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Cost-effectiveness of achieving clinical improvement with a dissonance-based eating disorder prevention program

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ABSTRACT

Using data from an effectiveness trial delivered by college clinicians, we examined the cost-effectiveness of the dissonance-based *Body Project* program for reducing eating disorder symptoms in women with body dissatisfaction. The outcome of interest was individual-level change; 14.9% of *Body Project* participants attained clinically meaningful improvement vs. 6.7% of controls. Delivering the intervention costs approximately $70 (2012 U.S. dollars) per person. Incremental cost-effectiveness was $838 for each additional at-risk person reducing eating disorder symptomology to a clinically meaningful degree. These analyses demonstrate the economic value of the *Body Project* for college-age women with symptoms below the eating disorder diagnosis threshold.

Introduction

Approximately 8–15% of young women meet lifetime criteria for *DSM-IV* anorexia nervosa, bulimia nervosa, or eating disorder not otherwise specified (EDNOS), which includes subthreshold and other eating disorders, such as binge eating disorder (Hudson, Hiripi, Pope, & Kessler, 2007; Wade, Bergin, Tiggemann, Bulik, & Fairburn, 2006). These disorders are marked by chronicity, distress, impairment, and risk for obesity, psychopathology, and mortality (Allen, Byrne, Oddy, & Crosby, 2013; Arcelus et al., 2011; Swanson, Crow, Le Grange, Swendsen, & Merikangas, 2011). Eating pathology has been found to occur along a continuum (Olatunji et al., 2012; Stice, Killen, Hayward, & Taylor, 1998; Tylka & Subich, 2003), and individuals with subthreshold bulimia nervosa and binge eating disorders experience functional impairment and emotional distress at rates comparable to those meeting full threshold (Engel, Adair, Las Hayas, & Abraham, 2009; Stice, Marti, Shaw, & Jaconis, 2009). In addition, subthreshold eating disorders often lead many individuals to seek treatment (Eddy, Celio, Hoste, Herzog, & Le Grange, 2008; Fairburn & Bohn, 2005).

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The *Body Project* is a dissonance-based intervention for women with body dissatisfaction that encourages participants to voluntarily critique the thin beauty ideal in various exercises. Theoretically these activities reduce thin-ideal internalization, which then decreases other eating disorder risk factors, symptoms, and disorder onset. Although intended to prevent eating disorder onset, the intervention also produces improvements in symptom reductions.

Cost-effectiveness analysis helps to allocate finite resources, by determining the ratio of incremental cost to incremental gain for two or more treatments, such as an intervention and a control "treatment." The result is a ratio between costs (and offsetting savings) in the numerator and a desired non-monetary outcome in the denominator. Decision-makers concerned with achieving this outcome can then compare cost-effectiveness ratios for various treatment programs to decide how best to allocate their financial resources. To date, cost-effectiveness studies have been published for treatment of full-blown eating disorders including in-patient anorexia nervosa treatment (Byford et al., 2007; Crow & Nyman, 2004; Toulany et al., 2015; Williamson, Thaw, & Varnado-Sullivan, 2001) and a self-help program for people meeting *DSM-IV* criteria for binge eating disorder (Lynch et al., 2010), and for one program to prevent bulimia nervosa (Wang, Nichols, & Austin, 2011), but none has addressed the cost-effectiveness of treating subclinical eating disorders.

The present study reports on the cost-effectiveness of the *Body Project* for clinically meaningful subthreshold symptom reductions, using data from a trial evaluating its effectiveness when delivered by college clinicians (Stice, Butryn, Rohde, Shaw, & Marti, 2013). Given a fixed budget, a university might choose to provide a low-efficacy intervention (i.e., brochures) to a large number of women, or they might prefer to provide a more costly but more effective intervention (i.e., *Body Project* group) to fewer women, if doing so would produce a greater net gain.

Methods

Participants were 408 young women (*M* age = 21.6, *SD* = 5.6) recruited from eight U.S. universities. Female students and university staff could enroll if they reported body image concerns. Representative of the universities, the sample was 58% European American, 17% Asian, 13% Hispanic, 7% African American, 4% Native American, and 1% Native Pacific Islander. Participants provided informed consent, and the project was approved by institutional review boards at Oregon Research Institute and each campus.

Participants were randomized to the *Body Project* (n = 203) or an educational brochure condition (which functioned as usual care; n = 205) via a random number table. Participants completed assessments by masked assessors at pretest, posttest, and 1-, 2-, and 3-year follow-ups (see outcome paper

for details; Stice et al., 2013). Participants in the two conditions did not differ on demographic variables or pretest outcome values.

Measures

DSM-IV eating disorder symptoms were assessed using the Eating Disorder Diagnostic Interview (EDDI). Past month symptoms were summed to form a composite, which has shown internal consistency (α = .92), inter-rater agreement (ICC = .93), 1-week test-retest reliability (ICC = .95), and sensitivity to interventions (Burton & Stice, 2006; Stice et al., 2013). In this study, the composite showed internal consistency (α = .74), inter-rater agreement (ICC = .84), and 1-week test-retest reliability (ICC = .95).

Analytic approach

Incremental cost-effectiveness calculation has two components: costs to deliver the intervention and usual care, and program effectiveness, here defined as attaining a clinically meaningful reduction in eating disorder symptoms. Following standard procedures (Farnham, Ackerman, & Haddix, 1996; Gold, Siegel, Russell, & Weinstein, 1996), we examine costs associated with replicating the interventions in non-research settings, excluding development/evaluation costs. We use micro-costing (Luce, Manning, Siegel, & Lipscomb, 1996) rather than gross-costing techniques, identifying costs for each intervention element. Cost data are in 2012 dollars, reflecting the higher end of values for the trial; enrollment was conducted from 2009 to 2011.

Development of the cost inventory

Value of clinician time

The primary cost to implementing the *Body Project* is the time to deliver and receive it. Clinician time is valued according to the U.S. Department of Labor's (2012) reported median salary for college mental health counselors, with the 25th and 75th percentile salaries used in sensitivity analyses. Fringe benefits were estimated per the 2010/2011 Survey on Employee Benefit Policies and Practices produced by Towers Watson Data Services, which reported median benefits at 18.8% of payroll (25th percentile = 14.4%; 75th percentile = 23.2%). An additional 11% of salary covers statutory employer expenses such as Social Security.

Clinician training

Intervention delivery cost includes cost of training clinicians, averaged over the number of times a typical clinician delivers the intervention. Training has two

components: (a) purchase of the 86-page *Body Project* facilitator guide, which costs $45, and (b) participation in an 8-hour workshop. The workshop typically costs $1250 for up to 16 participants, plus trainer airfare/lodging (http://www.bodyprojectcollaborative.com/training-costs.html). Trainer transportation costs average approximately $500, and because generally 12 people attend each workshop, total costs for arranging the workshop average $150 per clinician-trainee. Clinician's time is also a cost component and is estimated at 8 hours of workshop attendance.

Trained clinicians typically offer the intervention 2–3 times annually for 2–3 years, a common length of time before staff turnover. Thus, we estimate that the average clinician delivers 6 groups and divide the total per-clinician training cost by 6.

Participant recruitment

Participants are generally recruited by posters advertising a body acceptance group for women, supplemented by local media announcements. The clinician then fields calls from potential participants. Per group, advertising and promotion typically require half an hour of one clinician's time and minimal materials; fielding calls may take another hour.

Groups

The *Body Project* intervention entails 4 weekly 1-hour group meetings, ideally led by two clinicians. Each clinician typically spends 5 hours per meeting (4 hours for sessions, plus prep time and other duties). Handout costs are negligible. The intervention is intended to be delivered to groups of 5–9 women; in the effectiveness trial, 203 women participated in 29 groups (seven per group), and this figure is used in the cost estimates. Further, each missed session entails 15 minutes of clinician time for a personalized make-up; in the randomized trial this resulted in 55 make-ups across the 29 groups.

Control condition

Control participants received two mailed brochures: APA Help Center's three-page guide to "Eating Disorders" and a one-page "Ten Steps to Positive Body Image" brochure from the National Eating Disorders Association. Mailing costs include postage, envelope and cover letter, and labor (approximately 1 minute of office assistant time).

Assessment of outcomes of interest

The outcome of interest was whether the participant attained a clinically meaningful reduction in eating disorder symptoms (EDDI) between baseline and final assessment, a binary outcome that readily permits comparisons between conditions and other interventions. For this outcome, the Reliable

Change Index (Jacobson & Truax, 1991) was used. This metric compares the two scores, and "clinically meaningful change" is shown when the difference is least twice the standard error difference (1.96) in the desired direction. The index numerator is the difference in pretest and posttest scores divided by the standard error difference, which is based on the measure's standard deviation and test-retest reliability.

Cost-effectiveness analysis

The incremental cost-effectiveness ratio is calculated as the difference in per-participant costs between conditions (intervention minus control) divided by the difference in condition effectiveness, for each unit of outcome change, assuming that effectiveness for a given outcome is significantly different by condition.

Cost-effectiveness was assessed calculating organizational costs (i.e., costs incurred in replicating the intervention with existing materials), which are the most relevant costs to universities considering whether to adopt the program.

Sensitivity analyses

Incremental cost-effectiveness was also calculated using the higher and lower estimates of clinician's salary and benefits. The resulting values help set upper and lower cost bounds regionally and over time. Additional analyses show the effects of varying other parameters, e.g., for clinicians to deliver more groups (8 rather than the estimated 6), for one rather than two clinicians to deliver a group, for clinicians to self-train rather than attending a workshop, for clinicians to spend 1–5 hours on recruitment rather than the estimated 1.5 hours, and for groups to have fewer and more participants (4–10, rather than the estimated 7).

Results

Training and intervention costs

For this cost analysis, the median clinician wage was $28.91 (75th percentile = $37.03; 25th percentile = $22.42). Training costs under the assumptions above were $71 per clinician per group delivered ($468 per trained clinician divided by 6 groups). Total cost to deliver each intervention group was $488, and cost per participant was $70. Delivery of the educational brochure intervention costs an organization roughly $1 per person.

Relevant outcomes

Table 1 presents the rate at which participants attained a clinically meaningful EDDI improvement for intervention (27 of 181 participants, 14.9%)

Table 1. Incremental cost-effectiveness of reducing eating disorder symptoms (EDDI score) per individual attaining a clinically meaningful change (using main analysis assumptions, organizational perspective; completed case analysis).

Condition	Cost per participant	Incremental cost	Effectiveness: % achieving change*	Incremental effectiveness	Incremental cost per individual with CMC*
Brochure controls	1.01	—	6.7%	—	—
Body Project	69.75	68.74	14.9%	8.2%	$838

Note. *Clinically meaningful change: Control, 12/179; *Body Project* 27/181; $p < .05$.

and controls (12 of 179 participants, 6.7%). The difference was significant (χ^2 (1, N = 360) = 6.285, $p < .05$). Missing data were not imputed; the 360 participants completing the 3-year follow-up did not differ from the original 408 participants in terms of eating disorder symptoms or risk factors at baseline.

Cost-effectiveness

Table 1 also presents incremental cost-effectiveness for the individual change measure of eating disordered symptoms. On average, each additional person achieving a clinically meaningful change costs $838 from the organizational perspective.

Sensitivity analyses

When using the higher clinician cost estimates (75th percentile salary), the incremental cost per participant making a clinically meaningful improvement is $1,045; when using the lower clinician cost estimates (25th percentile salary), the incremental cost is $673.

One of the easiest ways to reduce intervention delivery cost, and thus the cost per person making a clinically meaningful change, is for clinicians to deliver more than 6 groups. If each trained clinician provided 8 groups, the cost per treated person would drop to $65, and the cost per person making the defined improvement would drop to $776. Another way to reduce cost is for only one clinician to deliver the sessions; in the randomized trial, 7 of the 29 groups had only one clinician. This approach reduces the cost per treated person to $39, and the cost per person making the defined improvement to $463. Some motivated clinicians choose to self-train, which involves purchasing the manual and working through it on their own, which takes approximately 6 hours. If two such clinicians worked together to offer 6 groups, the cost per treated person would be $60, and the cost per person making the defined improvement would be $718. Clinicians spending 1 or 5 hours on recruitment would change the cost per person to $813 or $1,014. Finally, a

group size of 4 would change the cost per person making the defined improvement to $1,459, whereas a group size of 10 would change the cost to $590.

The combined least costly scenario—self-trained clinicians offering 8 groups staffed by 1 clinician per group, with 1 hour of recruitment per group yielding 10 participants per group—would cost $433 per person achieving a clinically meaningful reduction in eating disorder symptoms for the median clinician salary. Using the lower and upper salary estimates, the cost per person making the defined improvement would be $356–818.

Discussion

This article begins to demonstrate the economic value of the *Body Project* intervention. On average, for every $838 invested in providing groups according to the standard intervention training and protocol instead of brochures, one additional at-risk person (on average) will reduce her eating disorder symptomology by a clinically meaningful degree. Clinicians confident in their ability to maintain intervention fidelity can reduce these costs to as low as $433 under median salary assumptions, but in other circumstances it could cost more than $1,000 to achieve the same outcome. This range of values and factors in the specific delivery setting might influence policy decision makers in their use of this intervention.

It is difficult to say whether this range of cost estimates reflects a good value. To the extent that subthreshold eating disorders interfere with a woman's education and future earnings, the cost may be quite reasonable. Further, some individuals participating in the *Body Project* who make a clinically meaningful improvement may otherwise have progressed to a diagnosed eating disorder, and the annual direct costs of an eating disorder have been estimated at $8,042 (Stuhldreher et al., 2012), which do not take into account additional costs of lost productivity, comorbid depression/anxiety, future obesity, premature morbidity, etc. For such individuals, these costs and the risk of premature death have been averted, and quality of life has been greatly improved. The current study was not designed to include measures of these possible outcomes, and some of them may take many years to manifest; we limited the scope of our analyses to the three-year follow-up period and the available outcomes which we had the statistical power to detect.

Ideally we would like to be able to compare this cost with use of other potential health care resources, which would typically be measured in quality-adjusted life-years saved (QALYs) or disability-adjusted life-years saved (DALYs); a cost per QALY of $50,000 is considered very cost-effective and a threshold of $200,000 per QALY may be reasonable (Ubel, Hirth, Chernew, & Fendrick, 2003). This calculation would involve assessing health-related quality

of life before intervention and at some later point and collecting all costs associated with the symptoms and intervention. One bulimia treatment program estimated a cost per QALY gained of €1,455-€16,481, including only intervention costs and assuming the untreated group would improve linearly to match the treated group within 10 years (Pohjolainen et al., 2010). However, others caution that QALYs should not be extrapolated beyond a study's follow-up period when evidence regarding the long-term courses of the different eating disorders is lacking (Stuhldreher et al., 2012), especially as eating disorder recovery is difficult to definitively ascertain (Aaserudseter, 2007).

Determining the intervention's cost-effectiveness using societal-level costs, which include the value of participants' time, averted costs of healthcare received, and associated discontinuities in education and employment, would also be worthwhile. This approach would also permit bootstrapping to estimate uncertainty around the incremental cost-effectiveness ratio, allowing the creation of cost-effectiveness acceptability curves (Fenwick, Claxton, & Sculpher, 2001; Fenwick, O'Brien, & Briggs, 2004) or confidence intervals (O'Brien, Drummond, Labelle, & Willan, 1994). The randomized trial from which the present study drew its data did not have the statistical power to detect differences in healthcare costs, nor did it collect data on lifestyle challenges incurred from subthreshold eating disorder symptoms, so these analyses are beyond the scope of this study.

Future research will explore alternate methods of delivering the *Body Project* intervention, including group delivery by college peer educators or via a stand-alone web-based program (Stice, Rohde, Durant, & Shaw, 2012). Even if these new methods produce smaller effects, their lower cost could result in greater cost-effectiveness.

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