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An uncontrolled pilot feasibility trial of an intuitive eating intervention for college women with disordered eating delivered through group and guided self-help modalities

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Abstract

Objective: College women engage in high rates of disordered eating behaviors (DEBs), and most do not receive treatment. Campuses lack resources to meet this need, thus accessible and affordable treatment options are important. Intuitive eating (IE) is gaining mainstream interest, but intervention research is scarce, with no known clinical trials in college women. This uncontrolled pilot trial examined the feasibility, acceptability, and preliminary efficacy of an eight-week IE intervention delivered through two potentially accessible and affordable modalities: group and guided self-help (GSH).

Method: Racially and ethnically diverse college women (N = 71; <50% White) were recruited from a large public Mid-Atlantic university and randomized to group (n = 40) or GSH (n = 31). Assessments occurred at 0 (pre-test), 8 (post-test), and 16 weeks (follow-up). Group participants attended eight weekly 1.5-hour sessions. GSH participants engaged in self-study and had eight weekly 20-minute phone calls.

Results: Both conditions demonstrated feasibility, with superior retention and attendance in GSH. Over 90% of those attending at least one session in either condition were retained through follow-up. Both conditions were highly acceptable, and produced medium to large reductions in DEBs, body dissatisfaction, and weight-bias internalization, and improvements in body appreciation, IE, and satisfaction with life from pre- to post-test, which were maintained at follow-up.

Discussion: Results of this pilot are encouraging and support the development of a larger randomized controlled trial. Avenues for refinement include strategies to improve feasibility of the group condition, and conducting longer-term follow-up to examine maintenance of effects and the intervention's eating disorder prevention potential.

KEYWORDS
disordered eating, group treatment, guided self-help, indicated prevention, intuitive eating, undergraduate women

1 | INTRODUCTION

Undergraduate women engage in high rates of disordered eating behaviors (DEBs; e.g., restriction, compensatory behaviors, and binge eating), A recent large-scale national survey found that 49% of college women endorsed objective binge episodes, 31% compensatory behaviors, and 17% were at high eating disorder (ED) risk (Lipson & Sonneville, 2017). DEBs are associated with considerable mental and

physical health impairment (Crow, Agras, Halmi, Mitchell, & Kraemer, 2002; Fitzsimmons-Craft, 2011), are often chronic (Neumark-Sztainer, Wall, Larson, Eisenberg, & Loth, 2011), and are a risk factor for full-threshold EDs, conditions with significant morbidity and mortality (Arcelus, Mitchell, Wales, & Nielsen, 2011; Attard, Herring, Howard, & Gordon-Larsen, 2013). Despite the high prevalence of DEBs in college women, very few affected students receive treatment (Lipson et al., 2017). Campuses lack sufficient resources to meet the high need for ED treatment services thus accessible, affordable, and inclusive intervention approaches are needed (Lipson et al., 2017).

Several prevention programs have produced effects on ED risk factors (Le, Barendregt, Hay, & Mihalopoulos, 2017), such as the Body Project, a dissonance-based intervention targeting thin-ideal internalization reduction (Becker & Stice, 2017), and Student Bodies, a cognitive-behavioral intervention targeting multiple risk factors (e.g., weight concerns; Wilksch et al., 2018). Data suggest dissonance-based interventions might be less effective for those with initially elevated ED symptoms (Horney, Stice, & Rohde, 2015), and Student Bodies, which promotes self-monitoring and weight regulation strategies, has shown particular efficacy for women with binge (vs. restrictive) behaviors (Jacobi, Völker, Trockel, & Taylor, 2012). Intuitive eating (IE) is a novel approach that promotes attunement to internal cues, eating in response to hunger and satiety, coping with emotions without using maladaptive eating and exercise behaviors, and body acceptance (Tribole & Resch, 2012; Tylka, 2006). IE has potential as a transdiagnostic, inclusive method of addressing DEBs that might uniquely address limitations of existing programs. For instance, IE targets body acceptance rather than thin ideal internalization reduction. This might enhance its cultural sensitivity, as many women of color internalize curvier or larger body ideals (Capodilupo, 2015), but manifest comparable rates of eating pathology to their White peers (Cheng, Perko, Fuller-Marashi, Gau, & Stice, 2019). Additionally, IE is weight-neutral, which might benefit women at higher weights for whom a weight-centric or restrictive approach could exacerbate DEBs (Hart, Granillo, Jorm, & Paxton, 2011; Neumark-Sztainer, 2015). Finally, IE's principles do not vary based on symptomatology, which could enhance its potential to prevent DEBs progression, as symptom crossover is common, particularly from adolescence to early adulthood (Pearson et al., 2017).

IE appears to be gaining mainstream interest in the United States, but this attention is outpacing empirical investigation. For instance, a recent Google search found, on just the first two pages, nine unique IE programs offered by dietitians, therapists, and unlicensed health coaches, none of which are empirically validated. Cross-sectional data are favorable, indicating IE behaviors are negatively associated with eating pathology, and positively associated with body appreciation, self-esteem, and emotional functioning (Bruce & Ricciardelli, 2016). Nevertheless, there is only one known trial, conducted with partners of military members (Cole & Horacek, 2010), that followed the 10 IE principles as designed by its creators (Tribole & Resch, 2012). More commonly, interventions have incorporated the Health at Every Size (HAES) curriculum, or included mindful eating or non-diet components (Clifford et al., 2015), which have produced positive effects on health

behaviors, physical health, quality-of-life, and self-esteem (Bacon et al., 2011; Clifford et al., 2015; Mensinger, Calogero, Stranges, & Tylka, 2016). These approaches have similarities and are often complementary, but differ in focus and scope. For instance, HAES incorporates IE, but has its own set of principles and a strong social justice emphasis (Bacon et al., 2011). Mindful eating emphasizes present, nonjudgmental awareness of one's eating experience, including slowing down eating and minimizing distractions (Mathieu, 2009). Finally, "non-diet" has not been formally operationalized, but generally refers to a rejection of dieting practices (Clifford et al., 2015). Although IE is considered non-diet, and encourages attuned eating, its 10 principles are multidimensional, encompassing factors such as body acceptance and mindful movement. Despite its growing popularity, there are no known IE interventions following the 10 principles conducted with a college sample. A recent, two-session non-diet intervention for college women produced effects on dieting intention, IE, and body dissatisfaction relative to a brochure control condition (Wilson, Marshall, Murakami, & Latner, 2020). Although this intervention encouraged eating guided by hunger cues, it also encouraged healthy eating via MyPlate guidelines, which is inconsistent with IE principles. As IE's mainstream popularity continues to grow, empirical evaluation of its principles is vital.

Given the considerable barriers to care that contribute to the high unmet need for DEBs treatment, accessible and affordable intervention approaches are an urgent priority (Kazdin & Blase, 2011). Prevention programs have been commonly implemented in group settings (e.g., Stice, Shaw, & Marti, 2007), but guided self-help (GSH; using self-help materials with guidance) shows promise as a cost-effective and scalable approach for mild to moderate DEBs (Traviss-Turner, West, & Hill, 2017; Wilson & Zandberg, 2012). Therefore, in this pilot, we evaluated two active intervention modalities, group and GSH, which are both more accessible and affordable than individual psychotherapy. Pilot trials are an instrumental first step in designing a fully-powered randomized-controlled trial (RCT) of a novel intervention (Leon, Davis, & Kraemer, 2011). Thus, this study's purpose was not to compare the efficacy of each modality, but instead to evaluate each condition's feasibility, acceptability, and preliminary efficacy to inform the design of a subsequent, fully powered RCT. This is the first known pilot of an IE intervention following the 10 principles outlined by its creators with a college sample. Our primary outcomes were feasibility and acceptability; secondary outcomes were preliminary efficacy on DEBs, IE, body appreciation and dissatisfaction, weight-bias internalization, and satisfaction with life. Body dissatisfaction is a primary ED risk factor and frequent prevention target (Stice, 2002). Moreover, body appreciation appears protective against body image threats (Andrew, Tiggemann, & Clark, 2015). Weight-bias internalization is strongly related to DEBs (O'Brien et al., 2016) because IE is weight-neutral and emphasizes body acceptance, it might foster weight-bias internalization reduction. Finally, we assessed whether intervention participation might offer more global benefits via satisfaction with life. We hypothesized that both conditions would: (a) be feasible and acceptable, and (b) demonstrate within-group preliminary efficacy.

2 | METHOD

2.1 | Design, participants, and procedure

This study was a 1:1 simple allocation randomized uncontrolled pilot trial of an IE intervention delivered through group and GSH. Analyses were conducted within-group. Randomization was done to avoid selection bias, and to ensure participants would accept randomization to these modalities. Ethics approval was obtained from the host institution. Recruitment occurred through flyers, word of mouth, and outreach to campus organizations. The study was advertised as an opportunity for women interested in improving their relationship with food and their bodies. Interested individuals provided electronic consent, which was transparent about study design (i.e., randomization), prior to completing online screening measures. Women (ages 18–25) who were enrolled at the host institution, and endorsed at least one fasting, binge, or compensatory behavior (i.e., compensatory exercise, vomiting, laxatives, or diuretics) in the last 28 days (as measured by the EDDS), but were below anorexia nervosa (AN) and bulimia nervosa (BN) thresholds, were eligible. Individuals were excluded if they: (a) met criteria for AN or BN or engaged in >4 purging episodes/month (as these individuals likely required more intensive care), or (b) were not enrolled at the host institution. All excluded individuals were provided a comprehensive list of local ED treatment resources.

Overall, 71 women (M age = 20.08, SD = 1.99) were randomized (group = 40; GSH = 31). These samples were sufficient to detect medium and large within-group effects over three timepoints. Participants identified as 39.4% (n = 28) White, 22.5% (n = 16) Black, 19.7% Asian (n = 14), 9.9% Latina (n = 7), and 7.0% (n = 5) multiracial. See Table 1 for participant characteristics. See Figure 1 for participant flow.

Online assessments occurred at 0 (pre-test), 8 (post-test), and 16 weeks (follow-up). Participants received $5, $10, and $15 e-gift cards, at each respective timepoint for survey completion. After completion of pre-testing, participants were randomly assigned and received their assignments via email one week prior to session one.

Group participants met with 6–10 other women and two group leaders for eight weekly sessions lasting ~1.5 hours. After the last session, participants completed anonymous exit questionnaires assessing feasibility and acceptability.

GSH participants received a hard copy of the IE workbook before the first session and were assigned 1–2 chapter(s) of weekly self-study, consistent with the content covered that week in group. Participants had weekly 20-min phone calls with a coach, who checked in on chapter completion, asked about the relative helpfulness of activities, answered questions, and assigned content for the next week.

All leaders (GSH and group, n = 8) were doctoral students with ≥ 1 year of clinical experience. Group leaders had prior group counseling experience. One leader participated in both conditions. Prior to intervention implementation, all leaders completed three hours of training addressing IE principles, manual content, and procedures specific to each condition. Supervision was provided by the first and second authors, and occurred for 1–2 hrs/week during the intervention.

TABLE 1 Enrolled participant characteristics by condition and overall

	Group (n = 40)	GSH (n = 31)	Overall (N = 71)
Age	20.20 (1.83)	20.00 (2.21)	20.11 (1.99)
Race/ethnicity			
Asian	15.0% (6)	12.9% (4)	14.1% (10)
Black	25.0% (10)	25.8% (8)	25.4% (18)
Latinx	12.5% (5)	9.7% (3)	11.3% (8)
Native American	2.5% (1)	3.2% (1)	2.8% (2)
South Asian	7.5% (3)	9.7% (3)	8.5% (6)
White	45.0% (18)	45.2% (14)	45.1% (32)
Other	5.0% (2)	—	2.8% (2)
Year in school			
First	22.5% (9)	36.7% (11)	28.6% (20)
Second	27.5% (11)	23.3% (7)	25.7% (18)
Third	17.5% (7)	16.7% (5)	17.1% (12)
Fourth	17.5% (7)	10.0% (3)	14.3% (10)
Graduate	15.0% (6)	13.3% (4)	14.3% (10)

Note: Age is presented as M(SD). Categorical variables presented as % (n). Women were asked to choose all racial and ethnic groups that applied.

2.2 | Intervention overview

Both conditions followed the content of the IE workbook (see Table 2; Tribole & Resch, 2017), which was developed for use in both group and individual clinical settings, and as a self-help guide. This approach follows that of prior body image interventions that successfully used workbooks to examine the efficacy of group and GSH interventions (Cash & Lavallee, 1997; Grant & Cash, 1995). To ensure the intervention timeline fit within one semester, IE's 10 principles were collapsed into eight sessions. Specifically, because of their closely related content, we combined the principles, "make peace with food" with "challenge the food police," and "feel your fullness" with "discover the satisfaction factor." Group leader manuals were adapted from the workbook by the first author. The GSH leader manual included session guidelines corresponding to the fidelity checklist. Weekly content was consistent across conditions. The workbook contains several exercises easily translated to interactive group activities. Any activity not covered in group was provided as a handout to complete between sessions (1–2/weekly). GSH participants were assigned the same chapter(s) covered in group that week for self-study, and spent 20 min/week processing the material with their coach.

2.3 | Primary outcome measures

2.3.1 | Feasibility and acceptability

Feasibility of each condition was assessed via % session attendance (>75%), attrition (<%80), and % material covered during time allotted (>75%). These benchmarks were based on previous ED prevention
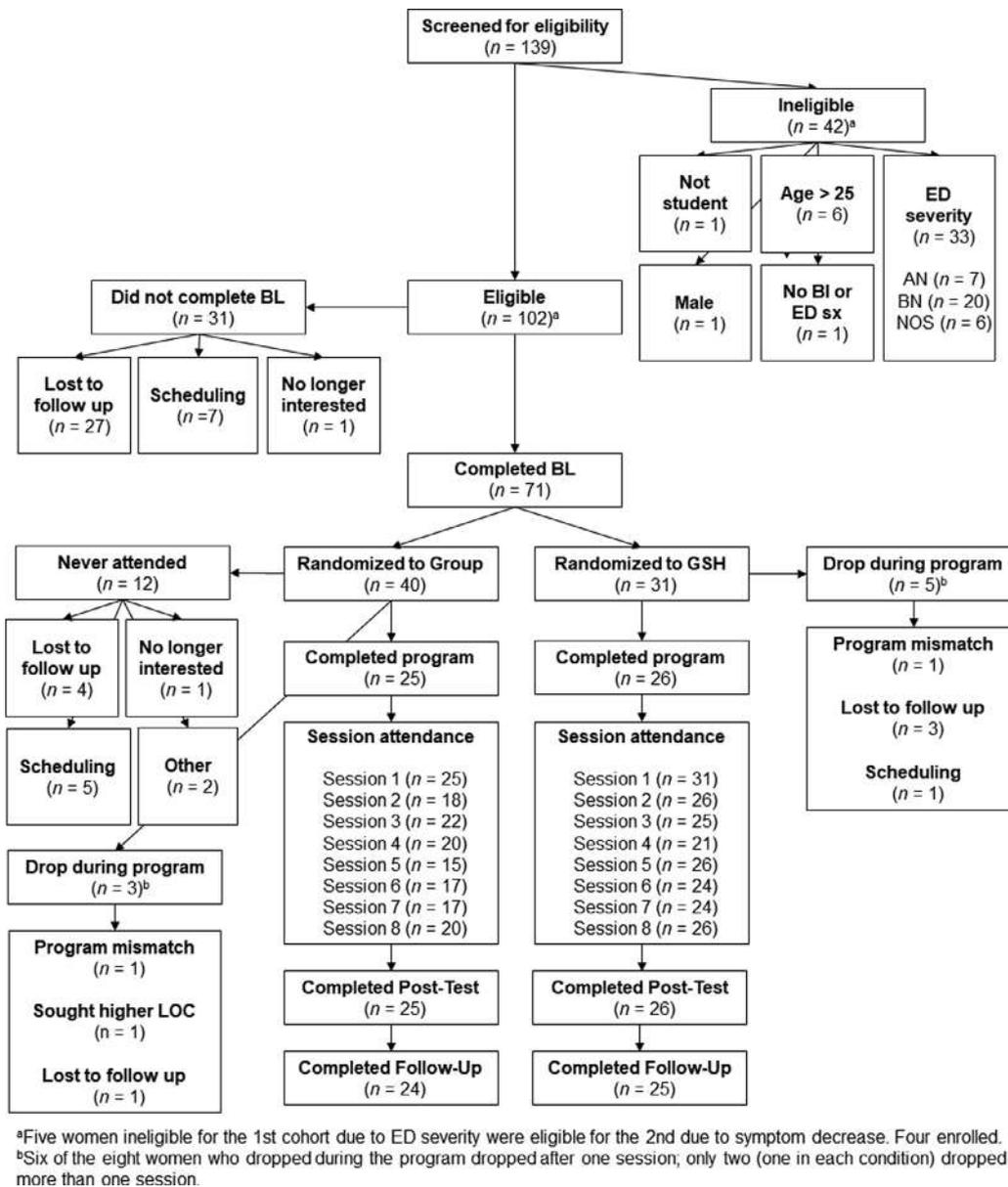
FIGURE 1 CONSORT chart of participant flow through the study

trials (Kilpela et al., 2016; Simpson, Burnette, & Mazzeo, 2019; Stice, Rohde, Shaw, & Marti, 2012). Acceptability was assessed via anonymous participant group and GSH exit questionnaires, with 18 and 15 items, respectively, rated on a 5-point scale from 1 = *Strongly disagree* to 5 = *Strongly agree*. These items assessed enjoyment, comfort, and perceived benefit, with some items specific to each condition. See Table 2 for items. Conditions were deemed acceptable if aggregate ratings were ≥ 4.0 (i.e., equivalent to "agree" or "strongly agree").

2.3.2 | Fidelity

Sessions in both conditions were audiotaped. In each condition, 25% of sessions were randomly selected to be rated for fidelity by trained undergraduate research assistants; 25% of those were rated by the first

author and inter-rater reliability was conducted. In group, the checklist assessed whether the leaders covered session material in the time allotted. In GSH, the checklist assessed if the leader provided a brief chapter overview, checked in on self-study progress the previous week (excluding first session), and assigned the chapter(s) for the next week (excluding last session).

2.4 | Secondary outcome measures

2.4.1 | Body image

Body dissatisfaction was assessed via the EDE-Q 6.0 (Fairburn & Beglin, 2008); though the EDE-Q has separate weight and shape concern subscales, multiple factor analyses suggest a three-factor solution

TABLE 2 Overview of IE session content

Session	IE workbook chapter(s)	Content
1	Chapter 1: Reject the diet mentality	Introduction; harms of dieting/weight-cycling; cultivating self-compassion; costs of dieting
2	Chapter 2: Honor your hunger	Reasons for signing up; overview of hunger; body cue awareness; self-care and attunement disrupters; getting to know biological hunger; distinguishing between thoughts and hunger cues
3	Chapters 3 and 4: Make peace with food/challenge the food police	Overview of make peace with food; habituation; overview of challenge the food police
4	Chapters 5 and 6: Feel your fullness/discover the satisfaction factor	Overview of feel your fullness; how can I tell if I'm full? Discovering the staying power of food; discovering the satisfaction factor
5	Chapter 7: Cope with your feelings without using food	It might not be your emotions (self-care); emotional reasons for eating; healing emotional eating; prevention
6	Chapter 8: Respect your body	You cannot fool mother nature; ways to show your body respect; stop body bashing; negative body talk; body appreciation
7	Chapter 9: Exercise: feel the difference	Identifying pleasurable activities; benefits and barriers to exercise; mindful exercise; exercising too much
8	Chapter 10: Honor your health: gentle nutrition	Body-food choice congruence; play foods; are you ready to consider nutrition in your food choices? Progress; benefits of group; future planning

better fits the data, with eight items from these scales forming a single body dissatisfaction (BD) factor (Barnes, Prescott, & Muncer, 2012; Peterson et al., 2007; Tobin, Lacroix, & von Ranson, 2019). We used the BD subscale, which had an average Cronbach's alpha of .92. Body appreciation was assessed using the 10-item Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015), which measures the acceptance of and favorable opinions toward one's body, and a rejection of narrow beauty ideals promoted in mass media. Items are rated on a 1–5 scale, and averaged to derive the overall score; higher values reflect greater body appreciation. This measure yields internally consistent scores in college women (α = 0.94–0.97) and predicts unique variance in IE and ED symptoms (Tylka, Calogero, & Daníelsdóttir, 2015; Tylka & Wood-Barcalow, 2015).

2.4.2 | Disordered eating behaviors

DEBs were measured by the Eating Disorder Diagnostic Scale, DSM-5 (EDDS; Stice, Telch, & Rizvi, 2000) and the Eating Disorder Examination Questionnaire (EDE-Q v.6.0; Fairburn & Beglin, 2008). The EDDS-5 is a 23-item self-report measure of ED symptoms, according to *DSM-5* criteria. It yields a symptom composite score, which was used as both a screening and outcome measure. The EDDS yields internally consistent scores in young adult samples (0.89) and is sensitive to intervention effects (Stice, Fisher, & Martinez, 2004). Average Cronbach's alpha in this study was 0.86. The EDE-Q 6.0 is a 28-item self-report version of the Eating Disorder Examination that measures disordered eating cognitions and behaviors in the previous 28 days. The EDE-Q has established norms in undergraduate women and yields internally consistent scores (α = 0.78–0.95; Luce, Crowther, & Pole, 2008; Schaefer &

Thompson, 2014), as well as convergent and discriminant validity (Bardone-Cone & Boyd, 2007; Fairburn & Beglin, 1994). DEBs were assessed via the restraint subscale and global score, as well as frequency of objective and subjective loss-of-control (LOC) eating episodes, purging (i.e., vomiting, laxatives, and diuretics), and compensatory exercise behaviors in the last 28 days. Average Cronbach's alphas were 0.81 (restraint) and 0.95 (global score).

2.4.3 | Intuitive eating

IE attitudes were measured by the total score on the 23-item Intuitive Eating Scale-2 (IES-2; Tylka & Kroon Van Diest, 2013). Items are measured on a 1–5 scale; higher scores reflect greater IE. The IES-2 yields internally consistent scores in college women (α = 0.87–0.88) and has demonstrated construct and incremental validity (Alleva, Tylka, & Kroon Van Diest, 2017; Tylka & Kroon Van Diest, 2013). Average Cronbach's alpha was 0.90.

2.4.4 | Weight-bias internalization

The 11-item Modified Weight Bias Internalization Scale (WBIS-M; Pearl & Puhl, 2014) is a modified version of the Weight Bias Internalization Scale, originally developed for individuals with high-weight BMIs, and adapted for use for individuals *across* the weight spectrum. The WBIS-M measures the degree to which individuals apply weight-based stereotypes to themselves and use them to guide their weight self-evaluations. Items are rated on a 1–7 scale, with two reverse-coded. Higher scores reflect higher weight-bias internalization. The

scale showed good internal consistency and construct validity in a sample of adults across the BMI spectrum (α = 0.94; Pearl & Puhl, 2014), and in this study (average Cronbach's alpha = 0.92).

2.4.5 | Satisfaction with life

The Satisfaction with Life Scale (SWLS; Diener, Emmons, Larsen, & Griffin, 1985) is a 5-item measure of global life satisfaction rated on a 1–7 scale, with higher scores reflecting greater satisfaction. It yields stable and valid scores in college samples (Diener et al., 1985; Tylka & Kroon Van Diest, 2013). In this study, average α = 0.92.

2.4.6 | Demographics

At pre-test, participants reported age, year in school, gender identity, and race/ethnicity.

2.5 | Data analysis plan

De-identified data were exported to the open-source R project statistical software (R Core Team, 2018) and screened for normality and outliers; missing data patterns were analyzed. Descriptive statistics were calculated both by condition and overall at each timepoint.

2.5.1 | Preliminary efficacy

To assess preliminary efficacy of continuous outcomes, linear mixed models (LMMs), wherein scores on the DV are clustered within a single participant over time, were conducted. Evidence from longitudinal clinical trials with missing data suggests that LMMs minimize Type I error relative to common missing data approaches, such as last, worst, and best observation carried forward (Hrishikesh & Gu, 2009). Thus, we examined LMMs in which all available data were leveraged to estimate parameters using maximum likelihood estimation. Data on treatment completers (i.e., individuals still enrolled at post-test, who attended at least 50% of sessions) are available as Supplementary Material.

The lmerTest package in R was used to conduct LMMs and count models (Kuznetsova, Brockhoff, & Christensen, 2017). Models were run separately by condition. Using a likelihood-ratio test, we compared a model with time as a fixed effect (i.e., stable across participants) and time as a random effect (i.e., trajectory of change over time allowed to vary between participants). Participant ID was entered as a random effect, to account for inherent variability in the sample. Time was coded as 0 = pretest, 8-post-test, 16 = follow-up. Cohen's d is presented as the effect size estimate (Cohen, 1969), calculated using the lme.dscore function in R, which standardizes via the standard deviation of the residual variance. Changes in frequency of binge, LOC eating, and compensatory exercise episodes over time were modeled with Poisson regression. Rate ratios (RRs) are presented as effect size estimates, and represent the proportion increase or decrease in the DV for every one-unit increase in the IV.

3 | RESULTS

3.1 | Feasibility

See Figure 1 for participant flow. Benchmarks for feasibility were > 75% attendance, <80% attrition, and > 75% material covered during time allotted.

3.1.1 | Attrition

Pretreatment attrition in the group condition was 30% (n = 12). Retention was high among group participants attending at least one session, with 89.29% (n = 25 of 28) retained and completing the program. To balance enrollment, women were over-randomized to group in the second cohort. Of the original 40 randomized to group, 25 (62.5%) completed the program, and 24 (60%) completed follow-up measures. There was no immediate attrition from GSH. Of the 31 randomized to GSH, 26 (83.87%) completed the program and follow-up measures.

3.1.2 | Attendance

The percentage of enrolled participants (i.e., those who had not dropped) attending each session was higher in the GSH condition (M = 93.88%) than group (M = 76.25%), t(14) = −3.627, p = .003. Enrolled group participants attended 6.08 (SD = 1.12) sessions on average (SD = 2.64) versus 7.50 (SD = 0.65) for GSH.

3.1.3 | Fidelity

All content was covered in the time allotted in group. Reliability of group session ratings indicated 100% agreement, κ = 1.0. In GSH, leaders adhered to all guidelines 97% of the time. The most commonly missed guideline was asking about the least helpful exercises, which occurred twice. Reliability was high, κ = 0.92.

3.2 | Acceptability

See Table 3 for item-level frequencies on each exit questionnaire. Most completed the questionnaires (group = 19/25, 76%; GSH = 23/26, 88%). The group condition appeared highly acceptable (M = 4.55, SD = 0.12), with most ratings "agree" or "strongly agree." Similarly, average responses in the GSH condition exceeded the proposed acceptability metric of ≥4.0 (M = 4.22, SD = .41). Acceptability did not significantly differ between conditions, t(40) = 1.98, p = .06.

TABLE 3 Exit questionnaire results

| | Frequency (n) | | | | | | | |
| | Group (n = 19) | | | | GSH (n = 23) | | | |
	Disagree	Neutral	Agree	Strongly agree	Disagree	Neutral	Agree	Strongly agree
I enjoyed completing the workbook on my own.	—	—	—	—	4.3% (1)	4.3% (1)	73.9% (17)	17.4% (4)
I enjoyed attending the group/weekly calls.	—	5.3% (1)	26.3% (5)	68.4% (13)	—	8.7% (2)	56.5% (13)	34.8% (8)
The topics were relevant to my concerns about eating and body image.	—	10.5% (2)	10.5% (2)	78.9% (15)	—	8.7% (2)	69.6% (16)	21.7% (5)
I felt comfortable with other group members.	—	5.3% (1)	10.5% (2)	84.2% (16)	—	—	—	—
The support of other group members was a valuable part of the program.	—	5.3% (1)	15.8% (3)	78.9% (15)	—	—	—	—
I felt comfortable to share in group.	—	10.5% (2)	26.3% (5)	63.2% (12)	—	—	—	—
I believe the intuitive eating approach is a legitimate way to improve eating habits and body image.	—	15.8% (3)	15.8% (3)	68.4% (13)	—	8.7% (2)	52.2% (12)	39.1% (9)
I am a more intuitive eater because of this group.	—	15.8% (3)	21.1% (4)	63.2% (12)	—	17.4% (4)	47.8% (11)	34.8% (8)
I am more aware of my hunger and satiety signals because of this group.	—	21.1% (4)	26.3% (5)	52.6% (10)	—	4.3% (1)	65.2% (15)	30.4% (7)
This group has helped me be more flexible with food.	5.3% (1)	10.5% (2)	31.6% (6)	52.6% (10)	—	8.7% (2)	65.2% (15)	26.1% (6)
I have fewer food rules as a result of this group.	5.3% (1)	10.5% (2)	31.6% (6)	52.6% (10)	—	17.4% (4)	52.2% (12)	30.4% (7)
This group has helped me find ways to cope with my emotions without using food.	5.3% (1)	10.5% (2)	26.3% (5)	57.9% (11)	—	17.4% (4)	52.2% (12)	21.7% (5)
This group has helped me accept my body more.	5.3% (1)	21.1% (4)	26.3% (5)	47.4% (9)	—	4.3% (1)	73.9% (17)	17.4% (4)
I no longer feel as guilty or ashamed about eating or my body because of this group.	5.3% (1)	15.8% (3)	47.4% (9)	31.6% (6)	—	17.4% (4)	73.9% (17)	—
I felt comfortable with the group leaders/my coach.	—	5.3% (1)	5.3% (1)	89.5% (17)	—	8.7% (2)	26.1% (6)	65.2% (15)
Group leaders/my coach was/were knowledgeable.	—	5.3% (1)	5.3% (1)	84.2% (16)	—	4.3% (1)	39.1% (9)	56.5% (13)
Group leaders/my coach was/were supportive.	—	5.3% (1)	10.5% (2)	84.2% (16)	—	4.3% (1)	30.4% (7)	65.2% (15)
Group leaders created an inclusive atmosphere.	—	10.5% (2)	—	89.5% (17)	—	—	—	—
I would recommend this group to other women.	—	—	26.3% (5)	73.7% (14)	—	—	39.1% (9)	60.9% (14)

3.3 | Preliminary efficacy

3.3.1 | Preliminary analyses

Missing data were minimal (<1%). Little's MCAR test demonstrated data were missing completely at random at each time point, $\chi^2(405) = 3.80$, $p < .05$ (pre-test), $\chi^2(330) = 0.001$, $p < .05$ (post-test), and $\chi^2(166) = 0.001$, $p < .05$ (follow-up). There were only 10 missing items across scales at pre-test, five at post-test, and two at follow-up.

There were < 5% outliers (>2.0 *SD*) on primary study variables, with no extremes; thus, all cases were retained (Schlomer, Bauman, & Card, 2010). Data were normal across timepoints (<2.0 skewness and kurtosis; Meyers, Gamst, & Guarino, 2016), with the exception of frequency data, which are zero-inflated and prone to positive skew (Coxe, West, & Aiken, 2009). Because there were no significant correlations between age, year in school, or racial and ethnic group and any of the outcome measures, no covariates were included in analyses. Descriptive statistics across time by condition are presented in Table 4 (continuous outcomes) and Table 5 (count outcomes). There were no significant differences between conditions on age, year in school, race/ethnicity, on any baseline measures, providing confidence in randomization success.

TABLE 4

	Group					GSH				
	Pre (n = 40) M (SD)	Post (n = 25)	FU (n = 24)	Pre-post d [95% CI]	Pre-FU	Pre (n = 31) M (SD)	Post (n = 26)	FU (n = 26)	Pre-post d [95% CI]	Pre-FU
EDDS symptom composite	37.50 (25.61)	23.76 (13.83)	20.38 (11.89)	1.23 [0.68, 1.77]	1.25 [0.63, 1.86]	34.74 (13.90)	22.96 (11.01)	16.89 (13.91)	1.12 [0.55, 1.68]	1.75 [1.10, 2.39]
EDE-Q global score	3.15 (1.17)	2.32 (0.97)	2.11 (1.16)	1.25 [0.70, 1.79]	1.53 [0.88, 2.16]	3.16 (1.07)	2.08 (1.03)	2.00 (1.01)	1.66 [1.05, 2.26]	1.79 [1.14, 2.43]
Restraint	2.83 (1.06)	1.71 (0.68)	1.90 (1.01)	1.97 [1.36, 2.57]	1.68 [1.02, 2.33]	2.70 (0.93)	1.89 (0.91)	1.74 (0.74)	1.38 [0.79, 1.96]	1.67 [1.03, 2.30]
Body dissatisfaction	3.70 (1.46)	3.09 (1.39)	2.61 (1.42)	0.60 [0.09, 1.11]	1.04 [0.44, 1.63]	3.77 (1.57)	2.55 (1.46)	2.50 (1.44)	1.41 [0.82, 1.99]	1.49 [0.87, 2.10]
Body appreciation	3.18 (0.91)	3.38 (0.71)	3.42 (0.83)	0.78 [0.26, 1.30]	0.85 [0.26, 1.43]	2.92 (0.86)	3.55 (0.75)	3.71 (0.77)	1.30 [0.72, 1.87]	1.66 [1.02, 2.29]
Intuitive eating-Total	2.93 (0.69)	3.40 (0.43)	3.30 (0.54)	1.43 [0.87, 1.98]	1.18 [0.57, 1.78]	2.82 (0.45)	3.53 (0.65)	3.54 (0.54)	2.15 [1.49, 2.80]	2.19 [1.49, 2.88]
Weight-bias internalization	4.55 (1.39)	3.94 (1.15)	4.09 (1.25)	.41 [−0.10, 0.91]	0.94 [0.34, 1.53]	4.56 (1.34)	3.66 (1.30)	3.66 (1.43)	1.03 [0.47, 1.58]	1.27 [0.67, 1.86]
Satisfaction with life	19.33 (6.70)	20.52 (8.13)	22.88 (7.88)	1.11 [0.57, 1.64]	0.95 [0.35, 1.54]	21.16 (7.13)	25.39 (7.17)	26.27 (6.86)	1.35 [0.77, 1.92]	1.35 [0.74, 1.95]

Note: Descriptive statistics and effect sizes of continuous outcomes. Pre-test includes descriptive statistics for all randomized participants. Cohen's (1988) conventions for interpreting *d* effect sizes are 0.20 = small, 0.50 = medium, 0.80 = large.

Abbreviations: EDDS-5, Eating Disorder Diagnostic Scale-5; EDE-Q, Eating Disorder Examination-Questionnaire; IES-2, Intuitive Eating Scale-2; FU, follow-up.

3.3.2 | Treatment completers versus non-completers

There were no significant differences on baseline measures between treatment completer and non-completers overall. Group non-completers (*n* = 15) had significantly lower baseline EDDS composite scores (*M* = 24.73, *SD* = 18.95) than group completers (*n* = 25; *M* = 45.16, *SD* = 26.34), *t*(38) = −2.62, *p* = .01.

GSH non-completers (*n* = 5) had significantly greater baseline body dissatisfaction (*M* = 4.98, *SD* = 0.62 vs. *M* = 3.53, *SD* = 1.59), *t* (16.33) = 3.448, *p* = .003, and global EDE-Q scores (*M* = 4.19, *SD* = 0.49 vs. *M* = 2.96, *SD* = 1.04), *t*(12.24) = 4.107, *p* = .001, and lower IES-2 total scores (*M* = 2.53, *SD* = 0.07 vs. *M* = 2.88, *SD* = 0.48), *t* (28.39) = −3.579, *p* = .001 than GSH completers (*n* = 26). There were no significant differences on any outcome variables between women who did not attend any group sessions and those attending at least one.

3.4 | Linear mixed models and count models

See Table 4 (LMMs) and Table 5 (count models) for model effect sizes with 95% confidence intervals (CIs). Full model results are available within Supplementary Material.

3.4.1 | Group

Parameters were estimated based on 40 baseline, 25 post-test, and 24 follow-up observations. Time entered as a random (vs. fixed) effect demonstrated better fit when modeling change in the EDDS symptom composite, restraint, and body appreciation. All other models were conducted with time as a fixed effect. The EDDS symptom composite, EDE-Q global score, restraint, body dissatisfaction, and weight-bias internalization significantly decreased, and body appreciation and the IES-2 total score significantly increased, from pre-test to both post-test and follow-up. Satisfaction with life significantly increased from pre-test to follow-up (*p* < .001). Effect sizes ranged from medium to large. Binge eating, LOC eating, and compensatory exercise decreased significantly from pre-test to post-test and pre-test to follow-up (all *p*s < .001). On average, behavior rates decreased by 60–69% at post-test, and by 49–70% at follow-up.

3.4.2 | GSH

Parameters were estimated based on 31 baseline and 26 post-test and follow-up observations. Models with time as a fixed effect demonstrated the best fit. Disordered eating (i.e., EDDS symptom composite, EDE-Q global, restraint), body dissatisfaction, and weight-bias internalization significantly decreased, and body appreciation, IES-2 total score, and satisfaction with life significantly increased from pre-test to both post-test and follow-up. All effect sizes were large. Binge eating and LOC eating decreased from pre-test to both post-test and follow-up (all *p*s < .001). Compensatory exercise did not significantly

TABLE 5 Descriptive statistics and effect sizes of count outcomes

Group	Pre-test Endorsed, % n = 40	M (SD)	Post-test Endorsed, % n = 25	M (SD)	FU Endorsed, % n = 24	M (SD)	Pre-post RR, 95% CI	Pre-FU
Binge eating	30 (75.0%)	4.35 (5.70)	12 (48.0%)	1.60 (2.58)	8 (33.3%)	1.25 (2.80)	0.40 [0.27, 0.58]	0.30 [0.20, 0.45]
LOC eating	24 (60.0%)	3.20 (4.47)	12 (48.0%)	1.24 (1.85)	7 (29.2%)	1.29 (3.39)	0.40 [0.27, 0.60]	0.42 [0.28, 0.64]
Purging behaviors	3 (7.5%)	0.13 (.46)	1 (4.0%)	0.12 (0.60)	1 (4.0%)	0.04 (0.20)	—	—
Compensatory exercise	17 (42.5%)	2.25 (4.00)	3 (12.0%)	0.72 (3.01)	6 (25.0%)	1.00 (3.08)	0.31 [0.18, 0.52]	0.51 [0.32, 0.82]
GSH	**n = 31**		**n = 26**		**n = 26**		**RR, 95% CI**	
Binge eating	23 (74.2%)	5.26 (5.73)	11 (42.3%)	1.46 (2.37)	11 (42.3%)	1.27 (2.25)	0.34 [0.24, 0.50]	0.30 [0.20, 0.44]
LOC eating	19 (61.3%)	4.39 (5.89)	9 (34.6%)	1.12 (2.22)	8 (30.8%)	0.81 (2.04)	0.33 [0.22, 0.52]	0.24 [0.15, 0.38]
Purging behaviors	4 (12.9%)	0.45 (1.82)	0 (0%)	0 (0)	1 (3.8%)	0.39 (1.96)	—	—
Compensatory exercise	15 (48.4%)	3.23 (4.79)	8 (30.8%)	2.12 (4.18)	1 (3.8%)	0.19 (0.98)	0.75 [0.53, 1.07]	0.07 [0.03, 0.16]

Note: Endorsement reflects proportion of individuals endorsing any instance of the behavior in the last 28 days; Means reflect average number of episodes in the last 28 days. Purging behaviors were not modeled due to low base rates. Rate ratios (RR) represent the proportion increase or decrease in the DV for every one-unit increase in the IV.

Abbreviation: LOC eating, loss-of-control-eating.

change from pre-test to post-test (*p* = .11), but decreased from pre-test to follow-up (*p* < .001). Behavior rates decreased significantly by 66–67% at post-test and by 70–93% at follow-up.

4 | DISCUSSION

This study evaluated the feasibility, acceptability, and preliminary efficacy of an eight-week pilot IE intervention delivered via group and GSH modalities for college women engaging in DEBs. The primary hypotheses that both conditions would demonstrate feasibility, acceptability, and preliminary efficacy, were largely supported.

4.1 | Feasibility and acceptability

The GSH condition exceeded proposed feasibility criteria; the group condition fulfilled these criteria when excluding participants who never attended. Based on these data, GSH appeared more feasible, though after the first session, feasibility appeared comparable.

High dropout from group treatments is a well-known phenomenon (Bostwick, 1987). However, the attrition observed in the group condition (37.5%) appears higher than previous ED prevention groups (1–17%; McMillan, Stice, & Rohde, 2011; Stice, Butryn, Rohde, Shaw, & Marti, 2013). This could be because, compared with prior research, this study involved a lengthier time commitment (eight sessions vs. three to four) and lower participant incentive amounts ($5–15 compared with, for example, $30–150 per assessment; Denison-Day, Appleton, Newell, & Muir, 2018; Stice, Rohde, Butryn, Shaw, & Marti, 2015, Stice, Shaw, Burton, & Wade, 2006).

Evaluating the differential attrition observed within this intervention is also challenging, given the dearth of trials including both GSH and group modalities. It is possible some women hoped to receive GSH,

perhaps because of anxiety about a group setting, or because they wanted the flexibility and perceived personalization of self-study. The high retention rate in group after session one supports this modality's acceptability, but underscores the challenge of encouraging initial attendance. In this study, participants learned their assignments before the first session. Because most were retained after session one, providing assignments during an in-person first session for all participants might enhance retention. Another strategy could be to provide assignments by phone, and engage in motivational interviewing, which has demonstrated efficacy in increasing the likelihood of first session attendance (Bean, Thornton, Jeffers, Gow, & Mazzeo, 2019).

Although GSH appeared more feasible in terms of attendance and retention, it might be less affordable, as it required more leaders to serve the same number of participants within the same time frame as group. Moreover, group interventions have unique benefits relative to individual, including offering community support and reducing feelings of isolation (Stice, Rohde, Shaw, & Gau, 2017). Digital interventions show promise in addressing the substantial unmet mental health treatment needs in college populations (Kass et al., 2017). Thus, a digital group intervention might be an affordable, accessible method of enhancing attendance and attrition, reducing barriers such as travel.

Both conditions were highly acceptable to participants. A strong majority reported enjoyment and perceived benefit, and all indicated they would recommend the program to other women. This is encouraging and supports further intervention development.

4.2 | Preliminary efficacy

4.2.1 | Group

The group intervention demonstrated preliminary efficacy in reducing DEBs, body dissatisfaction, and weight-bias internalization, and in

improving body appreciation, IE, and satisfaction with life. Effects were medium to large across models. Relative to established EDE-Q norms in undergraduate women, at pre-test group participants were > 85th percentile on the global score and body dissatisfaction, and > 75th on restraint (Luce et al., 2008). At follow-up, their scores were just above average, with global scores and restraint at the 60th percentile, and body dissatisfaction at the 55th (Luce et al., 2008). A recent large-scale survey found 49% of undergraduate women endorsed objective binge eating (Lipson & Sonneville, 2017); in this study, binge endorsement was far above this level at pre-test (>75% of participants), but below (33%) at follow-up. Incidence of purging behaviors was average at pre-test (8%), but below average at post and follow-up (4%; Luce et al., 2008).

4.2.2 | GSH

The GSH condition demonstrated preliminary efficacy in reducing DEBs, body dissatisfaction, and weight-bias internalization, and improving body appreciation, IE, and satisfaction with life. Effect sizes were large. At pre-test, GSH participants were in the 80th percentile on the EDE-Q global score and body dissatisfaction, and 70th percentile on restraint (Luce et al., 2008). At follow-up, scores were in the 60th percentile on the EDE-Q global score, and 55th percentile on body dissatisfaction and restraint. Rates of binge eating (74%), compensatory exercise (48%), and purging behaviors (10%) at pre-test were above recent estimates in college women (49%, 31%, and 8%, respectively), but below average at follow-up (42% binge eating, 4% compensatory exercise and purging; Lipson & Sonneville, 2017; Luce et al., 2008).

Effect sizes were generally larger in the GSH versus group condition. However, effect size estimates are unstable in pilot trials and should be interpreted with caution (Leon et al., 2011). It is possible characteristics of the GSH condition, such as individualized support and self-study, could have enhanced some effects. Future research might consider a GSH control condition to determine whether the intervention itself, or individualized support, drives effects. It is noteworthy that this intervention demonstrated preliminary efficacy not just on DEBs and IE, but also body image, weight-bias internalization, and satisfaction with life. This is encouraging given the strong associations among body dissatisfaction and weight-bias internalization with myriad negative outcomes (e.g., sedentary behaviors, lower health-related quality of life; Bucchianeri & Neumark-Sztainer, 2014; Latner, Barile, Durso, & O'Brien, 2014). Further, increasing body appreciation might strengthen intervention effects, given evidence it can protect against negative sociocultural influences on body image (Andrew et al., 2015).

4.3 | Strengths and limitations

This is the first known study to pilot an IE intervention that followed the principles outlined by the developers (Tribole & Resch, 2017) in college women. Because mainstream interest in IE is growing, empirical validation of its feasibility, acceptability, and efficacy is important. Efforts to recruit racially and ethnically diverse women engaging in

the *spectrum* of DEBs were successful, suggesting IE might have potential as a transdiagnostic approach relevant to women of color, a group with disproportionately lower treatment rates than White women (Marques et al., 2011). Another strength was this study's evaluation of two treatment modalities (group and GSH) more accessible and affordable than individual therapy. Although many prevention programs are implemented in group formats, GSH is recommended for mild to moderate DEBs (Traviss-Turner et al., 2017; Wilson & Zandberg, 2012). Thus, empirical evaluation is necessary to provide support for this recommendation.

It is also important to note this study's limitations. This was a pilot trial, with a small sample and no control condition. Thus, we were underpowered to detect between-group effects, and interpretations of preliminary efficacy must be made with caution. Although recruitment efforts were successful in obtaining a racially and ethnically diverse sample, the small sample precluded the ability to conduct between and within racial/ethnic group analyses. Without another active treatment arm, IE's efficacy relative to other treatment approaches cannot be established. Finally, this study had a short-term follow-up; it is unknown if intervention effects will be maintained.

5 | CONCLUSION

This study piloted an eight-week IE intervention delivered through group and GSH for college women engaging in DEBs. The primary hypotheses, that both conditions would demonstrate feasibility, acceptability, and preliminary efficacy, were largely supported. Pre-treatment attrition contributed to significantly lower retention and attendance in group versus GSH. However, 89% of women who attended at least one session in group were retained. Both conditions were highly acceptable to participants and demonstrated preliminary efficacy in reducing DEBs, body dissatisfaction, and weight-bias internalization, and increasing body appreciation, IE, and satisfaction with life through 2-month follow-up. These encouraging results support the development of a fully-powered RCT.

CONFLICT OF INTEREST
The authors have no conflicts of interest to disclose.

AUTHOR CONTRIBUTIONS
C. B. B. conceptualization; methodology; project administration; formal analysis; writing—original draft. S. E. M conceptualization; methodology; supervision; writing—review & editing.

DATA AVAILABILITY STATEMENT

Data available on request from the authors.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section at the end of this article.