onset over 4-year follow-up than the other conditions are novel. Results imply that it might be optimal to task-shift *Body Project* delivery to peer-leaders to address implementation barriers associated with clinician-led delivery.

What is the public health significance of this article?
Clinician- and peer-led *Body Project* groups and the Internet-based *eBody Project* produced greater reductions in risk factors and eating disorder symptoms than an educational video comparison condition, with some effects persisting through 4-year follow-up, the longest used in an eating disorder prevention trial. The finding that peer-led *Body Project* groups reduced future onset of eating disorders compared with educational video controls and alternative versions of this intervention over 4-year follow-up was novel because no eating disorder prevention program has reduced future eating disorder onset compared with alternative credible interventions. Delivery of the *Body Project* can be task-shifted to delivery by more abundant and cost-effective undergraduate peer educators without loss of effectiveness over long-term follow-up; indeed, peer-led groups were more effective than clinician-led groups in preventing future eating disorders.

Keywords: prevention, body dissatisfaction, eating disorder, dissonance, delivery modality

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Eating disorders affect 13% of females, show a chronic course, and result in significant distress, functional impairment, and early morbidity (Allen, Byrne, Oddy, & Crosby, 2013; Arcelus, Mitchell, Wales, & Nielsen, 2011; Dakanalis et al., 2017; Stice, Marti, & Rohde, 2013). Unfortunately, 80% of individuals with eating disorders do not receive treatment and the treatments show limited efficacy (Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Thus, a key public health priority is to broadly implement effective eating disorder prevention programs.

There have been marked advances in eating disorder prevention. Three prevention programs have significantly reduced eating disorder symptom composite measures (Atkinson & Wade, 2016; Stice, Marti, Spoor, Presnell, & Shaw, 2008; Stice, Rohde, Shaw, & Marti, 2013) and three have significantly reduced future onset of threshold or subthreshold eating disorders (Ghaderi, Andersson, Stice, Enö Persson, & Allzén, 2019; Martinsen et al., 2014; Stice et al., 2008; Stice, Rohde, Shaw, et al., 2013). However, only the *Body Project* has produced effects in multiple efficacy trials conducted by independent teams compared with both minimal intervention control conditions and credible alternative interventions (Becker, Smith, & Ciao, 2005; Ghaderi et al., 2019; Halliwell & Diedrichs, 2014; Mitchell, Mazzeo, Rausch, & Cooke, 2007; Serdar et al., 2014; Stice et al., 2008; Stice, Shaw, Burton, & Wade, 2006). Evidence that a prevention program produces larger effects than a credible alternative intervention is critical because it implies that the effects are not simply because of expectancies and demand characteristics inherent to randomized trials wherein participants are assigned to a credible program versus a minimal control condition.

In the *Body Project* young women with body image concerns critique the thin beauty ideal in verbal, written, and behavioral exercises, which theoretically generates dissonance that prompts participants to reduce their pursuit of this unrealistic ideal because people align their attitudes with their publicly displayed behaviors. We target this population because body image concerns reliably increase risk for future onset of eating disorders (Dakanalis et al., 2017; Ghaderi & Scott, 2001; Jacobi et al., 2011; Rohde, Stice, & Marti, 2015; Stice, Gau, Rohde, & Shaw, 2017). The *Body Project* seeks to reduce pursuit of the thin ideal because according to the *Dual Pathway Model* (Stice, 2001), pursuit of this ideal contributes to subsequent body dissatisfaction, which increases risk for future dietary restriction and negative affect, which in turn increase risk for emergence of eating disorders. Results from an 8-year prospective study of adolescent girls confirmed that these risk factors typically emerge in the temporal sequencing hypothesized in this meditational model for those who later show eating disorder onset (Stice & Van Ryzin, 2019). In support of the intervention theory, reductions in thin-ideal internalization mediate the effects of the *Body Project* on eating disorder symptom reductions (Seidel, Presnell, & Rosenfield, 2009; Stice, Presnell, Gau, & Shaw, 2007), high-dissonance versions of this program produce greater symptom reductions than low-dissonance versions (Green, Scott, Diyankova, Gasser, & Pederson, 2005; McMillan, Stice, & Rohde, 2011) and the *Body Project* reduced objectively measured brain reward region responsivity to thin models (Stice, Yokum, & Waters, 2015). Effectiveness trials confirm that the *Body Project* reduces risk factors and eating disorder symptoms when delivered by high school and college counselors under ecologically valid conditions (Stice, Butryn, Rohde, Shaw, & Marti, 2013; Stice, Rohde, Butryn, Shaw, & Marti, 2015; Stice, Rohde, Gau, & Shaw, 2009; Stice, Rohde, Shaw, & Gau, 2011).

Although clinician-delivered *Body Project* groups are effective and efficacious, most high schools and colleges do not have clinicians with a mandate to implement prevention programs to students. The present trial directly compared two methods of task-shifting implementation of this eating disorder prevention program to standard clinician-delivered *Body Project* groups for the first time. The first task-shifting approach was to test whether the *Body Project* produces similar effects to clinician-led groups when implemented by undergraduate peer educators. Pioneering research by Becker and colleagues revealed that peer educator-led *Body Project* groups produced greater reductions in risk factors and eating disorder symptoms than credible alternative interventions (Becker et al., 2005; Becker et al., 2010). Peer-led *Body Project* groups have reduced risk factors and eating disorder symptoms relative to educational video, educational brochure, and assessment-only control conditions (Halliwell, Jarman, McNamara, Risdon, & Jankowski, 2015; Stice, Rohde, Durant, Shaw, & Wade, 2013). Peer educators have produced larger effects than adult teachers and clinicians when implementing substance abuse prevention programs and an asthma management intervention (Botvin, Baker, Renick, Filazzola, & Botvin, 1984; Leupaker, Johnson, Murray, & Pechacek, 1983; Rhee, Belyea, Hunt, & Brasch, 2011), putatively because the peers were more similar to the adolescents who received the intervention, which increased credibility. Only one small pilot trial compared peer-led to clinician-led *Body Project* groups (Stice, Butryn, et al., 2013).

The second task-shifting approach was to test whether Internet-delivery of the *Body Project* produces similar effects to clinician-led and peer-led *Body Project* groups, which has not been investigated. We developed an unmoderated (stand-alone) Internet version of the *Body Project* that contained activities designed to induce dissonance about pursuing the thin beauty ideal to facilitate broad implementation. This intervention, referred to as the *eBody Project*, reduced risk factors and eating disorder symptoms relative to educational video and educational brochure controls in an initial pilot trial, producing some effects that persisted through 2-year follow-up (Stice, Durant, Rohde, & Shaw, 2014; Stice, Rohde, Durant, & Shaw, 2012). The effect size for pre-to-post eating disorder symptom reduction for the *eBody Project* versus educational brochure controls ($d = .39$) compares favorably to parallel average effect sizes for eHealth interventions for eating disorder symptoms ($d = .27$), depression ($d = .25$), anxiety ($d = .31$), and alcohol misuse ($d = .20$; Deady et al., 2017; Melioli et al., 2016; Riper et al., 2014). Further, the fact that the *eBody Project* produced effects that persisted through 2-year follow-up is encouraging because eHealth prevention programs typically have not produced effects that persist through 6-month follow-up (Riper et al., 2014).

Therefore, we initiated a trial to test whether intervention delivery could be task-shifted from clinicians to more abundant and cost-effective undergraduate peer educators or to Internet-delivery without loss of effectiveness. We recruited 680 young women with body image concerns and randomized them to clinician-led *Body Project* groups, peer-led *Body Project* groups, the Internet-delivered *eBody Project*, or an educational video control condition. We hypothesized that clinician-led *Body Project* groups, peer-led *Body Project* groups, and the *eBody Project* would produce larger

reductions in the continuous outcomes and future eating disorder onset than educational video controls. And based on the findings from pilot trials that compared peer-led *Body Project* groups and the *eBody Project* to clinician-led *Body Project* groups (Stice, Butryn, et al., 2013, 2014), we hypothesized that the latter intervention would produce larger reductions in outcomes than the former two interventions. A report on the acute effects from the present trial found that participants in all three variants of the *Body Project* showed significantly greater reductions in risk factors and eating disorder symptoms than educational video controls at posttest and at 6-month follow-up (Stice et al., 2011). Participants in clinician-led and peer-led *Body Project* groups showed significantly greater reductions in risk factors than *eBody Project* participants, but not in eating disorder symptoms. Peer-led groups did not differ significantly from clinician-led groups. Eating disorder onset over 6-month follow-up was significantly lower for peer-led *Body Project* group participants versus *eBody Project* participants (2.2 vs. 8.4%), but did not differ significantly from the other two conditions.

The present report describes the effects of clinician-led and peer-led *Body Project* groups and the Internet-delivered *eBody Project* relative to each other and to educational video controls at 1-, 2-, 3-, and 4-year follow-up. It is the first trial to directly compare these three delivery modalities and the first to evaluate the effects of an eating disorder prevention program through 4-year follow-up. It is also one of the only trials to use a credible educational video comparison condition, which should reduce the possibility that expectancies and demand characteristics inflate the observed effects that occur in trials that compare interventions to assessment-only control conditions. Indeed, the educational video evaluated in this trial produced larger reductions in eating disorder symptoms than a minimal-intervention educational brochure control condition (d = .29; Stice et al., 2012) confirming that it is a more rigorous comparison condition. We focused on female college students because eating disorders often emerge during college (Stice, Marti, et al., 2013) and there are over 10 million female college students in the United States (US Department of Education, 2008). Our primary outcomes were reductions in eating disorder symptoms and eating disorder onset during follow-up. Secondary outcomes were risk factors that have predicted future onset of eating disorders (Dakanalis et al., 2017; Ghaderi & Scott, 2001; Jacobi et al., 2011; Rohde et al., 2015; Stice, Gau, et al., 2017), which included thin-ideal internalization, body dissatisfaction, dieting, and negative affect.

Method

Participants and Procedure

Participants were 680 young women (M_{age} = 22.2, SD = 7.1) recruited from three universities in Oregon and Texas who completed assessments at baseline, postintervention, and at 6-month, 1-year, 2-year, 3-year, and 4-year follow-ups. An a priori power analysis indicated that 160 participants per condition would provide a power of .88 to detect a 9% reduction in eating disorder onset over follow-up, the reduction in eating disorder onset over 3-year follow-up observed in *Body Project* versus assessment-only control participants in a large efficacy trial (Stice et al., 2008). We oversampled to guard against effect size shrinkage. We added a 4-year follow-up assessment to increase sensitivity. The sample was 60% White, 17% Latina, 14% Asian, 5% Black, 3% Native Americans, and 1% Pacific Islander. Average parental education was 38% graduate or professional degree, 34% college graduate, 16% some college, and 13% high school graduate. The acute effects report (Stice, Rohde, Shaw, & Gau, 2017) provided more details regarding recruitment, inclusion or exclusion criteria, randomization, and other design features. In brief, we required that participants endorse body image concerns and anyone who met criteria for current *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition* (*DSM–IV*) anorexia nervosa, bulimia nervosa, and binge eating disorder were excluded. Figure 1 provides a participant flowchart. Participants were paid $40 each for the 1-, 2-, 3-, and 4-year follow-up assessments. The local Institutional Review Board (IRB) at Oregon Research Institute approved this study.

Interventions

Body Project. The *Body Project* consisted of four weekly 1-hr group sessions with 5–9 participants delivered by either clinicians or peer leaders using a scripted manual. Participants voluntarily engaged in verbal, written, and behavioral exercises in which they critiqued the thin beauty ideal in session and completed home exercises (see Stice, Butryn, et al., 2013 for details). Intervention scripts are available at: http://www.bodyprojectsupport.org. We recruited clinicians providing mental health care to students on campuses to conduct *Body Project* groups. We also recruited peer educators from established peer educator programs on each campus to conduct *Body Project* groups. In total 17 clinicians (95% female; age $M[SD]$ = 33.8 [10.1] years) and 21 peer educators (94% female; age $M[SD]$ = 20.9 years [0.9]) were recruited. Pairs of either clinicians or peer educators delivered the intervention.

eBody Project. The *eBody Project* is an Internet-based version of this intervention that includes six 40-min modules (equal in time to the group intervention) involving user-driven self-education activities and games (e.g., texting role-plays) that parallel the group program (see Stice et al., 2012 for details); module completion was tracked by program software. The *eBody Project* is available at: https://www.ebodyproject.org.

Educational video condition. Participants were asked to view *Dying to Be Thin* (WGBH Video, 2000), a 55-min documentary on eating disorders, body dissatisfaction, and body acceptance. Participants were sent a link to a web page where they could view the video for free.

Measures

Thin-ideal internalization. The eight-item Thin-Ideal Internalization scale assessed endorsement of the thin beauty ideal espoused for women (Stice, Rohde, et al., 2017) using a response scale ranging from 1 = *strongly disagree* to 5 = *strongly agree*. Our goal was to create and use brief scales to minimize respondent burden. Items for this scale were generated from a focus group asked to list descriptors of the feminine beauty ideal. We have relied on Cronbach's α to ensure adequate internal consistency rather than on factor analysis. Items were averaged for this scale and those described below. This scale showed a mean α = .75 across assessments, 5-week test–retest reliability (r = .56) for

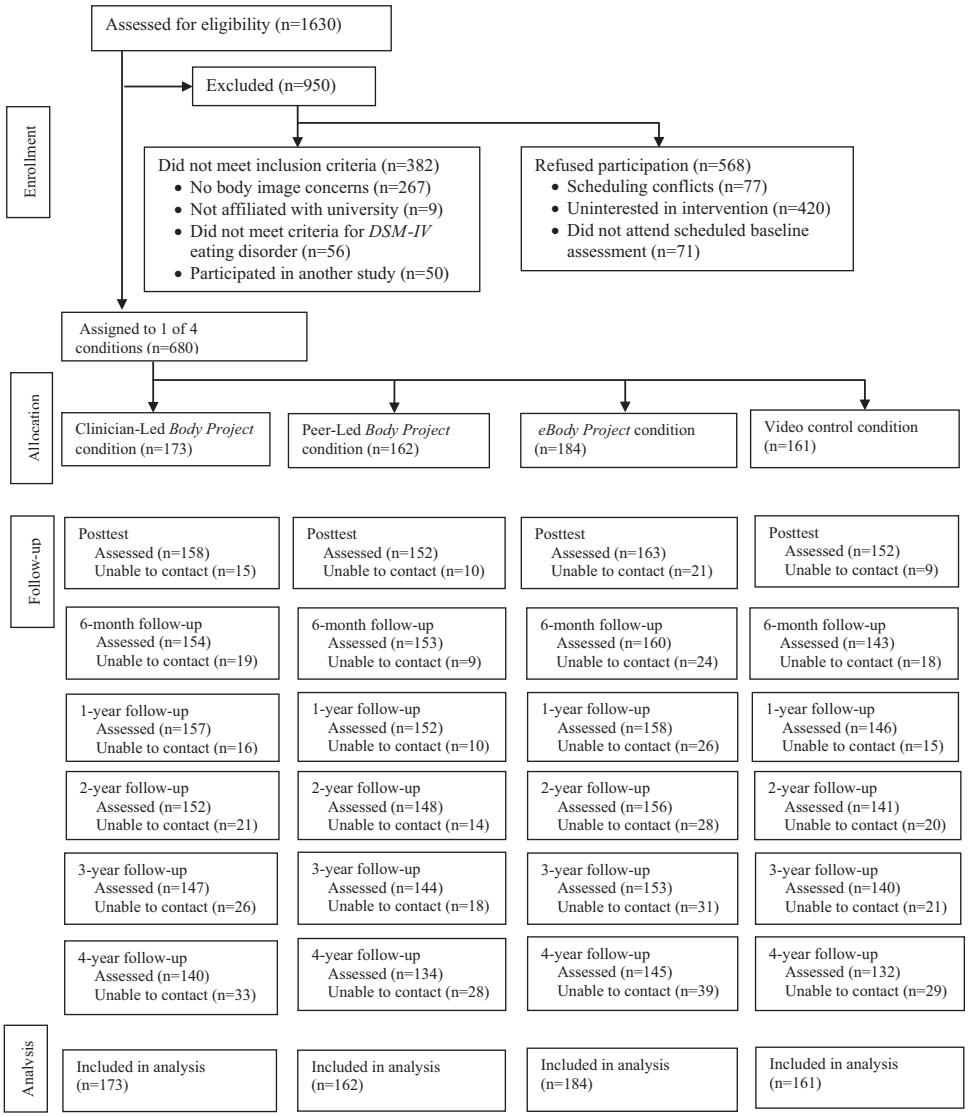

Figure 1. Participant flow throughout study.

educational video controls, and predictive validity for future onset of binge eating (odds ratio [*OR*] = 2.84, $p = .001$) in the present study.

Body dissatisfaction. Ten items from the Satisfaction and Dissatisfaction with Body Parts Scale (Berscheid, Walster, & Bohrnstedt, 1973) assessed satisfaction with body parts with a response scale ranging from 1 = *extremely dissatisfied* to 6 = *extremely satisfied* (responses were reverse scored). It has shown internal consistency ($\alpha = .94$), 3-week test–retest reliability ($r = .90$), predictive validity for onset of bulimia nervosa, binge eating disorder, and purging disorder, and sensitivity to detecting intervention effects (Stice et al., 2008, 2017); mean $\alpha = .86$.

Dieting. The 10-item Dutch Restrained Eating Scale (DRES; van Strien, Frijters, van Staveren, Defares, & Deurenberg, 1986) assessed the frequency of dieting behaviors using a response scale ranging from 1 = *never* to 5 = *always*. It has shown internal consistency ($\alpha = .95$), 2-week test–retest reliability ($r = .82$), convergent validity with reported caloric intake, predictive validity for onset of bulimia nervosa, binge eating disorder, and purging disorder, and sensitivity to intervention effects (Stice et al., 2017; van Strien et al., 1986); mean $\alpha = .91$.

Negative affect. Twenty items from the sadness, guilt, and fear/anxiety subscales from the Positive Affect and Negative Affect Scale–Revised (PANAS-X; Watson & Clark, 1992) assessed negative affect. Participants reported the extent to which they had felt negative emotions on scales ranging from 1 = *very slightly or not at all* to 5 = *extremely*. It has shown internal consistency ($\alpha = .95$), 3-week test–retest reliability ($r = .78$), convergent validity, predictive validity for bulimic symptom onset, and sensitivity to detecting intervention effects (Stice et al., 2006; Watson & Clark, 1992); mean $\alpha = .94$.

Eating disorder symptoms and diagnoses. The semistructured Eating Disorder Diagnostic Interview (EDDI) assessed *DSM–IV* eating disorder symptoms (this trial started before *DSM–5*).

Diagnostic interviews were conducted in person at baseline and over follow-up, unless the participant moved from the area or had a difficult time completing in person interviews, in which case they were done by phone. Frequency of binge eating, vomiting, laxative or diuretic use, fasting, and excessive exercise, and overvaluation of weight or shape, feeling fat, and fear of weight gain were assessed on a month-by-month basis over the intervals between assessments. Those who endorsed binge eating were asked about distress regarding binge eating, rapid eating, eating until uncomfortably full, eating large quantities of food when not hungry, eating alone because of embarrassment, feeling disgusted, depressed, or guilty after overeating. Items assessing symptoms in the past month were summed to form a composite at each assessment. This composite has shown internal consistency ($\alpha = .92$), interrater agreement (intraclass correlation coefficient [ICC] $r = .93$), 1-week test–retest reliability (ICC $r = .95$), predictive validity, and sensitivity to detecting intervention effects (Burton & Stice, 2006; Stice, Butryn, et al., 2013). The symptom composite showed internal consistency (mean $\alpha = .70$), as well as interrater agreement (ICC = .96, $n = 116$) and 1-week test–retest reliability (ICC = .96, $n = 109$) for randomly selected subgroups of participants. We used responses to determine the month during which a participant first met criteria for an eating disorder (operationalized in Table 1). EDDI diagnoses have shown 1-week test–retest reliability ($\kappa = .79$) and interrater agreement ($\kappa = .75$), sensitivity to detecting intervention effects, and participants with versus without EDDI-diagnosed eating disorders show greater functional impairment, emotional distress, and mental health treatment (Stice et al., 2008; Stice, Butryn, et al., 2013; Stice, Rohde, et al., 2017).

Statistical Methods

Intent-to-treat (ITT) analyses of condition effects were evaluated using mixed effects growth models fit with SAS 9.2 PROC MIXED (SAS/STAT, 2011). Individual variability in outcomes from posttest to 4-year follow-up was modeled adjusting for pretest outcome values. Following Singer and Willett (2003), when constructing the longitudinal models we (a) examined empirical growth plots; (b) fit an unconditional means model; (c) fit an unconditional linear growth model; (d) fit unconditional nonlinear models; and (e) compared models of longitudinal change using the Akaike Information Criterion. Condition, time (coded in months since posttest), and a Condition × Time interaction were added to the unconditional model. We estimated a growth model for each of the five continuous outcomes. We report the results of six planned contrasts from these five models, contrasting each pair of conditions, reporting condition differences in the model implied least-square means derived from the Time and Condition × Time interactions at 1-, 2-, 3- and 4-year follow-up. Effect sizes are equivalent to Cohen's *d* (Feingold, 2009). We used full information maximum likelihood (ML) estimation to impute missing data because this intent-to-treat approach produces more accurate and

Table 1
DSM–IV Diagnostic Criteria for Threshold and Subthreshold Eating Disorders

Subthreshold anorexia nervosa	• BMI of between 90 and 85% of that expected for age and gender • Definite fear of weight gain more than 25% of the days for at least 3 months • Weight and shape were definitely an aspect of self-evaluation • Missed one period in a 3 month period (unless on birth control)
Threshold anorexia nervosa	• BMI of less than 85% of that expected for age and gender • Definite fear of weight gain more than 50% of the days for at least 3 months • Weight and shape one of the main aspects of self-evaluation • Missing menstrual cycles in a 3 month period (unless on birth control)
Subthreshold bulimia nervosa	• At least two uncontrollable binge eating episodes per month for at least 3 months • At least two compensatory behavior episodes (i.e., self-induced vomiting, laxatives use, diuretic use, fasting, and excessive exercise to compensate for overeating) per month for at least 3 months • Weight and shape was definitely an aspect of self-evaluation
Threshold bulimia nervosa	• At least eight uncontrollable binge eating episodes per month for at least 3 months • At least eight compensatory behavior episodes per month for at least 3 months • Weight and shape was definitely one of the main aspects of self-evaluation
Subthreshold binge eating disorder	• At least two uncontrollable binge eating episodes/days per month for at least 6 months • Less than one compensatory behaviors on average per month during this period • Marked distress about binge eating • Binge eating was characterized by three or more of the following: rapid eating, eating until uncomfortably full, eating large amounts when not physically hungry, eating alone because of embarrassment, feeling disgusted, depressed, or guilty after overeating
Threshold binge eating disorder	• At least eight uncontrollable binge eating episodes/days per month for at least 6 months • Less than one compensatory behaviors on average per month during this period • Marked distress about binge eating • Binge eating was characterized by three or more of the following: rapid eating, eating until uncomfortably full, eating large amounts when not physically hungry, eating alone because of embarrassment, feeling disgusted, depressed, or guilty after overeating
Purging disorder	• At least eight episodes of self-induced vomiting or diuretic or laxative use for weight control purposes per month for at least 3 months • Less than one uncontrollable binge eating episode on average per month during this period • Weight and shape was definitely an aspect of self-evaluation

Note. *DSM–IV = Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition*; BMI = body mass index. A diagnosis of threshold or subthreshold AN took precedence over threshold and subthreshold diagnosis of bulimia nervosa (BN), binge eating disorder (BED), and purging disorder (PD).

efficient parameter estimates than alternative analytic approaches such as analyzing only participants who provide complete data, making multiple imputation the recommended procedure for handling missing data (Graham, 2009). Missing data were imputed using PROC MI using baseline levels of the outcomes, condition, and demographic factors (age, race, and parent education). Based on the recommendations (Graham, 2009), we imputed 50 data sets. Model parameters and standard errors were combined following Rubin (1987) and implemented using PROC MIANALYZE. Cox proportional hazard models, fit with STATA (StataCorp, 2007) tested whether eating disorder onset over 4-year follow-up was significantly lower in each condition versus each other condition. Schoenfeld residuals were examined to test the proportional hazards assumption. Hazard ratios and number needed to treat (NNT; Altman & Andersen, 1999) are provided as measures of effect size. Because hazard models accommodate right censoring, we did not impute missing incidence data.

We used a *p* value of .05 for inferential tests because the effects of the *Body Project* have consistently replicated, providing compelling evidence that they are not chance findings. Specifically, 88% of the effects for the core outcomes have replicated in the 22 controlled trials conducted by our team and others (Becker et al., 2005; Becker, McDaniel, Bull, Powell, & McIntyre, 2012; Ciao, Latner, Brown, Ebneter, & Becker, 2015; Green et al., 2005; Halliwell & Diedrichs, 2014; Halliwell et al., 2015; Kilpela et al., 2016; Linville et al., 2015; Matusek, Wendt, & Wiseman, 2004; McMillan et al., 2011; Mitchell et al., 2007; Seidel et al., 2009; Serdar et al., 2014; Stice, Mazotti, Weibel, & Agras, 2000; Stice, Trost, & Chase, 2003, 2013a, 2012, 2009, 2006, Stice, Marti, et al., 2013). Further, we had a power of only .56 to detect small effects in the continuous outcomes, and power would have been .17 if we used a Bonferroni correction, illustrating that there was a greater risk for false negative findings than false positive findings.

Results

Preliminary Analyses

The acute effects report (Stice, Rohde, et al., 2017) provided information regarding distribution of the outcomes, baseline equivalency, attrition, session attendance and homework completion, and fidelity. Briefly, the eating disorder symptom composite was normalized with a logarithmic transformation, randomization produced initially equivalent groups, and attrition was 11% at 6-month follow-up. Clinician- and peer-led groups did not significantly differ on attendance, homework completion, or fidelity and competence ratings; 47% of participants completed all clinician-led *Body Project* groups, 45% of participants completed all peer-led *Body Project* groups, and 57% of participants completed all *eBody Project* modules (81% attended at least 50% of clinician-led sessions, 80% attended at least 50% of peer-led sessions, and 74% completed at least 50% of *eBody Project* modules).

Table 2 provides means and *SD*s for outcomes at pretest and 1- to 4-year follow-up across conditions. Attrition was 10% at 1-year

Table 2
Means and Standard Deviations for Outcomes by Condition at 1-, 2-, 3-, and 4-Year Follow-Up

Outcomes variables by condition	Pretest		1-year follow-up		2-year follow-up		3-year follow-up		4-year follow-up	
	M	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Thin ideal internalization										
Clinician-led groups	3.86	.42	3.48	.56	3.34	.64	3.40	.62	3.32	.68
Peer-led groups	3.86	.44	3.41	.58	3.35	.62	3.10	.65	3.26	.66
Internet-delivered	3.85	.45	3.47	.56	3.43	.65	3.44	.65	3.35	.69
Educational video control	3.87	.42	3.65	.46	3.58	.56	3.56	.54	3.50	.59
Body dissatisfaction										
Clinician-led groups	3.64	.66	3.18	.72	3.09	.74	3.08	.77	3.13	.82
Peer-led groups	3.68	.61	3.14	.78	3.01	.76	3.01	.76	2.98	.87
Internet-delivered	3.61	.65	3.13	.74	3.09	.80	3.05	.80	3.09	.79
Educational video control	3.78	.61	3.37	.74	3.31	.78	3.27	.73	3.19	.83
Negative affect										
Clinician-led groups	2.33	.83	1.89	.72	1.83	.70	1.87	.71	1.86	.70
Peer-led groups	2.32	.74	1.92	.82	1.88	.74	1.88	.76	1.82	.76
Internet-delivered	2.30	.79	1.90	.73	1.93	.76	1.88	.73	1.83	.71
Educational video control	2.35	.78	2.01	.78	1.99	.80	1.92	.78	1.90	.80
Dieting										
Clinician-led groups	3.13	.81	2.29	.82	2.30	.86	2.30	.82	2.27	.86
Peer-led groups	3.11	.78	2.33	.83	2.27	.88	2.33	.88	2.24	.91
Internet-delivered	3.19	.76	2.40	.84	2.37	.87	2.25	.86	2.18	.85
Educational video control	3.13	.86	2.61	.91	2.52	.92	2.43	.88	2.35	.87
Eating disorder symptoms										
Clinician-led groups	2.70	.69	1.95	.82	1.83	.81	1.81	.82	1.78	.82
Peer-led groups	2.65	.68	1.93	.79	1.85	.77	1.74	.90	1.70	.91
Internet-delivered	2.73	.66	1.92	.85	1.90	.80	1.82	.83	1.78	.85
Educational video control	2.69	.67	2.13	.82	2.06	.84	1.95	.81	1.79	.88

Note. The acute effects report (Stice, Rohde, et al., 2017) provided means and standard deviations for outcomes at posttest and 6-month follow-up. Log-transformed values of eating disorder symptoms reported.

follow-up, 12% at 2-year follow-up, 14% at 3-year follow-up and 19% at 4-year follow-up. Attrition was not associated with condition, demographics, or baseline values of outcome variables, with the exception that participants who dropped out had higher baseline eating disorder symptoms (d = .49). Models indicated no significant variability attributable to groups or sites in the partially clustered models (Baldwin, Stice, & Rohde, 2008). Thus, all models were fit as two-level models in which assessments were nested within individuals. Linear models fit the data better than nonlinear models.

Continuous Outcomes

Parameter estimates from the random effects linear growth models are shown in Table 3. Because these models measure change from 1- to 4-year follow-up, adjusting for baseline levels of the outcomes, the condition effect reflects an intervention effect, and the Time × Condition effect signals whether the condition effects on the outcomes differed significantly over follow-up. Effect sizes, 95% confidence intervals, and p values for condition differences at 1-, 2-, 3-, and 4-year follow-up across all pairs of conditions are shown in Table 4 (parallel results from participants who completed all assessments are reported in the online supplemental material; results are largely similar, though a few effects became nonsignificant because of the 30% reduction in the sample size). Compared with educational video controls, clinician-led *Body Project* participants showed greater reductions in all five continuous outcomes at 1- and 2-year follow-up and greater reductions in thin-ideal internalization at 3- and 4-year follow-ups. Compared with controls, peer-led *Body Project* participants showed greater reductions all five continuous outcomes at 1-year follow-up, greater reductions in all continuous outcomes except negative affect by 2-year follow-up, greater reductions in thin-ideal internalization and body dissatisfaction at 3-year follow-up, and greater reductions in thin-ideal internalization at 4-year follow-up. Compared with controls, *eBody Project* participants showed greater reductions in thin-ideal internalization, body dissatisfaction, dieting, and eating disorder symptoms at 1-year follow-up, greater reductions in thin-ideal internalization, body dissatisfaction, dieting, and eating disorder symptoms at 2-year follow-up, greater reductions in thin-ideal internalization and dieting at 3-year follow-up, and greater reductions in dieting at 4-year follow-up.

Regarding comparisons between *Body Project* intervention conditions, two contrasts were significant; peer-led *Body Project*

Table 3
Parameter Estimates From the Mixed Effects Linear Growth Models

	Outcome measure														
	Thin-ideal internalization			Body dissatisfaction			Negative affect			Dieting			Eating disorder symptoms		
Comparison	Est.	*SE*	*p*	Est.	*SE*	*p*	Est.	*SE*	*p*	Est.	*SE*	*p*	Est.	*SE*	*p*
Clinician-led vs. video control															
Intercept	3.714	0.033	<.001	3.430	0.045	<.001	2.763	0.049	<.001	2.078	0.043	<.001	2.330	0.047	<.001
Condition	−0.256	0.046	<.001	−0.300	0.063	<.001	−0.380	0.067	<.001	−0.234	0.060	<.001	−0.332	0.066	<.001
Time	−0.005	0.001	<.001	−0.006	0.001	<.001	−0.009	0.002	<.001	−0.004	0.001	.001	−0.011	0.002	<.001
Condition × Time	0.002	0.002	.211	0.006	0.002	.002	0.006	0.002	.005	0.004	0.002	.012	0.006	0.002	.004
Peer-led vs. video control															
Intercept	3.713	0.032	<.001	3.421	0.042	<.001	2.076	0.043	<.001	2.764	0.046	<.001	2.331	0.044	<.001
Condition	−0.260	0.045	<.001	−0.323	0.059	<.001	−0.181	0.062	.003	−0.343	0.065	<.001	−0.257	0.063	<.001
Time	−0.005	0.001	<.001	−0.006	0.001	<.001	−0.004	0.001	.001	−0.009	0.002	<.001	−0.011	0.002	<.001
Condition × Time	0.000	0.001	.784	0.004	0.002	.068	0.003	0.002	.094	0.005	0.002	.018	0.003	0.002	.125
Internet vs. video control															
Intercept	3.712	0.031	<.001	3.411	0.039	<.001	2.077	0.043	<.001	2.764	0.046	<.001	2.331	0.048	<.001
Condition	−0.176	0.043	<.001	−0.182	0.055	.008	−0.126	0.060	.035	−0.190	0.064	.033	−0.257	0.066	.001
Time	−0.005	0.001	<.001	−0.006	0.001	<.001	−0.004	0.001	.001	−0.009	0.002	<.001	−0.011	0.002	<.001
Condition × Time	0.001	0.001	.476	0.003	0.002	.109	0.002	0.002	.223	−0.001	0.002	.644	0.004	0.002	.080
Clinician-led vs. Internet															
Intercept	3.536	0.034	<.001	3.219	0.043	<.001	1.949	0.039	<.001	2.580	0.048	<.001	1.949	0.039	<.001
Condition	−0.078	0.048	.101	−0.087	0.060	.148	−0.105	0.056	.061	−0.197	0.068	.004	−0.105	0.056	.061
Time	−0.004	0.001	.007	−0.003	0.001	.022	−0.002	0.001	.067	−0.010	0.002	<.001	−0.002	0.001	.067
Condition × Time	0.001	0.001	.548	0.003	0.002	.104	0.002	0.002	.157	0.007	0.002	.001	0.002	0.002	.157
Peer-led vs. Internet															
Intercept	3.536	0.033	<.001	3.224	0.041	<.001	1.950	0.039	<.001	2.577	0.046	<.001	2.075	0.046	<.001
Condition	−0.083	0.048	.082	−0.126	0.057	.027	−0.055	0.057	.330	−0.156	0.067	.019	−0.002	0.066	.979
Time	−0.004	0.001	.003	−0.003	0.001	.019	−0.002	0.001	.076	−0.010	0.002	<.001	−0.007	0.001	<.001
Condition × Time	−0.001	0.001	.646	0.001	0.002	.742	0.001	0.002	.559	0.006	0.002	.003	0.000	0.002	.866
Clinician-led vs. peer-led															
Intercept	3.453	0.036	<.001	3.099	0.046	<.001	1.895	0.041	<.001	2.418	0.049	<.001	2.070	0.046	<.001
Condition	0.005	0.050	.925	0.029	0.065	.652	−0.051	0.057	.375	−0.035	0.068	.610	−0.071	0.065	.270
Time	−0.004	0.001	.001	−0.002	0.001	.084	−0.001	0.001	.377	−0.003	0.002	.032	−0.008	0.002	<.001
Condition × Time	0.002	0.001	.308	0.002	0.002	.210	0.001	0.002	.445	0.001	0.002	.652	0.003	0.002	.191

Note. Est. = unstandardized estimate. For each comparison, the first group is the reference group. Because of space considerations, we admitted estimates for pretest score.

Table 4
Effect Sizes (d) and Significance Levels for Condition Differences at 1-, 2-, 3-, and 4-Year Follow-Up From Mixed Effects Growth Models

Comparison	Outcome measure				
	Thin-ideal internalization	Body dissatisfaction	Negative affect	Dieting	Eating disorder symptoms
1-year follow-up					
Clinician-led vs. video control	**−.55 [−.75, −.35] <.001**	**−.35 [−.52, −.18] <.001**	**−.22 [−.35, −.10] .001**	**−.37 [−.51, −.22] <.001**	**−.38 [−.55, −.21] <.001**
Peer-led vs. video control	**−.59 [−.78, −.40] <.001**	**−.46 [−.63, −.28] <.001**	**−.19 [−.33, −.05] .008**	**−.34 [−.48, −.20] <.001**	**−.32 [−.46, −.16] <.001**
Internet vs. video control	**−.36[−.55, −.19] <.001**	**−.23 [−.38, −.08] .001**	−.13 [−.26, .00] .052	**−.25 [−.39, −.11] .001**	**−.32 [−.50, −.15] .003**
Clinician-led vs. Internet	−.16 [−.36, .05] .140	−.08 [−.23, .08] .347	−.10 [−.21, .02] .115	−.14 [−.29, .01] .077	−.07 [−.25, .10] .417
Peer-led vs. Internet	−.20 [−.41, .00] .050	**−.19 [−.35, −.03] .021**	−.06 [−.18, .07] .384	−.10 [−.26, .05] .199	−.01 [−.18, .16] .919
Clinician-led vs. peer-led	.05 [−.17, .27] .634	.09 [−.08, 27] .302	−.04 [−.17, .08] .494	−.03 [−.19, .13] .713	−.05 [−.22, .11] .525
2-year follow-up					
Clinician-led vs. video control	**−.50 [−.71, −.28] <.001**	**−.24 [−.41, −.06] .011**	**−.16 [−.29, −.03] .018**	**−.27 [−.43, −.12] .001**	**−.27 [−.46, −.09] .004**
Peer-led vs. video control	**−.58 [−.79, −.37] <.001**	**−.38 [−.57, −.20] <.001**	−.14 [−.28, .00] .055	**−.26 [−.42, −.10] .002**	**−.26 [−.45, −.08] .005**
Internet vs. video control	**−.35 [−.55, −.14] .001**	**−.17 [−.34, −.01] .044**	−.09 [−.22, .03] .148	**−.27 [−.42, −.12] .001**	**−.25 [−.44, −.07] .007**
Clinician-led vs. Internet	−.13 [−.36, .10] .260	−.02 [−.18, .15] .816	−.06 [−.18, .06] .309	−.02 [−.18, .13] .775	−.03 [−.21, .15] .755
Peer-led vs. Internet	−.22 [−.44, .00] .052	**−.18 [−.35, −.01] .044**	−.04 [−.17, .09] .533	.00 [−.17, .17] .991	−.02 [−.20, .17] .991
Clinician-led vs. peer-led	.10 [−.15, .34] .436	.14 [−.04, .32] .132	−.02 [−.16, .11] .715	−.01 [−.18, .15] .864	−.01 [−.19, .18] .956
3-year follow-up					
Clinician-led vs. video control	**−.44 [−.71, −.17] .001**	−.12 [−.33, .09] .264	−.09 [−.24, .06] .235	−.18 [−.37, .01] .057	−.16 [−.39, .06] .147
Peer-led vs. video control	**−.58 [−.79, −.37] <.001**	**−.31 [−.54, −.08] .009**	−.09 [−.26, .08] .291	−.18 [−.38, .02] .070	−.21 [−.43, .02] .073
Internet vs. video control	**−.32 [−.64, −.07] .012**	−.11 [−.32, .09] .286	−.06 [−.21, .09] .413	**−.28 [−.47, −.10] .003**	−.19 [−.41, .03] .090
Clinician-led vs. Internet	−.11 [−.38, .17] .442	.04 [−.16, .23] .713	−.03 [−.17, .11] .685	.09 [−.09, .28] .332	.01 [−.20, .23] .895
Peer-led vs. Internet	−.24 [−.50, .02] .075	−.17 [−.37, .04] .119	−.03 [−.18, .12] .735	.10 [−.10, .28] .332	−.02 [−.24, .20] .847
Clinician-led vs. peer-led	.14 [−.15, .42] .342	.19 [−.03, .40] .088	.00 [−.16, .15] .951	.00 [−.20, .20] .999	.04 [−.18, .27] .696
4-year follow-up					
Clinician-led vs. video control	**−.39 [−.72, −.06] .022**	−.01 [−.27, .26] .968	−.03 [−.21, .16] .782	−.09 [−.32, .14] .459	−.06 [−.33, .22] .686
Peer-led vs. video control	**−.57 [−.82, −.31] <.001**	−.24 [−.52, .05] .103	−.04 [−.25, .16] .699	−.10 [−.35, .15] .433	−.15 [−.43, .13] .306
Internet vs. video control	−.29 [−.60, .02] .065	−.05 [−.31, .21] .686	−.03 [−.21, .15] .755	**−.30 [−.53, −.06] .013**	−.12 [−.39, .15] .370
Clinician-led vs. Internet	−.08 [−.41, .25] .629	.09 [−.15, .34] .452	.01 [−.16, .17] .949	.21 [−.02, .43] .075	.06 [−.21, .32] .667
Peer-led vs. Internet	−.26 [−.57, .06] .111	−.15 [−.41, .10] .242	−.01 [−.19, .17] .909	.20 [−.05, .45] .114	−.03 [−.30, .25] .840
Clinician-led vs. peer-led	.18 [−.16, .52] .302	.23 [−.03, .50] .082	.01 [−.17, .20] .877	.01 [−.23, .26] .908	.09 [−.18, .37] .506

Note. Effect sizes reported first followed by 95% confidence intervals in brackets and *p* values. Significant effects at $p < .05$ are shown in bold. For each comparison, the first group is the reference group.

participants showed greater reductions in body dissatisfaction at 1-year and at 2-year follow-ups than *eBody Project* participants.

Eating Disorder Onset

Incidence of eating disorder onset over 4-year follow-up was 27 (19.3%) for clinician-led *Body Project* participants (subthreshold anorexia [sAN] = 3, bulimia nervosa = 4 [BN], subthreshold bulimia nervosa [sBN] = 4, binge eating disorder = 8 [BED], subthreshold binge eating disorder [sBED] = 15, purging disorder = 5 [PD], subthreshold purging disorder = 4 [sPD], [11 exhibited more than one disorder at different times during follow-up]). Incidence was 11 (8.1%) for peer-led *Body Project* participants (BN = 2, sBN = 4, BED = 5, sBED = 6, PD = 3, sPD = 3 [eight exhibited more than one disorder at different times]). Incidence was 22 (15.5%) for *eBody Project* participants (sAN = 1, BN = 3, sBN = 10, BED = 5, sBED = 6, PD = 9, sPD = 3 [11 participants exhibited more than one disorder at different times]). Incidence was 23 (17.6%) for educational video controls (sAN = 1, BN = 4, sBN = 10, BED = 4, sBED = 10, PD = 5, sPD = 4 [13 participants exhibited more than one disorder at different times]).

Figure 2 shows the cumulative survival rates for onset of any eating disorder in each condition among participants free of an eating disorder at pretest. Eating disorder onset was lower among peer-led *Body Project* participants versus educational video participants (hazard ratio [HR; 95% CI] = 0.43 [0.21, 0.89], $p = .020$, *NNT* = 11), but did not differ between clinician-led *Body Project* participants and educational video participants (HR [95% CI] = 1.08 [0.62, 1.89], $p = .778$, NNT = 59) or between *eBody Project* participants and educational video participants (HR [95% CI] = 0.87 [0.48, 1.56], $p = .639$, NNT = 48). The difference in eating disorder onset was just above the statistical significance cut-off for peer-led *Body Project* participants versus *eBody Project* participants (HR [95% CI] = 0.49 [0.24, 1.02], $p = .056$, NNT = 14). Eating disorder onset was not different for clinician-led *Body Project* participants compared with *eBody Project* participants (HR [95% CI] = 1.25 [0.71, 2.19], $p = .437$, NNT = 26). Eating disorder onset was lower for peer-led *Body Project* participants versus clinician-led *Body Project* participants (HR [95% CI] = 2.53 [1.25, 5.10], $p = .009$, NNT = 9).

Discussion

This report on the long-term effects of this task-shifting effectiveness trial generated several unique and important findings. First, the evidence that clinician-led *Body Project* groups produced greater reductions in all of the risk factors and in the primary outcome of eating disorder symptoms, compared with educational video controls through long-term follow-up, with one effect persisting through 4-year follow-up, is novel because the educational video is an alternative intervention and this is the longest follow-up used in an eating disorder prevention trial. The evidence that peer-led *Body Project* groups produced greater reductions in risk factor and eating disorder symptoms than educational video controls, with one effect persisting through 4-year follow-up, is also novel for the same reasons. Several of the significant effects were medium in magnitude, including one at 4-year follow-up, though many were small. When interpreting effects relative to the educational video condition it is important to remember that this video produced larger reductions in eating disorder symptoms ($d = .29$) than an educational brochure control condition (Stice et al., 2012), making it a more rigorous comparison condition than assessment-only control conditions typically used in eating disorder prevention trials. It was noteworthy that the effects for peer-led versus clinician-led *Body Project* groups did not differ, because no fully powered trial has compared the effects of clinician-led to peer-led *Body Project* groups over long-term follow-up. Yet, the average effect for continuous outcomes across all follow-ups (including nonsignificant findings and findings at posttest and

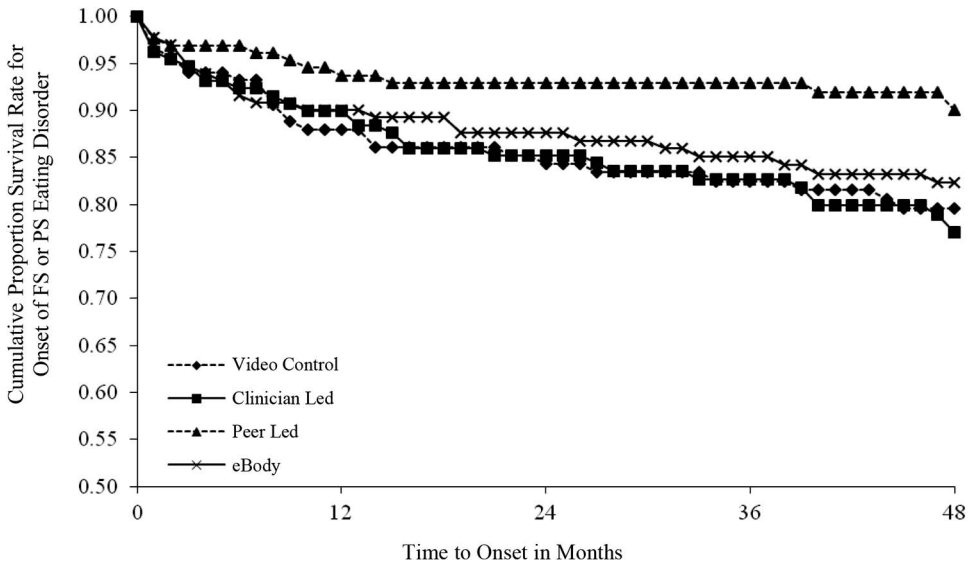

Figure 2. Cumulative survival rates for onset of any threshold or subthreshold *Diagnostic and Statistical Manual of Mental Disorders-Fourth Edition* (*DSM–IV*) eating disorder by condition.

6-month follow-up) was 20% larger for peer-led versus clinician-led groups (d = .29 vs. .24). Reducing eating disorder symptoms in young women at high-risk for eating disorders is clinically important. Results indicated that 18% of controls showed onset of an eating disorder over 4-year follow-up, which is higher than the 13% lifetime incidence observed in unselected (nonhigh-risk) samples (e.g., Allen et al., 2013; Dakanalis et al., 2017; Stice, Marti, et al., 2013), confirming that young women with body image concerns are at high-risk. Further, the reductions in thin-ideal internalization, body dissatisfaction, and negative affect are important because these variables increased risk for future onset of eating disorders in multiple prospective risk factor studies (Jacobi et al., 2011; McKnight Investigators, 2003; Rohde et al., 2015; Stice et al., 2017).

Second, the evidence that the *eBody Project* produced greater reductions in risk factors and eating disorder symptoms though 1- and 2-year follow-up, in thin-ideal internalization through 3-year follow-up, and in dieting by through 4-year follow-up compared with educational video controls is novel. To our knowledge, no other Internet-delivered prevention program has reduced eating disorder symptoms, produced greater reductions in outcomes than an alternative educational intervention, or produced effects that have persisted through 4-year follow-up. Indeed, Internet-implemented prevention programs for other mental health problems have not produced effects that persist over multiyear follow-ups (Riper et al., 2014). Nonetheless, the *eBody Project* produced fewer effects and these effects were less persistent than the group-based *Body Project*. The smaller effects did not appear to be because of low acceptability, because the proportion of participants who completed all *eBody Project* modules (57%) was higher than the proportion who completed all *Body Project* group sessions when delivered by clinicians (47%) or peer-leaders (45%) but may have been because of the *eBody Project* lacking both a group leader or fellow group members. It is possible that the *eBody Project* could be made more engaging. We have been refining the group-delivered *Body Project* for over 20 years, whereas the *eBody Project* that we evaluated is the first generation of this Internet-delivered intervention.

Third, the finding that peer-led *Body Project* groups produced greater reductions in some risk factors than the *eBody Project* through 2-year follow-up is novel because this is a credible alternative intervention that contains similar content to the group-based *Body Project*. Results suggest that in-person delivery of dissonance-based activities is more effective than Internet-delivery, potentially because the greater public accountability maximizes dissonance-induction (Green et al., 2005), the social support provided by group members (Shaw, Rohde, & Stice, 2016), or group-implementation changes perceptions of peer norms (i.e., that most students reject the thin beauty ideal; Cruwys, Haslam, Fox, & McMahon, 2015). Yet, clinician-led *Body Project* groups did not produce greater reductions in risk factors or symptoms than the Internet-delivered intervention, providing one piece of evidence that peer-led groups may be more effective than clinician-led groups. More broadly, it is noteworthy that the *Body Project* has produced significantly larger reductions in risk factors and symptoms than seven alternative interventions, including an educational video, expressive writing, a media advocacy prevention program, a psychoeducational prevention program, a healthy weight prevention program, a low-dissonance versions of the *Body Project*, and now an Internet-delivered version of the *Body Project*. The fact that the *Body Project* has produced greater reductions in outcomes than alternative credible comparison conditions, many of which were of the same duration as the *Body Project*, reduces the possibility that expectations or demand characteristics are responsible for the observed effects. Few other eating disorder prevention programs have produced significantly larger effects than alternative credible interventions. However, the fact that the *Body Project* has not produced greater reductions in all outcomes than these alternative interventions implies that the alternative programs may have some preventive effects or that nonspecific factors, expectancies, and demand characteristics contribute to some of the reductions in outcomes.

Fourth, although all three variants of the *Body Project* produced larger reductions in the primary continuous outcome of eating disorder symptoms than educational video controls at 1- and 2-year follow-ups, the effects for eating disorder symptom reductions for the three variants of the *Body Project* did not differ significantly at any of the follow-up points. This implies that Internet-delivery of the *eBody Project* may not attenuate effects for this primary outcome.

Fifth, and perhaps most importantly, peer-led *Body Project* participants showed a significant 54% reduction in onset of eating disorders over 4-year follow-up compared with educational video controls, a significant 58% reduction compared with clinician-led *Body Project* participants, and a marginal 48% reduction compared with *eBody Project* participants. These findings are extremely novel in that this effect has not been found for peer-led *Body Project* groups, no eating disorder prevention program has produced a significant reduction in future eating disorder onset than a credible alternative intervention, and these preventive effects emerged over a 4-year follow-up, the longest examined to date. Indeed, only one other prevention program (the *Healthy Weight* intervention) has significantly reduced future onset of eating disorders in multiple trials (Stice, Butryn, et al., 2013; Stice et al., 2008), communicating that true preventive effects from prevention programs are difficult to achieve. Data suggest that for every 100 young women with body image concerns who complete peer-led *Body Project* groups versus watching an educational video on eating disorders, there should be approximately 10 fewer eating disorder cases that emerge over 4-year follow-up. The NNT of 11 for peer-led *Body Project* groups versus educational video controls indicates that it is necessary to offer peer-led *Body Project* groups to only 11 participants to prevent the onset of an eating disorder in one of the group members.

It is noteworthy that clinician-led *Body Project* group participants did not show a significant reduction in future eating disorder onset relative to participants in the other conditions. Although the average effect for the continuous outcomes across all follow-ups was 20% larger for peer-led versus clinician-led *Body Project* groups relative to educational video controls, clinician-led groups produced nonsignificantly larger reductions in eating disorder symptoms than peer-led groups at posttest and 6-month follow-up, but peer-led groups produced nonsignificantly larger reductions in symptoms than clinician-led groups at 2-, 3-, and 4-year follow-ups. The evidence that peer-led groups produced slightly larger reductions in eating disorder symptoms at the latter follow-up assessments likely contributed to the superior reduction in eating disorder onset over 4-year follow-up. In this context it is important

to note that we generated the definitions for threshold and subthreshold eating disorders on an a priori basis when working on a separate report (Stice, Gau, et al., 2017). Intriguingly, the pattern of findings across the four fully powered trials of the *Body Project* suggests that this prevention program only reduces future onset of eating disorders when implemented by peer-educators (the present trial) or when groups were coimplemented by a female undergraduate student (Stice et al., 2008), but not when clinicians at colleges or high-schools implement the groups (the present trial and Stice et al., 2011, 2015). Also consistent with this interpretation, virtual delivery of *Body Project* groups over the Internet by peer educators produced a 77% reduction in future eating disorder onset compared with expressive writing controls over 2-year follow-up in a recent trial (Ghaderi et al., 2019). This pattern of findings suggests that the dissonance-based *Body Project* is more effective when peers who are the same age (and sex) as the group participants facilitate the groups. Presumably, this is because health promotion interventions are perceived as more credible if delivered by individuals who are similar to group participants (Cialdini, 2007). Young women may find it more credible when a relatable young woman argues against pursuing the thin beauty ideal versus an older clinician, who might also be male. Given that the results from five separate fully powered randomized trials suggest that *Body Project* groups only reduce future onset of eating disorders when groups are facilitated completely or in part by other young women, it might be optimal to have undergraduate peer educators facilitate *Body Project* groups in implementation efforts. Peer-led interventions have produced larger effects than adult clinician- or teacher-led interventions for prevention programs (the present trial; Botvin et al., 1984; Leupaker et al., 1983) and one self-management program for asthma (Rhee et al., 2011). Results suggest that peer educators are particularly effective for scripted interventions that target adolescents, theoretically because peer-leaders are perceived as more similar and are more credible. Apparently, the superior effects for peer-leaders was not because all of these interventions were very simple, in that one of the substance abuse prevention programs covered nine distinct topics over 20 sessions (Botvin et al., 1984).

In total, 80–81% of participants completed at least half of *Body Project* sessions and 74% of completed at least half of the *eBody Project* modules, suggesting moderate acceptability. These figures compare favorably to the parallel figure for another widely studied selective eating disorder prevention program; only 47% of participants assigned to *Student Bodies* completed at least half of that eating disorder prevention program (Taylor et al., 2016). Nonetheless, it would be useful to improve engagement of the various forms of the *Body Project.*

It is important to balance risk for false positive findings and risk for false negative findings. Given that we had five continuous outcomes and 1 dichotomous outcome, it is possible that some effects emerged by chance because we used a p value of .05. However, 38% of the effects tested in this trial were statistically significant, which is considerably higher than the 5% anticipated based on chance alone, suggesting it is unlikely that we are simply reporting false positive findings. And as noted, 88% of the effects for the core outcomes have replicated in the 22 controlled trials conducted by our team and others. If each of these 22 studies only detected the 5% of effects that would be expected because of chance, not even one effect would be expected to replicate across all 22 trials, which is considerably smaller than 88%.

Limitations

First, although we used state-of-the-art procedures for handling missing data, moderate attrition may have biased the results. Systematic attrition, such as the evidence that participants with higher eating disorder symptoms at baseline were more likely to drop out from the trial, could have resulted in artificially lower eating disorder symptom scores at follow-up that would have resulted in overestimates of intervention effects for this outcome. Fortunately, simulation analyses indicate that multiple imputation produces more accurate parameter estimates than occur with alternative analytic approaches, including only analyzing data from participants who provide complete data (Graham, 2009). Second, the outcomes were largely based on self-report data, raising the possibility that expectances and demand characteristics contributed to the observed effects. However, trials have found that the *Body Project* produced reductions in objectively measured brain region response to thin-ideal images (Stice et al., 2015) and objectively measured cardiac functioning (Green et al., 2017) relative to control participants. Third, although we sought to power this study by using the largest sample to date in a trial of this prevention program, the fact that the 48% reduction in future eating disorder onset for peer-led *Body Project* group participants compared with *eBody Project* participants was only marginal communicates how difficult it is to power a trial to detect meaningful differences in future eating disorder onset. Fourth, it is important to consider that the educational video was not matched in duration to the *Body Project* conditions when interpreting the findings.

Conclusions and Directions for Future Research

Both clinician-led and peer-led *Body Project* groups produced reliable reductions in risk factor and eating disorder symptoms, with some effects persisting through the entire 4-year follow-up. Further, the Internet-delivered *eBody Project* produced reductions in risk factors and eating disorder symptoms, with some effects persisting through 4-year follow-up. These findings are encouraging given that these three prevention programs were only 4-hr. No other eating disorder prevention program has produced effects that persist over such a long-term follow-up. Most critically, peer-led *Body Project* groups reduced future onset of eating disorders relative to an assessment-only control condition, clinician-led *Body Project* groups, and the *eBody Project*, though the latter effect was only marginal. Collectively, results suggest that delivery of the *Body Project* can be task-shifted to peer implementation with little attenuation of effects, and that peer-led *Body Project* groups are more effective in preventing future eating disorder onset than clinician-led groups. This is important because professional clinicians are relatively expensive whereas the peer-leaders delivered the *Body Project* groups at no cost as part of their college coursework. Peer leaders are also abundant because 80% of colleges have peer educator programs (Hong, Robertson, Catanzarite, & McCall, 2011). Thus, implementing the group-based *Body Project* with peer educators appears to represent an effective and cost-efficient delivery modality that may extend to delivery of other prevention programs. In juxtaposition, the *eBody Project*

produced somewhat fewer and less persistent effects than *Body Project* groups, and was less effective in preventing future eating disorder onset than peer-led *Body Project* groups, implying that it would be better to implement peer-led *Body Project* groups rather than use the more cost-efficient *eBody Project*. Nonetheless, in instances where this is unfeasible, it might be useful to encourage completion of the *eBody Project*, which produced several significant effects and is available for anyone to complete for free.

Findings suggest it might be useful to develop a more professional version of the *eBody Project*, as it may increase efficacy, while overcoming implementation barriers for the group-implemented *Body Project.* Research should also examine moderators that determine whether particular individuals show larger intervention effects from the various delivery modalities for this prevention program, as a personalized prevention approach might improve the yield of prevention efforts. Further, it will be important to conduct cost effectiveness analyses of the various methods of delivering this prevention program. It will be critical to examine factors that influence adoption and implementation of effective eating disorder prevention programs, as well as factors that predict fidelity, competence, and sustainability of intervention delivery. Lastly, research should evaluate whether peer-leaders produce larger effects than clinicians for other prevention programs and explore the factors that contribute to any superior effects, as this could facilitate broad implementation of prevention programs for pressing public health problems.

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