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Peer mentorship as an adjunct intervention for the treatment of eating disorders: A pilot randomized trial

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Abstract

Objective—Peer mentorship has been shown to be helpful for other mental health conditions, but it has been understudied for patients with eating disorders. The goal of the present study was to evaluate the feasibility and efficacy of peer mentorship for individuals with eating disorders by conducting a randomized controlled trial (RCT).

Trial Design—Parallel three-arm pilot RCT with 1:1:1 allocation to peer mentorship, social support mentorship (active comparison intervention), and waiting list.

Method—Sixty outpatients with anorexia nervosa (AN), bulimia nervosa (BN), or binge-eating disorder (BED) were randomly assigned to a condition. Outcome measures, including eating disorder symptoms and general psychopathology, were completed at baseline, mid-, and postintervention.

Results—Session attendance and acceptability ratings were higher in peer mentorship than social support mentorship. More participants in social support mentorship (39%) dropped out compared to peer mentorship (5%). In intent-to-treat analysis, peer mentorship showed greater reductions in body dissatisfaction and anxiety compared with both control groups. Compared with social support mentorship, peer mentorship had greater reductions in depression. Compared with waiting list, peer mentorship had greater reduction in binge eating days/week in patients with BN/BED and restriction days/week in patients with AN. Peer mentorship did not impact body mass index or reentry into higher level of care.

Discussion—This pilot RCT provides preliminary evidence that peer mentorship is effective for some cognitive and behavioral symptoms of eating disorders as an adjunct to outpatient treatment. Additional studies are needed to evaluate the efficacy of peer mentorship in absence of treatment.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

SUPPORTING INFORMATION

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

Keywords

anorexia nervosa; binge-eating disorder; bulimia nervosa; peer mentorship; peer-based intervention; randomized controlled trial

1 INTRODUCTION

Eating disorders affect 1–5% of the population, predominantly women (Udo & Grilo, 2018) and are characterized by high rates of medical and psychiatric comorbidity (Devlin, 2017; Westmoreland, Krantz, & Mehler, 2016) and relapse (Herpertz-Dahlmann et al., 2018; Khalsa, Portnoff, McCurdy-McKinnon, & Feusner, 2017). Many individuals with eating disorders do not receive treatment (Agh et al., 2016; Ali et al., 2017), in part due to high cost, lack of insurance coverage, and stigma (Ali et al., 2017). One approach to address barriers to traditional treatment is peer mentorship, which involves interventions delivered by fully recovered peers, whose expertise stems from their own "lived experience," rather than professional training. Although peer mentorship shows promise for clinical and quality of life (QOL)-related outcomes in some populations (Clarke et al., 2000; Cook et al., 2012; Fuhr et al., 2014; Sledge et al., 2011; Timko, Sutkowi, Cronkite, Makin-Byrd, & Moos, 2011), empirical support for patients with eating disorders is limited. The goal of the present study was to conduct a pilot randomized controlled trial (RCT) to test the feasibility and efficacy of peer mentorship for individuals with eating disorders.

To date, there are only a small number of studies of mentorship in the eating disorders field. In an observational study, Perez, Van Diest, and Cutts (2014) compared individuals receiving online mentorship to those waiting for a mentor and found that individuals receiving mentorship reported better QOL and missed fewer treatment sessions compared to those who were unmatched. In a feasibility study comparing baseline and postintervention outcomes in 30 individuals receiving 6 months of mentorship, approximately 75% of participants completed the program, and they showed improvement in body mass index (BMI), eating disorder symptoms, general psychological wellbeing, and QOL (Beveridge et aL., 2019). Qualitative studies suggest that mentorship may be particularly helpful for feeling understood and instilling hope that recovery is possible (Ramjan, Fogarty, Nicholls, & Hay, 2018; Ramjan, Hay, & Fogarty, 2017).

Our objectives in this pilot RCT were to evaluate the feasibility and efficacy of peer mentorship in comparison with social support mentorship (active comparison intervention) as well as a waiting list. We hypothesized that individuals assigned to peer mentorship would rate the intervention as more acceptable and attend more sessions, and that they would demonstrate greater reductions in eating disorder symptoms and general psychiatric symptoms and reduced rates of reentry into a higher level of care, compared to individuals assigned to social support mentorship or to a waiting list.

2 METHOD

2.1 Trial design

The study was a parallel three-arm pilot RCT with 1:1:1 allocation to peer mentorship, social support mentorship, and waiting list. It was initially proposed that entering a higher level-of-care for the eating disorder or other mental health issue would result in discontinuation of mentorship meetings for the duration of the treatment; after study commencement, this was altered such that only individuals entering inpatient, residential, or partial hospitalization were asked to discontinue mentorship for the duration of treatment.

The study was funded in part by a not-for profit organization, Project HEAL (Help to Eat Accept and Live™) that had recently developed and initiated a mentorship program. Mentorship sessions were offered in-person for all participants who lived in any of six metropolitan regions where Project HEAL had administrative infrastructure, including Boston, Los Angeles, New York, Philadelphia, Pittsburg, and San Francisco. Participants from other regions were offered online mentorship interventions using videoconferencing technology. Project HEAL provided funding, selected and trained mentors, and participated in matching and supervision of mentors. Because the present study was conceived as an independent analysis of the peer mentorship model, all study design decisions, participant screening and enrollment, randomization, data collection and analysis, and manuscript preparation were carried out exclusively by the Columbia research team.

All data collection was performed at the New York State Psychiatric Institute/Columbia University Medical Center.

2.2 Participants

Participants were recruited using online postings and through contacts with eating disorder centers and providers. Participants were individuals aged 14–45 years with an eating disorder who had been treated at and discharged from a higher level of care within the prior 6 months (including hospitalization, residential treatment, partial hospitalization or day-treatment, intensive outpatient treatment, or Phase 1 of Family Based Therapy). Participants met criteria for a DSM-5 eating disorder, including anorexia nervosa (AN), atypical anorexia nervosa (AAN), bulimia nervosa (BN), or binge-eating disorder (BED) at the time of initiating treatment. Participants were required to be clinically stable and in outpatient treatment with a licensed treatment provider who was aware of and providing care for the eating disorder.

2.3 Procedure

Potentially eligible participants were screened by phone and those interested and eligible were sent copies of consent forms, which were subsequently reviewed by telephone with a doctoral-level clinician. Verbal consent or assent from participants and consent from parents of participants under age 18 was documented, and the patient was enrolled at this time. The protocol was approved by the institutional review board at the New York State Psychiatric Institute/Columbia University.

After enrollment but prior to randomization, participants completed baseline questionnaires using an online survey platform and the patient's clinician was contacted and asked to provide information pertaining to clinical stability and height and weight measurements. After all baseline assessments were complete, the participant was randomized. Follow-up questionnaires were obtained from participants at mid- and posttreatment. Throughout the 6-month randomized phase, clinicians provided measured height and weight on a monthly basis and participants completed online weekly surveys regarding the frequency of eating disorder behaviors and whether they met with their mentor (see Table 1).

2.4 Interventions

2.4.1 Common intervention components—Table 2 depicts the components of each study intervention. Mentor applicants responded to online postings from Project HEAL asking for volunteers with and without lived eating disorder experience who wished to help individuals with eating disorders. Peer mentors were individuals with lived experience of an eating disorder, and social support mentors did not have lived experience of an eating disorder. Mentors were at least 18 years old and they participated in an interview process to assess reliability, self-awareness, and listening skills. Mentors completed a training program delivered via an online platform that included training in intervention content, communication skills, managing boundaries, difficult situations, and safety concerns. Mentors attended supervision every other week. All mentor-mentee dyads met for 1 hr/week. Those participating at in-person sites met in public or semipublic locations, such as libraries or coffee shops. Online dyads met using video chat platforms (e.g., FaceTime). Participants were informed that they could also attend in-person peer support groups led by Project HEAL.

2.4.2 Peer mentorship—At the time of serving as a mentor, peer mentors were in full recovery for at least 2 years, defined as self-reported abstinence from any eating disorder behavior and agreement with an attestation (Supporting Information). In the peer mentorship intervention, mentors act as a support person and role model, providing interpersonal support and guidance based on training and personal experiences. The intervention content was developed by Project HEAL based upon "Eight Keys to Recovery from an Eating Disorder" developed by Carolyn Costin, MA, FAED (Costin & Grabb, 2012). Peer mentorship training required 35 hr over 8 weeks.

2.4.3 Social support mentorship—Social support mentorship involved mentorship by an individual without history of an eating disorder. The social support mentorship program was developed by the Columbia research team to serve as an active, time-matched intervention designed to provide interaction with a supportive individual that intentionally did not focus on eating disorder symptoms. During weekly meetings, mentors and mentees were asked to identify and engage in a range of leisure activities such as arts and crafts, self-care, volunteering/activism, connecting with friends and family (e.g., writing a letter, making a gift), attending local events, and others. The intervention rationale was that exploring activities, hobbies, and interests in the context of a supportive relationship would foster positive affect and sense of self outside the eating disorder, thereby potentially

promoting recovery indirectly. Social support excluded moderate to vigorous physical activity, eating, and explicit cognitive behavioral therapy (CBT) strategies.

2.4.4 Waiting list—At the conclusion of the 6-month waiting list period, mentees who continued to meet study inclusion criteria were eligible to be matched with a mentor and receive 6 months of either type of mentorship.

2.4.5 Matching—Two factors were considered when matching mentees with mentors: location and participant requests regarding gender or other shared characteristics (e.g., same diagnosis). Mentees were informed that matching was contingent on mentor availability but that specific preferences would be accommodated when possible.

2.4.6 Fidelity—Peer mentors and social support mentors attended separate supervision calls. Supervision focused on treatment fidelity and adherence to the content of the intervention and clinical issues. To monitor fidelity, mentees and mentors answered questions about session content after each meeting.

2.5 Outcomes

Feasibility outcomes included attendance of one-to-one mentorship meetings and mentee-rated acceptability. Primary efficacy outcomes were eating disorder symptoms, assessed via the Eating Pathology Symptoms Inventory (EPSI), BMI for patients with AN or AAN, and frequency of binge eating and purging for patients with BN and BED. Secondary outcomes included eating disorder-related QOL, symptoms of anxiety and depression, health care utilization, and frequency of restriction. Detailed descriptions of measures are provided below. Study outcomes were preregistered at https://clinicaltrials.gov/ct2/show/NCT03317379.

2.6 Measures

2.6.1 Fidelity—Participants reported whether each of 15 content areas was discussed “Not at all,” “A little," or “A lot” that session. Content areas corresponded with intended intervention content for each intervention.

2.6.2 Attendance—Because all meetings between mentors and mentees took place off-site, attendance was determined by the first question on the weekly survey filled out by mentees: “Have you met with your mentor since you last filled out this survey?” Participants received the survey once per week, intending to correspond with each weekly mentorship meeting. Participants were contacted by the study team when two consecutive surveys were missed. Mentors also completed weekly surveys. Data from mentors' surveys were used if mentee data were unavailable. When neither mentee nor mentor filled out the survey, the meeting was considered missed.

2.6.3 Acceptability—Acceptability was assessed using an acceptability form developed by the Columbia research team, modified from existing evaluation measures. It queried dimensions of helpfulness, appropriateness, overall experience, matching expectations, and whether mentees would recommend the program to a friend, on a 7-point scale.

2.6.4 Eating disorder symptoms—The EPSI is a self-report questionnaire that includes 45 items covering 8 subscales, 7 of which were administered: Body Dissatisfaction, Binge Eating, Cognitive Restraint, Purging, Restricting, Excessive Exercise, and Muscle Building. Each item is scored on a five-point Likertstyle scale (0 = Never; 4 = Often) and scores are derived by summing responses. We selected three subscales (Body Dissatisfaction, Cognitive Restraint, Restriction) as primary by virtue of capturing transdiagnostic symptoms (DuBois, Rodgers, Franko, Eddy, & Thomas, 2017; Fairburn, Cooper, & Shafran, 2003; Goldschmidt et al., 2018).

2.6.5 Body mass index—Participants' clinicians reported their measured height, weight, and date of measurement. For adults, the baseline height measurement was used for all BMI calculations. For teens, height data were individually examined, and the height measurement from which BMI was calculated was updated if the teen grew taller.

2.6.6 Eating disorder QOL—QOL in relation to the eating disorder was measured using the Eating Disorder Quality of Life assessment survey (Engel et al., 2006), a 30-item measure assessing the impact of the eating disorder on psychological, physical/cognitive, financial, and work/school domains of life. Higher scores indicate higher QOL impairment. (Engel et al., 2006).

2.6.7 Anxiety symptoms—Anxiety symptoms were measured using the State-Trait Anxiety Inventory (Spielberger, Edwards, Lushene, Montuori, & Platzek, 1973).

2.6.8 Depression symptoms—Depressive symptoms were measured using the Patient Health Questionnaire-9 (PHQ-9) (Kroenke, Spitzer, & Williams, 2001).

2.6.9 Entry into higher level of care—Participants completed a healthcare utilization survey, from which information about higher levels of care was obtained. Responses were dichotomized as “yes” or “no” to reflect whether the participant received a higher level of care for the eating disorder within the past 3 months.

2.6.10 Symptom frequency—Each week, participants reported the number of days per week that they engaged in restriction, binge eating, purging following binge eating, and purging after eating an ordinary amount of food. Ratings were made on a 5-point Likert scale (0 = "No days”; 1 = “A few [1–2 days]”; 2 = “About half [3–4 days]”; 3 = “Most [5–6 days]”; and 5 = “All [7 days]”).

2.7 Sample size

GLIMMPSE software (https://glirnmpse.samplesizesh0p.0rg/#/results/report; “Guided Study Design”) tool was used to perform sample size calculations. Parameters from Forbush et al. (2014) were used to approximate average score and variability for the EPSI Body Dissatisfaction Score. Presuming β) = .8; α = .05, and three groups of equivalent size, a total sample size of 78 was required to detect 20% difference in symptom change between groups. Presuming attrition of approximately 10%, the study aimed to randomize a total of 90 participants. After 60 participants were randomized, recruitment was stopped due to limitations in mentor availability that arose during the trial. Using the same parameters from

Forbush et al., post hoc power calculation suggests that a sample size of 60 provided 70% power to detect a 20% difference in change.

2.8 Randomization

A Java-based program utilizing a random number generator seeded by time of day was used to generate randomization lists (sequences), stratified by site. A separate randomization sequence was generated for each site. To ensure similar group sizes across the three interventions, the randomization lists were generated in blocks of three. The lists also included singletons inserted 20% of the time to reduce ability to infer every third randomization assignment. After each randomization sequence was generated, it was placed into a folder labeled with the site. The randomization sequence was generated by B.T.W., who had no contact with study participants. L.M.R. and M.W. enrolled participants. A research assistant who had no contact with participants used the pregenerated randomization sequence to assign participants. Given the psychosocial nature of the intervention, there was no blinding to intervention condition.

2.9 Statistical methods

2.9.1 Fidelity—For each intervention content area, the percentage of total mentee/mentor meetings in which that topic was discussed was calculated. Fidelity was determined based upon rates of discussing peer mentorship topics across intervention groups.

2.9.2 Attendance and acceptability outcomes—Participants were categorized as dropping out if they discontinued the intervention on or before Week 8. Participants were categorized as stopping the intervention early if they stopped participating before Week 20. Two attendance parameters were calculated for each participant: (a) total number of weeks spent engaged in the intervention, and (b) total number of sessions completed. Analysis of variance (ANOVAs) were used to compare total weeks engaged, total number of sessions completed, and acceptability ratings by condition.

2.9.3 Efficacy outcomes—All analyses were intent-to-treat. Linear mixed models (LMM) were used to examine the relationship between group and each continuous primary and secondary outcome variable over time. For the dichotomous outcome of reentry into a higher level of care, a generalized LMM was used. Predictors in each model were time, group, and their interaction. For all models, a random (subjectspecific) intercept and a variance components correlation structure were used. The need for random slopes for the primary independent variables was examined by evaluating model fit indices and testing the significance of the difference of the covariance estimate from zero. The peer group was coded as the reference group in order to provide estimates and significance values for the difference between peer mentorship and each control condition. Estimates and the *SD* of the estimates are presented as a measure of effect size for the LMM. Since traditional effect sizes accounting for baseline values are not able to be calculated for LMM, for descriptive purposes, effect sizes for change in each self-report outcome variable are presented. We derived these by dividing the between-group difference in change score (i.e., change $\text{score}_{\text{peer}}$ - change $\text{score}_{\text{socia Support}}$, change $\text{score}_{\text{peer}}$ - change $\text{score}_{\text{waiting list}}$) by the *SD* of the change score.

3 RESULTS

3.1 Participant flow

Figure 1 displays the CONSORT diagram. Two hundred and twentytwo individuals expressed interest in the study. Sixty were interested, eligible, and randomized.

3.2 Recruitment

Recruitment occurred between October 2017 and November 2018. All mentorship was carried out between December 2017 and June 2019. The trial was stopped after 60 participants were randomized because there were not enough mentors to provide mentorship to all new participants entering the study and all participants completing the waiting list.

3.3 Baseline data

Table 3 depicts baseline participant characteristics. Groups did not differ at baseline in age, race/ethnicity, sex, diagnosis, BMI (by diagnosis), months since treatment, insurance type (private vs. public), or study site (online vs. in person). All participants were engaged in outpatient treatment with a licensed provider at study onset. Treatment modalities included psychotherapy/counseling, medical monitoring, psychopharmacology, nutritional counseling, and case management. Licensed treatment providers included medical doctors including psychiatrists, psychologists, dieticians, and social workers. Most participants attended more than one treatment modality. Some attended group therapy and support groups in addition to individually focused treatments.

3.4 Intervention fidelity

Across 34 participants who reported on at least one mentorship meeting, 342 weekly surveys about mentorship meeting content were completed, including 11.6 ± 5.6 (range l-24)/person in peer mentorship and 7.9 ± 6.1 (range l-24)/person in social support mentorship. Proportion of sessions during which each intervention topic was discussed in peer and social support mentorship is displayed in Figure 2. The proportion of social support mentorship sessions during which peer mentorship topics were discussed ranged from 2.3% (“Challenging eating disorder behaviors”) through 20.9% (“Strengthening the healthy self”), all of which were significantly lower than peer mentorship (*p*s < .01). By way of comparison, proportion of sessions during which each peer intervention topic was discussed in peer mentorship meetings ranged from 47.8% (“Finding purpose”) through 83.2% (“Motivation”). Out of all topics specific to peer mentorship, none was discussed in more than 25% of social support mentorship meetings.

3.5 Primary feasibility outcomes

3.5.1 Attendance—Five percent (*n* = 1) of mentees in peer mentorship and 39% (*n* = 7) in social support mentorship dropped out before 2 months (*p* = .01). Follow-up data were obtained from all participants in peer mentorship and 83% in social support mentorship. Peer mentorship participants attended 14.1 ± 6.4 sessions over 21.7 ± 6.3 weeks and social support mentorship participants attended 7.6 ± 7.1 sessions over 11.9 ± 9.6 weeks (both *p*s

< .01). More participants in peer mentorship (16/20) completed the intervention compared with social support mentorship (6/18, $p < .01$).

3.5.2 Acceptability—Eighteen (90.0%) peer mentorship participants and 14 (77.8%) social support mentorship participants completed the postintervention acceptability survey. Peer mentorship participants rated the intervention as significantly more helpful, appropriate, and positive, and they were significantly more likely to recommend mentorship to a friend (Figure 3, all ps < .01).

3.6 Primary efficacy outcomes

For all efficacy outcomes measured at pre-, mid-, and posttreatment, descriptive statistics (means and *SD*s) for each group at each timepoint are presented in Table 4. For descriptive purposes, effect sizes corresponding with group differences in pre- to postintervention change scores are also presented; however, these include only participants who completed pre- and postintervention timepoints.

3.6.1 Eating pathology symptoms inventory—In the model for body dissatisfaction, there was a significant interaction between time and group, in which peer mentorship demonstrated significantly greater decrease in body dissatisfaction compared with waiting list (estimate $\pm SE = -0.61 \pm 0.28$ points per month, $p = .03$) and social support mentorship (estimate $\pm SE = -0.69 \pm 0.29$ points per month, $p = .02$). For the cognitive restraint subscale, there was no overall group difference in change over time ($p = .15$), but the peer mentorship group experienced a nonsignificantly larger magnitude reduction in cognitive restraint per month compared with waiting list (estimate $\pm SE = -0.20 \pm 0.11$ points per month, $p = .08$) and social support mentorship (estimate $\pm SE = -0.18 \pm 0.12$ points per month, $p = .12$). There were neither main nor interaction significant effects for restriction (ps > .4), indicating absence of group differences in rate of change.

3.6.2 BMI for AN/AAN subset—Data from 45 patients with AN or AAN were analyzed. Most (31 participants) provided a postintervention measurement (occurring at Month 5 or 6). Three participants' final follow-up measurement was provided at Month 3 or 4. Nine participants' final follow-up measurement was at Month 1 or 2, and two participants provided no follow-up data. There was neither a group by time interaction ($p = .58$) nor main effects of group or time (ps > .57). Results were similar when the 12 AAN patients were excluded.

3.6.3 Weekly binge and purge frequency for BN/BED subset—Fifteen participants with BN or BED completed 16.9 ± 8.1 (range 5–25) weekly ratings, for a total of 254 observations. There was a significant overall group by time interaction ($p = .04$), such that the peer mentorship group had greater rate of decrease in binge frequency compared to waiting list (estimate = −0.14 ± 0.05 unit change/month, $p = .01$). Peer mentorship did not differ significantly from social support mentorship (estimate = −0.08 ± 0.07, p = .28). In participants with BN ($n = 12$), for purging after binge eating, there were no significant main or interaction effects of group and time on episode frequency ($p = .94$). For purging after non-binge-eating episodes, there was a significant overall group by time interaction ($p < .01$)

in which peer mentorship had significantly greater reduction compared to social support mentorship (estimate = −0.17 ± 0.06 unit change/month, $p < .01$), but did not differ significantly from waiting list ($p = .83$).

3.7 Secondary outcomes

3.7.1 Eating disorder QOL—Neither main effects of time or group nor the overall group by time interaction was significant ($p = .15$). However, the peer mentorship group experienced a nonsignificantly larger magnitude reduction in QOL impairment compared with waiting list (estimate ± SE = −0.06 ± 0.03 points per month, $p = .06$) but did not differ from social support mentorship (estimate ± SE = −0.01 ± 0.03 points per month, $p = .70$).

3.7.2 Anxiety symptoms—There was a significant overall group difference in change in anxiety over time ($p = .056$), with the peer mentorship group demonstrating significantly greater reduction compared with waiting list (estimate ±SE = −1.03 ± 0.47 points per month, $p = .03$) and social support mentorship (estimate ±SE = −1.02 ± 0.55 points per month, $p = .04$).

3.7.3 Depression symptoms—There was a significant overall group by time interaction ($p = .04$). Compared with social support mentorship, the peer mentorship group demonstrated significantly greater reduction in depressive symptoms per month (estimate ±SE = −0.68 ± 0.27, $p = .01$). Compared with waiting list, a nonsignificant trend was observed (estimate = −0.41 ± 0.25, $p = .10$).

3.7.4 Higher level of care—There was a main effect of time, with likelihood of entering higher level of care decreasing over time ($p = .001$), likely resulting from study inclusion criteria (all participants were required to have been in higher level of care in past 6 months). There was neither a main effect of group nor a group by time interaction, in predicting entry into higher level of care (ps > .46).

3.8 Exploratory outcome: Restriction days per week

Participants completed 17.2 ± 7.7 (range 1–29) weekly surveys, producing 1,030 reports of restriction days per week. In the full sample, there were no main or interaction effects on days of restriction/week ($p = .49$). In the AN subset ($n = 33$), there was an overall group by time interaction ($p < .01$). Compared to the waiting list, there was a greater decrease in restriction days per week in peer mentorship (estimate = −0.20 ± 0.06 unit change/month, $p = 0.001$). Reduction in restriction days per week was not significantly greater compared with social support mentorship (estimate = −0.05 ± 0.05, $p = 0.29$).

3.9 Harms

There were no unexpected adverse events that were determined to be related to the study interventions. Based on participant feedback on the postintervention survey and/or provided to our team informally, there were several instances in which mentees reported that they found parts of an intervention unhelpful (i.e., a specific comment by their mentor, being encouraged to discuss topics that were perceived as not relevant).

4 DISCUSSION

The present study is, to our knowledge, the first pilot RCT to examine the feasibility and efficacy of peer mentorship for individuals with an eating disorder. Across 60 participants, attendance and acceptability were significantly higher in peer mentorship compared to social support mentorship, the active comparison program. Albeit possibly *as a result of* differences in engagement, for some symptoms, including body dissatisfaction, anxiety, and depression, there was significantly greater symptom reduction in the peer mentorship group compared to either one or both other conditions. There were also suggestions that peer mentorship was associated with greater reduction in frequency of eating disorder behavior, including binge days in the BN/BED group and restriction days in the AN group, although results were mixed and the quality of the evidence was suboptimal, given that analyses involved subsets of the full sample. There was no evidence that BMI or entering a higher level of care was affected by peer mentorship.

Consistent with prior work (Beveridge et al., 2019; Perez et al., 2014), peer mentorship appeared feasible among patients with eating disorders, based on high acceptability ratings, low dropout rate, and good attendance rate. The rate of program completion was 80%, which is comparable with 73% retention in a prior feasibility study of peer mentorship for patients with eating disorders (Beveridge et al., 2019). Findings pertaining to attendance, feasibility, and intervention preference suggest that connecting with someone who has “been there” is a preferred treatment modality that can engender high patient engagement, which is particularly notable for patients with eating disorders, often characterized by high ambivalence about change. Our findings align with a growing body of literature across fields of mental health pointing to the utility of peer connection and relationships in mental health recovery (Collins et al., in press; Naslund, Aschbrenner, Marsch, & Bartels, 2016; Sanger, Bath, & Bates, 2019).

While findings pertaining to engagement are promising, they also imply that observed differences in intervention efficacy may stem at least partially from differences in feasibility-related variables, such as expectancy, attendance, and acceptability, rather than the intervention content itself, and therefore must be interpreted cautiously. Regarding efficacy outcomes, our results are partially consistent with literature on peer mentorship for other mental health conditions which suggest promising effects on QOL-related variables but more modest impact on objective outcomes like hospitalization (Fuhr et al., 2014; Manning et al., 2012; Timko et al., 2011; van GestelTimmermans, Brouwers, van Assen, & van Nieuwenhuizen, 2012). In the present study, although we did not observe a direct impact on QOL, the peer mentorship group had greater reduction in self-reported body dissatisfaction, mood, and anxiety, compared to social support mentorship. The positive impact of body dissatisfaction is notable because body image is thought to take longer to change than other eating disorder symptoms following structured treatment (Fennig, Brunstein Klomek, Shahar, Sarel-Michnik, & Hadas, 2017; Konrad, Carels, & Garner, 2007) and because body image was not directly targeted, suggesting that improvement may not be via direct conversations. In the present study and others, peer mentorship is thought to provide mentees with feeling understood and a sense of hope that recovery is possible, both potentially fostering positive affect and hopefulness, and possibly explaining our samples'

improvements in domains of anxiety and depression. In a meta-analysis examining hope as a transdiagnostic mechanism of change, intraindividual change in hope predicted symptom trajectories, and hope was concluded to be a promising change mechanism (Gallagher et al., 2019). There were also specific components of the peer-based intervention, including "feeling feelings," "challenging thoughts," and focus on behavior change that encompass or overlap with CBT techniques with known efficacy for anxiety and depression, possibly contributing to change in these areas.

It is notable that there was no impact of intervention condition on reentry into treatment. In severe mental illness and depression, some individual studies found that peer mentorship reduced hospitalization rates (Cook et al., 2012; Sledge et al., 2011), although a meta-analysis of RCTs suggested no overall impact for either depression or serious mental illness (Fuhr et al., 2014). Although we hypothesized that peer mentorship would ameliorate returning to a higher level of care, it is also possible that, in the short term, mentorship may encourage patients to seek treatment when they might otherwise relapse. Given that entering treatment in the short-term may be considered positive (getting the treatment one needs) or negative (relapsing), it is difficult to conclude whether absence of an effect should be interpreted as lack of effectiveness of peer mentorship. Examining treatment utilization over a longer time course will inform if peer mentorship ultimately reduces health care utilization over time. Mentorship may also differentially affect mentees with varying levels of access to health care, possibly filling a critical treatment gap for those who lack access. Finally, there are numerous proposed methods to examine health care utilization, including comprehensive strategies for estimating health care cost by tabulating frequencies of appointments, therapy, tests, and so on, and this should be explored in future studies.

Analysis of BMI trajectories in the AN/AAN subset indicated that there was no effect of intervention group on BMI trajectory, and this may reflect absence of an impact of mentorship on patients' ability to maintain or gain weight. Given the design of the study—in which we enrolled patients following discharge from higher level of careaverage BMI of the sample at baseline was 20.1 kg/m^2. It is possible that patients' weight status at study onset or resulting variability in weight targets and goals impacted ability to detect an effect on weight change. Although baseline BMI did not differ significantly between groups, the difference between average BMI in peer (21.0 kg/m^2), social support (19.6 kg/m^2), and waiting list (19.2 kg/m^2) groups may be clinically meaningful.

There were several limitations of the present study. Although we aimed to enroll 90 participants, mentor availability hindered ability to complete recruitment, and the small sample size especially impacted ability to examine behavior change in subgroup analyses. Additionally, there were several findings that were marginally significant including findings pertaining to cognitive restraint, QOL, and anxiety, and this may reflect insufficient power or true absence of a significant difference. For analyses of BMI and frequency of restriction, binge eating, and purging, assumptions of LMM may be violated as the data are not missing at random but influenced by group assignment, with peer mentorship participants being more likely to have completed these measures. Second, several limitations pertained to the social support mentorship intervention. Although we aimed to design a control intervention with equivalent appeal, 94% of participants reported in a postintervention survey that their

preference was to have been randomized to mentorship by a recovered peer. The social support mentorship intervention was also more practical when delivered in person but was delivered online for 60% of mentees. Dyads sometimes cited difficulty identifying and selecting activities to do, and this likely contributed to high rates of dropout from social support mentorship. Additionally, social support mentors were encouraged to avoid indepth discussions about the eating disorder, and, in practice, this potentially impacted alliance, a construct with known positive impact on efficacy. Indeed, social support mentorship had higher dropout rates, lower completion rates, and fewer sessions attended, constituting a barrier to ascertaining whether the observed group differences are simply due to differences in engagement and participation versus dropout, or, if they reflect true differences in effectiveness. Therefore, it cannot be ruled out that common factors (i.e., alliance) with known therapeutic effects constitute the mechanism of change in peer mentorship.

Unlike several prior studies of mentorship, the present study did not examine outcomes for mentors, nor did it address best practices for matching mentors and mentees. Future studies should aim to examine if and how shared characteristics or experience (e.g., diagnosis) impact intervention engagement and outcomes. Additionally, assessment of the impact of being a mentor could be an important future direction. A final limitation is that recruitment language targeted individuals who were interested in “one-to-one support” and “mentorship,” presumably producing a sample with positive views of peer mentorship that may not reflect the entire population of individuals with eating disorders. In the future, it will be important to explore generalizability to patients who do not explicitly seek out mentorship opportunities. Given that the study sample was comprised almost exclusively of women, the majority of whom were young, white, and had AN, the findings should not be generalized to males, older individuals, or those with other diagnoses. Although the present study was conceived as an independent analysis of the peer mentorship model and therefore, Project HEAL team members were not involved in study design, data collection, analyses, or manuscript preparation, it is still possible that their role in recruitment, mentor selection and matching, and supervision had potential to introduce bias.

Taken together, peer mentorship for individuals with eating disorders following successful acute treatment is a desirable intervention with demonstrable impact on several key symptoms including body dissatisfaction, anxiety and depression, although it is possible that the mechanism of change is simply expectation or engagement. Nonetheless, its feasibility and efficacy suggest that peer mentorship may be a promising adjunct to traditional treatment for patients recently discharged from acute care. Whether it is efficacious or appropriate in the absence of treatment remains a key outstanding question.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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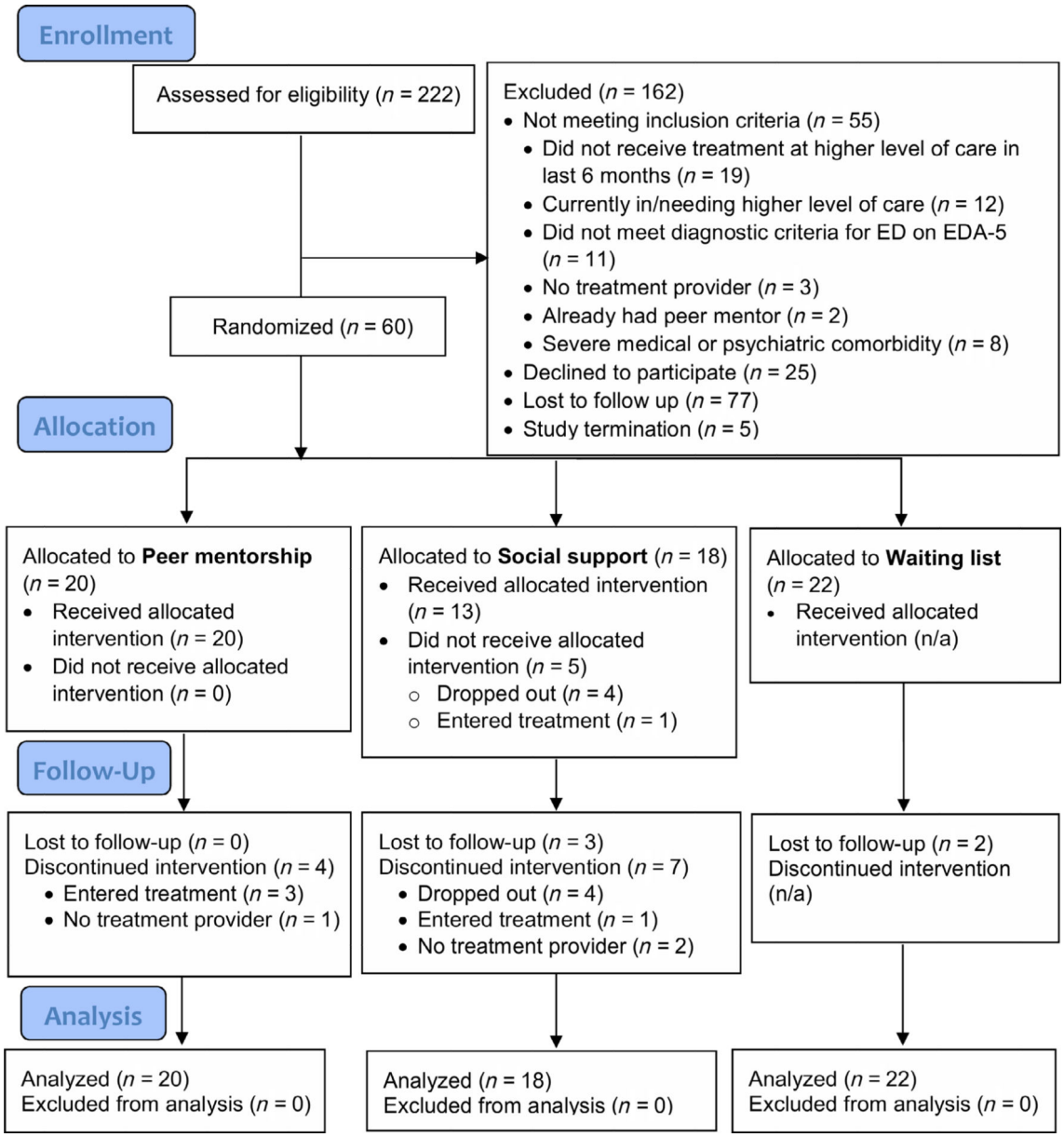
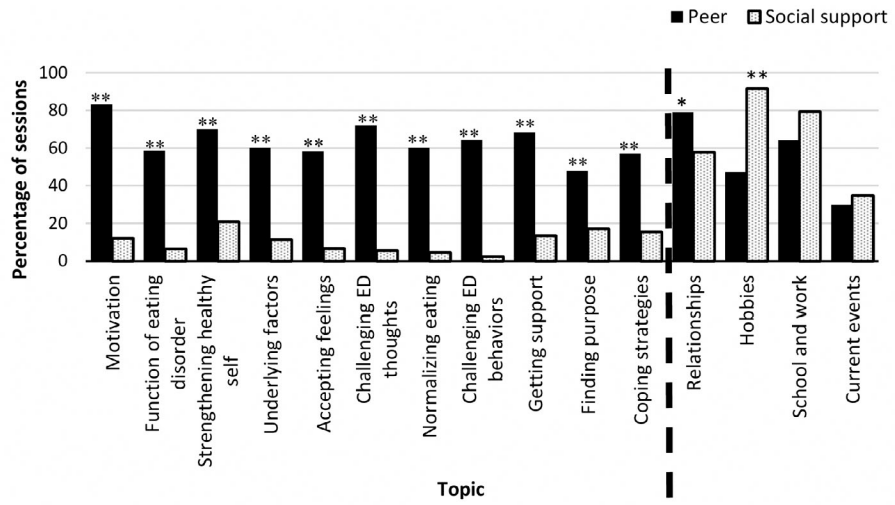


FIGURE 1.
Flow diagram of the progress through the phases of the randomized trial



ED = Eating disorder, all topics to the left of the hashed line are specific to peer mentorship

$^{**}p < 0.001$, $^{*}p < 0.01$

FIGURE 2.

Proportion of sessions in which each eating disorder and noneating disorder topic was discussed in peer and social support conditions across all mentorship meetings (each session weighted equally)

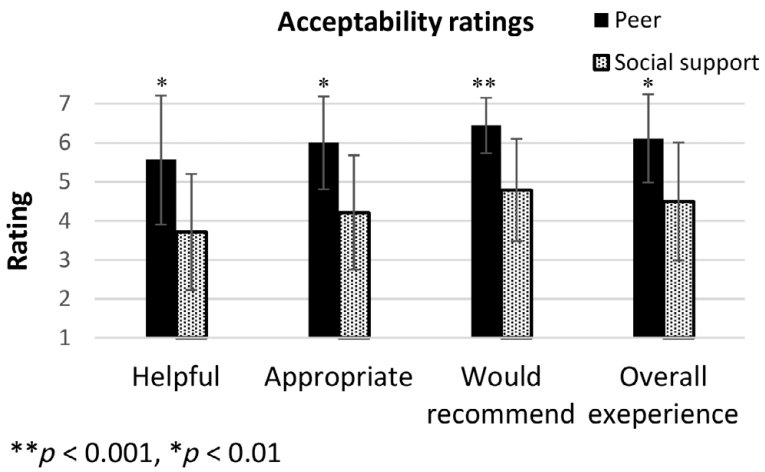


FIGURE 3.
Acceptability ratings by group

TABLE 1

Timeline of study assessment measures

	Month						
	Baseline	**1**	**2**	**3 (mid)**	**4**	**5**	**6 (end)**
Feasibility							
Attendance		X	X	X	X	X	X
Acceptability							X
Primary outcomes							
Eating Pathology Symptoms Inventory (EPSI)	X			X			X
Clinician-measured BMI (AN/AAN only)	X	X	X	X	X	X	X
Weekly binge and purge frequency (BN/BED groups only)	X	X	X	X	X	X	X
Secondary outcomes							
Eating disorder QOL	X			X			X
Depressive symptoms (PHQ-9)	X			X			X
Anxiety symptoms (STAI)	X			X			X
Health care utilization	X			X			X

Abbreviations: AAN, atypical anorexia nervosa; AN, anorexia nervosa; BN, bulimia nervosa; BED, binge-eatingdisorder; BMI, body mass index (kg/m^2); QOL, quality of life; PHQ-9, Patient Health Questionnaire-9; STAI, State-Trait Anxiety Inventory.

TABLE 2

Common and unique intervention components of eachstudy intervention

	Peer mentorship	Social support mentorship	Waiting list
Led by	Recovered mentor with eating disorder history	Project HEAL volunteer without eating disorder history	N/A
1-hr in person or Online contact/week	Y	Y	N
Focus on eating disorder recovery	Y	N	N
Mentor training in eight keys to recovery	Y	N	N
Focus on life outside eating disorder	N	Y	N
Study assessments	Y	Y	Y
Recovery record as a recovery tool	Y	N	N
Community support groups led by Project HEAL mentors	Optional	Optional	Optional

TABLE 3

Participant characteristics at baseline by group

	Peer (*n* = 20) mean ± *SD*/*n* (%)	**SS (*n* = 18) mean ± *SD*/*n* (%)**	**WL (*n* = 22) mean ± *SD*/*n* (%)**	**Sig. *p*/χ^2**
Age (years)	27.9 ± 7.6	31.0 ± 5.0	27.1 ± 6.9	.20
Race/ethnicity				
Asian	2 (10.0%)	0 (0.0%)	1 (4.5%)	.31
Black/African American	1 (5.0%)	0 (0.0%)	0 (0.0%)	
Hispanic	2 (10.0%)	0 (0.0%)	0 (0.0%)	
Other/mixed race	0 (0.0%)	1 (5.6%)	1 (4.5%)	
White/Caucasian	15 (75.0%)	17 (94.4%)	20 (91.0%)	
Sex (% female)	20 (100%)	17 (94.4%)	22 (100%)	.31
Diagnosis				
AN	13 (65%)	10 (55.5%)	10 (45.5)	.86
AAN	2 (10%)	4 (22.2%)	6 (27.3%)	
BN	4 (20%)	3 (16.7%)	5 (22.7%)	
BED	1(5%)	1 (5.6%)	1 (4.5%)	
Body mass index (kg/m^2)[a]				
AN	21.1 ±2.9	19.8 ± 2.0	19.2 ± 2.8	.25
AAN	27.6 ± 1.6	22.8 ± 3.6	25.3 ± 2.6	.19
BN	29.0 ± 7.6	24.7 ± 6.2	31.6 ±9.1	.53
Insurance type (*n* = 58)				
Private	11 (55%)	13 (76%)	17 (81%)	.16
Public	9 (45%)	4 (24%)	4 (19%)	
In-person or Online				
In-person	7 (35.0%)	7 (38.9%)	10 (45.5%)	.78
Online	13 (65.0%)	11 (61.1%)	12 (54.5%)	
Months since treatment	2.8 ± 2.0	2.1 ± 1.7	3.2 ± 2.2	.18

Abbreviations: AAN, atypical anorexia nervosa; AN, anorexia nervosa; BED, binge-eating disorder; BN, bulimia nervosa; SS, social support; WL, waiting list.

[a]Mean BMI for BED not reported because there was only one participant per group.

TABLE 4

Baseline, mid-, and postintervention sample size and descriptive statistics for all self-report variables

	Peer		SS		WL	
	n	**Mean ± *SD***	***n***	**Mean ± *SD***	***n***	**Mean ± *SD***
EPSI body dissatisfaction						
Baseline	20	23.5 ± 4.3	18	19.9 ± 6.3	21	21.2 ± 6.5
Midintervention	19	19.6 ± 6.9	13	19.4 ± 6.0	19	21.2 ± 6.2
Postintervention	18	18.2 ± 7.5	15	20.7 ± 6.1	20	20.9 ± 6.5
Effect size (vs. peer)[a]				0.78 (0.07–1.4)		0.73 (0.09–1.38)
EPSI cognitive restraint						
Baseline	20	7.1 ± 2.8	18	7.3 ± 3.0	21	7.1 ± 2.4
Midintervention	19	6.2 ± 3.3	13	6.8 ± 3.0	19	7.3 ± 2.1
Postintervention	18	5.6 ± 2.3	15	7.0 ± 2.7	20	7.4 ± 2.3
Effect size (vs. peer)[a]				0.72 (0.01–1.43)		0.64(0.0–1.30)
EPSI restricting						
Baseline	20	11.5 ± 7.2	18	10.8 ± 6.4	21	8.4 ± 4.6
Midintervention	19	11.7 ± 6.6	13	10.5 ± 5.9	19	9.6 ±4.9
Postintervention	18	9.5 ± 6.1	15	10.2 ± 5.2	20	9.4 ± 4.9
Effect size (vs. peer)[a]				0.30 (−0.41 to 1.01)		0.45 (−0.20 to 1.10)
ED-QOL						
Baseline	20	1.62 ± 0.61	18	1.57 ± 0.54	21	1.43 ± 0.63
Midintervention	19	1.33 ± 0.76	13	1.41 ± 0.69	19	1.50 ± 0.54
Postintervention	17	1.29 ± 0.88	15	1.41 ± 0.64	20	1.56 ± 0.64
Effect size (vs. peer)[a]				0.04 (−0.67 to 0.75)		0.52 (−0.14 to 1.18)
PHQ-9 (depression)						
Baseline	18	13.8 ± 6.5	17	9.6 ± 5.3	21	13.1 ± 7.2
Midintervention	19	13.3 ± 7.9	12	8.3 ± 4.2	19	13.9 ± 8.0
Postintervention	18	9.9 ± 6.6	15	11.3 ± 6.8	20	13.7 ± 9.0
Effect size (vs. peer)[a]				0.78 (0.09–1.47)		0.45 (−0.19 to 1.09)
STAI (anxiety)						

	Peer		SS		WL	
	n	**Mean ± *SD***	***n***	**Mean ± *SD***	***n***	**Mean ± *SD***
Baseline	20	61.8 ± 8.2	18	59.1 ± 7.7	21	59.0 ± 9.6
Midintervention	19	57.9 ± 12.3	13	57.2 ± 11.0	19	62.5 ± 9.1
Postintervention	17	54.9 ± 13.1	15	59.9 ± 10.4	20	61.3 ± 9.9
Effect size (vs. peer)[a]				0.77 (0.06–1.48)		0.69 (0.04–1.34)

Abbreviations: ED-QOL, Eating Disorder Quality of Life; EPSI, Eating Pathology Symptoms Inventory; PHQ-9, Patient Health Questionnaire-9; SS, social support; STAI, State-Trait Anxiety Inventory; WL, waiting list.

[a]Effect sizes are calculated as between-group difference in change score divided by *SD* in change score.