



Randomized trial of a digital single-session intervention for body image and mood concerns among LGBTQ+ adolescents

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ABSTRACT

LGBTQ+ youth experience disproportionately high rates of mental health concerns, including eating disorders (EDs) and depression. Body dissatisfaction is a shared risk factor for EDs and depression. Given the limited nature of accessible, affirming resources, LGBTQ+ youth often seek mental health support online. Promising research has been conducted on LGBTQ-affirmative interventions, but this work has focused on adults and digital delivery has been limited. To reduce body dissatisfaction at-scale, we developed a digital, single-session intervention (SSI)—Project Body Neutrality. A total of 218 LGBTQ+ adolescents (ages 13–17) with body image and mood concerns were recruited online and randomized to Project Body Neutrality or to a control (a structurally similar digital SSI designed to mimic supportive therapy). Both conditions were highly acceptable, and a qualitative analysis of open-ended feedback elucidates what participants found most helpful about Project Body Neutrality. Compared to control participants, intervention participants reported significantly greater immediate positive changes in body satisfaction, functionality appreciation, hopelessness, and perceived agency. At 3-month follow-up, these differences were not sustained. Across the full sample, there were no significant differences between groups in 3-month reductions in ED psychopathology or depression symptoms. However, an exploratory analysis indicates that the intervention had a significant effect on ED psychopathology among participants at-risk for EDs (as opposed to those above the clinical threshold). Future research would benefit from further investigation of when, for whom, and within what treatment-seeking context Project Body Neutrality may be most impactful (ClinicalTrials.gov ID: NCT06172452).

1. Introduction

Youth are experiencing a mental health crisis. Over the last few decades, the mental health of young people has declined steadily and a surge in youth mental health concerns occurred in tandem with the COVID-19 pandemic (McGorry et al., 2024). An important yet often underrecognized aspect of the mental health crisis is body dissatisfaction (Bucchianeri & Neumark-Sztainer, 2014). Nearly half of adolescent girls and boys report experiencing moderate or clinically significant body dissatisfaction (McLean et al., 2022). This high prevalence is concerning given that body dissatisfaction is a major risk factor for a range of mental health concerns including eating disorders (EDs) and depression (Goldschmidt et al., 2016; McLean et al., 2022; Stice et al., 2017).

The Internet is a forum rife with pitfalls and promises related to adolescent mental health. Extensive literature documents the negative

role that social media use can play in adolescent development, but recent research also highlights potential benefits (Choukas-Bradley et al., 2023). Since young people frequently seek mental health information and support online, the Internet can be harnessed for mental health benefit (Pretorius et al., 2019). Specifically, adolescents who engage with online content related to disordered eating report being open to trying digital interventions and suggest that social media could be used to connect people with treatment (Fitzsimmons-Craft et al., 2020). This openness to digital interventions presents an opportunity to leverage online platforms to address EDs and their risk factors. Maximally accessible interventions for EDs, including digital tools, are needed to reduce the treatment gap between those in need of and those who receive services (Kazdin et al., 2017). However, the impact of existing digital programs for EDs is limited by low user engagement (Linardon et al., 2020). This challenge is further exacerbated by

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evidence suggesting that adolescents frequently lack awareness of “reliable” digital support systems and struggle to understand the meaning of “evidence-based treatments” (Carman et al., 2010).

Two ways that digital interventions can better engage adolescents are by (a) limiting the time commitment of engaging in treatment and (b) meeting adolescents where they are by using their terminology. Given that real world, long-term engagement with mental health apps is low, one path forward is to develop single-session interventions (SSIs)—digital programs that are *intentionally* designed to confer benefit within one encounter (Baumel et al., 2019; Schleider et al., 2020). There is extensive evidence to support the acceptability, feasibility, and effectiveness of digital SSIs for youth depression, but more research on SSIs for EDs is needed (Schleider et al., 2023, 2025). Additionally, it is necessary to design interventions that prioritize the needs and desires of end users (Graham, Lattie, & Mohr, 2019; Graham, Wildes, et al., 2019; Schleider, 2023). Given some users’ preferences for accessible, flexible, and anonymous approaches to treatment, it is important to make self-guided interventions readily available (Cheung et al., 2025). Furthermore, a shift towards focusing on the topics that end users find salient and employing relevant language may be beneficial. One such topic that has become popular in online discussions about body image is body neutrality, defined in public discourse as (1) a neutral attitude toward the body that is realistic, mindful, and flexible, (2) appreciation, respect, and care for the functionality of the body, and (3) a move away from defining self-worth based on appearance (Pellizzer & Wade, 2023).

Online communities have embraced the term body neutrality when communicating about body image. Content analyses of TikTok videos indicate that the body neutrality movement is being viewed as a more inclusive alternative to the body positivity movement (Hallward et al., 2023; Mancin et al., 2024). Body positivity emerged to challenge conventional appearance-based ideals and promote love for all bodies, but some argue that it has been diluted and co-opted by corporate interests and become exclusionary to non-normative bodies as well as overly prescriptive (Cwynar-Horta, 2016; Darwin & Miller, 2021; Sastre, 2014). Importantly, it remains debated whether the body neutrality movement actually fosters a more inclusive online space than that produced by the body positivity movement (Aubrey et al., 2024; Mancin et al., 2024; Nuss et al., 2025) and it is notable that body neutrality is not necessarily distinct from well-established academic positive body image constructs (Mulgrew & Hinz, 2024; Tiggemann, 2024; Wood-Barcalow et al., 2024). Nevertheless, it seems that body neutrality emerged as a catchall term for positive body image practices (e.g., functionality appreciation, body image flexibility and fluidity) due to positive body image becoming conflated with the co-opted version of body positivity and because the language of body image researchers has not been adopted by the public (Mulgrew & Hinz, 2024; Wood-Barcalow et al., 2024). It is essential to recognize that public understandings and academic understandings of concepts may differ and to pay attention to how body image concepts are being perceived by the populations we intend to reach.

Our team sought to leverage public enthusiasm for body neutrality with the hope that an intervention rooted in end users’ understandings of this term would achieve high acceptability and engagement. We therefore developed a digital self-guided SSI called Project Body Neutrality. Using body neutrality language to engage participants, the SSI targets body dissatisfaction—a known risk factor for EDs and depression (Goldschmidt et al., 2016; Stice et al., 2017)—through exercises that promote positive body image. This approach is supported by the notion that improvements in positive body image may indirectly influence reductions in negative body image (Linardon, 2021; Linardon et al., 2022; Tylka & Wood-Barcalow, 2015). Of the positive body image constructs that may underlie body neutrality (Pellizzer & Wade, 2023), Project Body Neutrality most prominently emphasizes functionality appreciation. Functionality appreciation is defined as appreciation for what the body can do which includes internal processes, physical capacities, senses and sensations, creativity, communication with others,

and self-care (Alleva et al., 2017; Alleva & Tylka, 2021). In a non-randomized pilot trial, we previously delivered the Project Body Neutrality SSI to 75 youth ages 13 to 17 with elevated body image and mood concerns. Analyses of pre to post responses showed that participants rated the SSI as highly acceptable and reported significant, medium to large improvements in hopelessness, functionality appreciation, and body dissatisfaction (A. C. Smith et al., 2023). Although the pilot study was open to youth of all backgrounds and outcomes did not differ based on gender identity or sexual orientation, the majority of participants identified as LGBTQ+ (Roberts et al., in preparation; A. C. Smith et al., 2023). LGBTQ+ youths’ self-selection into the study may reflect the appeal and accessibility of digital SSIs for this population in general (McDanal et al., 2022, 2024), as well as this population’s particular affinity towards Project Body Neutrality, given that LGBTQ+ youth have suggested that body neutrality language be used to improve ED treatment (Hartman-Munick et al., 2021).

There is a particular need for digital SSIs that address body dissatisfaction in LGBTQ+ youth. Despite experiencing higher rates of mental health concerns than their cisgender, heterosexual peers, LGBTQ+ youth face large disparities in mental healthcare access (Lund & Burgess, 2021; Parmar et al., 2021). Half of LGBTQ+ youth who report wanting mental healthcare are unable to access any (Nath et al., 2024). LGBTQ+ youth encounter the same barriers to seeking treatment as other adolescents, such as prohibitive cost and parental permission, along with additional identity-specific barriers like fear of being outed and a shortage of affirming providers (J. M. Cohen et al., 2022; Mora Ringle et al., 2024; Williams & Fish, 2020; Zullo et al., 2021). Given the lack of in-person mental health resources available to LGBTQ+ individuals, it is crucial to develop accessible digital resources that meet the needs of this population (J. M. Cohen et al., 2022). Promising research on ED-specific interventions for LGBTQ+ individuals is beginning, but the work is in its infancy and not yet focused on highly scalable delivery models (Brown et al., 2024; Nagata et al., 2024). To our knowledge, no in-person or digital interventions specifically targeted toward LGBTQ+ youth with EDs have been evaluated (Nagata et al., 2024). Although Project Body Neutrality was not designed or tailored specifically for LGBTQ+ youth, we recognized LGBTQ+ participants’ strong interest in the SSI during the pilot study. Taking together this observation along with the potential a digital, self-guided, ED-focused SSI could have in supporting LGBTQ+ youth who often lack needed services, we shifted our focus to this population.

In the current study, we sought to learn more about how Project Body Neutrality may benefit LGBTQ+ youth. Expanding on our non-randomized pilot study, we conducted an RCT comparing the effectiveness of Project Body Neutrality to a control among LGBTQ+ youth with body image and mood concerns. We hypothesized that Project Body Neutrality would produce greater reductions in ED and depression symptoms than a control group by targeting relevant proximal outcomes, namely, body dissatisfaction, functionality appreciation, hopelessness, and perceived agency. By increasing functionality appreciation, the SSI may decrease body dissatisfaction (as measured by increases in state body satisfaction ratings), and in turn, reduce ED and depression symptoms (Linardon et al., 2023; Paxton et al., 2006; Stice, 2001; Stice & Bearman, 2001; Stice et al., 1996). Additionally, we measured hopelessness and perceived agency since they are hypothesized to be mechanisms of change in depression-focused SSIs that have also produced reductions in ED symptoms (Schleider et al., 2020; Schleider et al., 2022). In line with previous evaluations of the acceptability of Project Body Neutrality and the control condition, we expected that both SSIs would be highly acceptable (Schleider et al., 2022; A. C. Smith et al., 2023). Through this study, we aim to examine the effectiveness of Project Body Neutrality in reducing ED and depression symptoms among LGBTQ+ youth, thereby contributing to the evaluation of intervention options for this minoritized population.

2. Methods

2.1. Ethical considerations

The study was approved and the requirement for parental permission was waived by the Northwestern University IRB (STU00220039). A waiver of parental consent was highly important for this study because over one third of LGBTQ+ youth share that concerns with obtaining parental permission is a reason that they are unable to access mental health support (Nath et al., 2024). Our methods were preregistered on Open Science Framework (<https://osf.io/7ftq9>) and on ClinicalTrials.gov (<https://clinicaltrials.gov/study/NCT06172452>).

2.2. Recruitment and procedures

Recruitment was conducted from December 18, 2023 to April 22, 2024. At the start of the study, recruitment was conducted exclusively via paid Instagram advertisements, in line with the pilot study (A. C. Smith et al., 2023) and previous large-scale RCTs of digital SSIs (Schleider et al., 2022). However, we found that many responses collected via Instagram were fraudulent; a finding in line with increasing concerns about data quality in online research (French et al., 2024). In response to identifying numerous fraudulent responses, we halted the paid advertisements. We shifted to other recruitment methods including emails to our lab's past participants (besides participants of the pilot study), emails to listservs of ED researchers and clinicians, and partnerships with mental health and ED-specific nonprofits. All responses were manually reviewed with data integrity checks, as outlined in the study assent form. Using best practices in fraud management (Davies et al., 2023), these checks included inspecting if attention questions were answered correctly, determining if a respondent's IP address was in the United States and if it matched the location data collected by Qualtrics, and reviewing the data from the reCAPTCHA and RelevantID technologies enabled by Qualtrics. reCAPTCHA and RelevantID create embedded data fields that flag responses based on the likelihood that they are bots, duplicates, or fraudulent (Qualtrics, n.d.). Responses were excluded from the study if one or more of these indicators of possible fraud was identified.

Interested individuals began by clicking a Qualtrics link which led them to a screening survey. Participants were eligible if they endorsed (1) having a LGBTQ+ identity, (2) being between the ages of 13 and 17 years old, (3) residing in the United States, (4) feeling comfortable reading and writing in English, (5) never participating in the pilot study of Project Body Neutrality, (6) having elevated depression symptoms according to a score of ≥ 2 on the Patient Health Questionnaire-2 (Kroenke et al., 2003), and (7) experiencing body image concerns according to a yes/no item (Stice et al., 2008, 2013). The yes/no item stated: "Do you have body image concerns? For example, negative thoughts about your body that make you feel bad about yourself." Respondents who were ineligible were directed to a page with mental health resources. Eligible participants could review the assent form, complete a comprehension assessment, and provide web-based assent. After the assent procedures, participants progressed directly to the pre-intervention questionnaires, their randomly assigned SSI condition, and then the post-intervention questionnaires. Participants were randomized via the tool available in Qualtrics. Three months after they began their assigned SSI condition, participants were sent a follow-up survey to the email that they provided at baseline. After the follow-up period was complete, control group participants were also given access to Project Body Neutrality. Participants were compensated \$10 for completing the baseline survey and \$5 for completing the follow-up survey.

2.3. SSI conditions

Project Body Neutrality is a digital SSI that encourages adolescents to

adopt a body neutrality mindset, with an emphasis on functionality appreciation. The SSI includes psychoeducation about body image difficulties, an introduction to the concept of body neutrality, vignettes from fictional peers to normalize experiences and increase relatability, multiple choice and free-response activities to practice applying body neutrality (e.g., developing a list of functions one's body enables, cognitive restructuring of negative body image thoughts to be more neutral), an opportunity to engage in advocacy, and an action plan that compiles users' responses for later reflection. More information about the intervention content is available in the pilot study manuscript (A. C. Smith et al., 2023). Based on the qualitative feedback obtained during the pilot study, small content revisions were made. These changes included an extended explanation of body neutrality that expands beyond functionality appreciation and better encompasses the other core elements outlined by Pellizzer and Wade (2023), additional content to address the accessibility of body neutrality in the context of people having varying physical abilities, two new peer testimonials featuring stories of adolescents struggling explicitly with disordered eating, a statement acknowledging the benefits of individual changes even when systemic changes remain needed, as well as clarifying instructions and descriptions. However, no adaptations specific to the current trial were pursued. While evidence-based LGBTQ-affirmative interventions often directly address LGBTQ-related stressors within the framework of minority stress theory (Pachankis et al., 2023), not all contexts require extensive modification.

Using established frameworks for deciding when and how to adapt evidence-based interventions (Alvidrez et al., 2019; Movsisyan et al., 2019), we found that no additional adaptations of Project Body Neutrality were needed based on two key factors: acceptability and practicality. First, the original SSI had already been tested in a pilot study with a large, diverse group that included a significant proportion of LGBTQ+ youth (A. C. Smith et al., 2023). Overall acceptability was high ($M = 4.34/5$, $SD = 0.54$) (A. C. Smith et al., 2023), and there was no significant difference in acceptability between cisgender heterosexual participants and LGBTQ+ participants (Roberts et al., in preparation). Additionally, the original SSI features LGBTQ-inclusive vignettes and explicitly pairs each fictional peer with their pronouns—an approach that was well-received based on qualitative feedback (A. C. Smith et al., 2023). The quantitative and qualitative data made it clear that Project Body Neutrality aligned well with the needs of LGBTQ+ youth. Second, the practicality of the SSI was fully maintained in the current trial. We used the same digital platform and delivery format as in the pilot trial, ensuring a consistent experience in terms of access, user interface, and overall delivery. Since the implementation setting did not change, there were no new barriers that necessitated changes to maintain the SSI's effectiveness or usability. The full SSI is available on Open Science Framework (<https://osf.io/7qtuj>).

The Sharing Feelings Project is a digital SSI that is structurally similar to Project Body Neutrality. It was designed to control for nonspecific aspects of completing a digital, self-guided program without emphasizing specific skills or beliefs (Schleider & Weisz, 2016, 2018). Mimicking supportive therapy, the face-valid program encourages users to discuss their positive and negative emotions with close others and has shown high acceptability in prior clinical trials (Schleider et al., 2022). The control content is available on Open Science Framework (<https://osf.io/u4axs>).

Measures¹

¹ The Muscle Dysmorphic Disorder Inventory (MDDI) (Hildebrandt et al., 2004) Body Image Acceptance and Action Questionnaire (BI-AAQ) (Sandoz et al., 2013), and Comprehensive Inventory of Mindfulness Experiences for Adolescents - Accepting with Nonjudgmental Orientation Subscale (CHIME-A) (Johnson et al., 2017) were included as exploratory measures. Analyses were not reported due to poor internal consistency.

2.3.1. Demographics

Participants reported their age, race/ethnicity, sex assigned at birth, gender identity, and sexual orientation. Participants also completed the Hunger Vital Sign in which a response of Often True or Sometimes True on one or both items indicates risk of food insecurity (Hager et al., 2010). Participants were also asked about if their past and present mental health support needs for depression and EDs have been met. When applicable, follow-up free response questions inquired about barriers to treatment seeking. Demographics were assessed within the pre-intervention battery.

2.3.2. Primary outcomes

Eating Disorder Examination Questionnaire (EDE-Q) - 10 item, 3 factor version (Fairburn & Beglin, 2008; Habashy et al., 2023). ED psychopathology was assessed using a 10-item, 3 factor version of the EDE-Q. The factor structure of the original EDE-Q has not been supported for use with diverse populations and this version has achieved strict invariance by gender and race/ethnicity (Habashy et al., 2023). Higher global scores indicate greater ED severity (the primary ED outcome). The 10-item EDE-Q yields 3 subscales: Dietary Restraint, Preoccupation with Eating Concern, and Shape/Weight Overvaluation. Each item is on a 0 to 6 scale and the scores are computed as means. The EDE-Q was included at pre-intervention and 3-month follow-up. Internal consistency was 0.88 at pre-intervention and 0.92 at 3-month follow-up. To our knowledge, the 10-item, 3 factor version of the EDE-Q (Habashy et al., 2023) has not been validated specifically for LGBTQ+ youth, but another brief version of the EDE-Q has been validated with LGBTQ+ adults (Compte et al., 2023; Nagata et al., 2023).

Short Mood and Feelings Questionnaire (SMFQ) (Messer et al., 1995). Depression symptoms were assessed using a 13-item questionnaire designed for youth. Total scores range from 0 to 26, with higher scores indicating greater depression severity. The SMFQ was included at pre-intervention and 3-month follow-up. Internal consistency was 0.82 at pre-intervention and 0.91 at 3-month follow-up. To our knowledge, the SMFQ has not been validated specifically for LGBTQ+ youth, but it has been used in research with this population (Hatchel et al., 2019; Mora Ringle et al., 2024).

2.3.3. Proximal outcomes

Beck Hopelessness Scale (BHS) - 4 item version (Perczel Forintos et al., 2013). Hopelessness was assessed using 4 statements rated from 0 (Absolutely Disagree) to 3 (Absolutely Agree). Total scores range from 0 to 12, with higher scores indicating greater levels of hopelessness. The BHS was included at pre-intervention, post-intervention, and 3-month follow-up. Internal consistency was 0.82 at pre-intervention, 0.81 at post-intervention, and 0.83 at 3-month follow-up. To our knowledge, the BHS has not been validated specifically for LGBTQ+ youth, but it has been used in research with this population (Hirsch et al., 2017; Shen et al., 2023).

State Hope Scale (SHS) - 3 item Pathways subscale (Snyder et al., 1996). Perceived agency was assessed using 3 statements rated from 1 (Definitely False) to 8 (Definitely True). Total scores range from 3 to 24, with higher scores reflecting greater perceived ability to identify routes to reach goals. The SHS Pathways subscale was included at pre-intervention, post-intervention, and 3-month follow-up. Internal consistency was 0.75 at pre-intervention, 0.84 at post-intervention, and 0.77 at 3-month follow-up. To our knowledge, the SHS has not been validated specifically for LGBTQ+ youth, but it has been used in research with this population (McDanal et al., 2022; Poteat et al., 2020), and the 3-item version was derived from confirmatory factor analysis using a dataset that includes LGBTQ+ adolescents (Schleider et al., 2020).

Functionality Appreciation Scale (FAS) (Alleva et al., 2017). Functionality appreciation was assessed using 7 statements rated from 1 (Strongly Disagree) to 5 (Strongly Agree). Total scores range from 7 to 35, where higher scores indicate greater appreciation for body

functionality. The FAS was included at pre-intervention, post-intervention, and 3-month follow-up. Internal consistency was 0.87 at pre-intervention, 0.89 at post-intervention, and 0.90 at 3-month follow-up. Confirmatory factor analysis supports the use of the FAS with sexual minority adults (Soulliard & Vander Wal, 2021), and it has been used in research with adolescents (Linardon et al., 2023).

Body Image States Scale (BISS) (Cash et al., 2002). State body satisfaction was assessed using 6 items rated from 1 (poor body image state) to 9 (favorable body image state). Total scores range from 6 to 54, where higher scores indicate higher state body satisfaction (and lower state body dissatisfaction). The BISS was included at pre-intervention, post-intervention, and 3-month follow-up. Internal consistency was 0.80 at pre-intervention, 0.82 at post-intervention, and 0.88 at 3-month follow-up. To our knowledge, the BISS has not been validated specifically for LGBTQ+ youth, but it has been used in research with sexual minority youth (Heron et al., 2022) as well as transgender and nonbinary adults (Watson et al., 2024).

2.3.4. Treatment seeking

In order to assess participants' treatment seeking since randomization, they were asked: "In the past 3 months (since completing the first survey for this study), did you seek out any new support for depression or mood problems?" and "In the past 3 months (since completing the first survey for this study), did you seek out any new support for an eating disorder or body image problems?" These questions were included at 3-month follow-up.

2.3.5. Acceptability

Program Feedback Scale (PFS) (Schleider et al., 2019). Intervention acceptability was assessed using 7 statements rated from 1 (Really Disagree) to 5 (Really Agree). The measure also includes open-ended items that invite respondents to share what they liked and/or would change about the intervention. Total scores range from 5 to 35, with higher scores indicating a more positive evaluation. The PFS was included at post-intervention. Internal consistency was 0.80 at post-intervention.

2.3.6. Analysis plan

Analyses were conducted using RStudio version 2024.12.0.467 (Posit Team, 2024). The intent-to-treat outcomes were recorded as the primary analysis (V. Smith et al., 2021) and the treatment-on-the-treated (intervention completers) outcomes are available in Appendix A. De-identified data and analytic code are available at <https://osf.io/w82bf/>. All d_{av} effect sizes were multiplied by -1 to assist with ease of interpretation. To assess the effect of treatment group on changes in outcomes from pretest to posttest, regressions using residualized change scores (equivalent to ANCOVA) were used. When there is randomization, the use of regression with residualized change scores has been preferred to repeated measures ANOVA because the former is more highly powered and makes the correct assumption about the distribution of baseline scores (Castro-Schilo & Grimm, 2018; van Breukelen, 2013).

2.3.7. Effect of Project Body Neutrality on primary outcomes

We ran a series of linear regressions to test whether Project Body Neutrality produced greater reductions in depressive symptom severity and ED global symptom severity from pre-SSI to 3-month follow-up, when compared to the Sharing Feelings Project. The models investigated the follow-up score predicted by the treatment group and the pre-intervention score. We also reported Cohen's d effect sizes and 95 % confidence intervals using the MOTE package in R (Buchanan et al., 2019).

2.3.8. Effect of Project Body Neutrality on proximal outcomes

Using linear regressions, we tested whether Project Body Neutrality or the Sharing Feelings Project predicted improvements in the proximal

targets of functionality appreciation, body satisfaction, hopelessness, and perceived agency at post-SSI and 3-month follow-up. The models examining immediate change investigated the post-intervention score predicted by the treatment group and the pre-intervention score. The models examining change at 3-month follow-up investigated the 3-month score predicted by the treatment group and the pre-intervention score.

2.4. Effect of Project Body Neutrality on treatment seeking

We used logistic regressions to compare differences in 3-month treatment seeking between groups, exclusively among participants who reported these data at follow-up (i.e., the imputation procedures outlined below were not applied to these data), controlling for treatment access at baseline. This analysis deviates from the pre-registration in which we planned to use Chi-squared tests (this method would have failed to account for baseline rates).

2.4.1. Intervention acceptability

Separately for the intervention and control condition, we calculated means and standard deviations of the PFS, for each item and for the overall score. An average score of “Agree” (>3) on any given PFS item reflected endorsement of that item (i.e., positive feedback/adequate acceptability). The benchmark for overall perceived SSI acceptability was similarly a mean of all items >3 (Schleider et al., 2020). Given the range of developmental levels represented among 13- to 17-year-olds, we conducted an exploratory evaluation of overall Project Body Neutrality acceptability as predicted by age.

2.4.2. Sample size

Due to suspected fraud, we had to exclude 30 participants from analyses after they were already compensated for their baseline survey (and we did not have the funds to recruit and compensate additional participants). Additionally, 2 participants were dropped per the missing baseline data criteria outlined below. As a result, our actual sample size was 218 while our preregistered sample size was 250. A sample of 218 participants is comparable to sample sizes in other two-armed RCTs evaluating SSIs that have detected small to medium effects on adolescent depressive symptoms across multi-month follow-up periods (Schleider et al., 2020; Schleider & Weisz, 2018). The R package *pwr* (Champely, 2020) was used to evaluate the power of our preregistered and actual sample size. The preregistered sample size of 250 yielded 71 % power to detect an effect size of 0.32, the average meta-analytic effect size found in SSI studies with youth (Schleider & Weisz, 2017). The actual sample size of 218 yielded 65 % power to detect an effect size of 0.32.

2.4.3. Handling missing data

Participants with more than 5 % missing baseline data on primary outcomes were dropped from analyses. For included participants, we used the *missForest* package in R (Stekhoven, 2022) to impute missing baseline and follow-up data. The algorithm input included all of a participant’s available baseline and follow-up scores, intervention assignment, and completion checkpoints. The normalized root mean squared error of the algorithm, which represents the average difference between imputed values and true values, was estimated to be 0.17 standard deviations for continuous variables. The percent of imputed categorical values falsely classified was estimated to be 5 %.

2.4.4. Correcting for multiple tests

The False Discovery Rate (FDR) correction was applied, and results were considered statistically significant if FDR corrected $p < 0.05$.

2.4.5. Exploratory Analyses

Since we had no *a priori* predictions about subgroups that Project Body Neutrality may be best suited to support, individuals with almost any level of elevation in body image and mood concerns could

participate in this trial. However, it is common for mental health programs to operate as either prevention, targeting at-risk/subclinical individuals, or as intervention, targeting individuals who have surpassed a clinical threshold (Koreshe et al., 2023; Tokgöz et al., 2021). We thus conducted non-preregistered, exploratory analyses to determine if symptom levels moderated the effect of SSI assignment on primary outcomes. When significant interaction effects between pre-intervention scores and SSI assignment were found, we estimated subgroup effects of intervention assignment on the primary outcome separately for at-risk/subclinical and clinically elevated individuals. For ED symptoms, the split was made at a pre-intervention global EDE-Q score of 2.8 since this is a suggested clinical threshold (Mond et al., 2008). For depression symptoms, there is no single cutoff point available for the SMFQ (Child Outcomes Research Consortium, n.d.), so we used a median split of pre-intervention scores (Iacobucci et al., 2015).

Additionally, given the inclusion of transgender/gender diverse and cisgender non-heterosexual participants, we conducted non-preregistered, exploratory analyses to compare differences in outcomes between these groups. This comparison is important because, although both transgender/gender diverse and cisgender non-heterosexual individuals experience elevations in mental health concerns including ED psychopathology compared to their cisgender heterosexual peers, these disparities are particularly pronounced for transgender/gender diverse individuals (Diemer et al., 2015; Heiden-Rootes et al., 2023; The Trevor Project, 2022). We therefore examined baseline differences in ED psychopathology and depression symptoms and evaluated whether condition assignment interacted with gender identity to influence these primary outcomes. Furthermore, since these groups may exhibit different intervention preferences, we investigated if there were differences in acceptability ratings of Project Body Neutrality between transgender/gender diverse and cisgender non-heterosexual participants. A binary gender identity variable was created for these analyses. Participants who selected any gender identity other than “Woman/Girl” or “Man/Boy” (i.e., the cisgender options) were categorized as transgender/gender diverse.

2.4.6. Qualitative analysis of open-ended feedback from Project Body Neutrality completers

To supplement the quantitative evaluation of Project Body Neutrality’s acceptability and effectiveness, an inductive content analysis was conducted to identify themes within participant feedback (Hsieh & Shannon, 2005). This analysis explored elements participants valued, reasons for their preferences, and suggested modifications to the intervention or its delivery platform. Participants could answer open-ended questions after completing their assigned intervention, including: (a) “What are some things you liked about the activity?” and (b) “What are some things you would change about the activity?” Verbatim responses were imported into MAXQDA version 22 (VERBI Software, 2021). The analysis focused on participants randomized to Project Body Neutrality. Of the 103 participants randomized to this condition, 93 provided responses to each question (resulting in 186 total responses). The coding process was led by the first author, a PhD student researcher, and the third author, a PhD-level researcher. Initially, each coder independently analyzed separate halves of the responses for each question to identify key themes and develop a preliminary codebook. The codebook included various components of the intervention that participants appreciated or suggested modifying, as well as the inclusion and exclusion criteria and corresponding example excerpts. The coders then met to review the generated codes, resolve discrepancies, and finalize the codebook. To check that interrater reliability achieved the kappa reliability threshold of 0.70 (MacPhail et al., 2016), the coders independently analyzed a subset of responses ($n = 40$). The results indicated strong agreement across codes ($\kappa = 0.90$). All responses ($N = 186$) were then independently coded. Coding disagreements were resolved through discussion to achieve consensus. Responses that did not elaborate on specific components of the intervention that they liked or did not

like/would change (e.g., “I liked everything about the intervention”; “I would not change anything”) were removed from the final analytic sample ($n = 28$, 15 %). This led to a final set of 158 cases (85 % of total responses) that were retained in the analytic sample.

3. Results

3.1. Sample characteristics

Fig. 1 depicts the study flow and Table 1 details the demographic characteristics of the 218 randomized participants. There were no differences in baseline symptom levels and most demographic characteristics between groups. The exceptions are that there were significantly more a gender participants randomized to the Sharing Feelings Project and significantly more American Indian or Alaskan Native participants randomized to Project Body Neutrality.

3.2. Study dropout and intervention use

Intervention completion was high across conditions, with 99 of the 103 Project Body Neutrality participants (96.12 %) and 105 of the 115 Sharing Feelings Project participants (91.30 %) completing their assigned SSI. In the intervention group, 97 participants (94.17 %) completed the PFS, 96 (93.20 %) completed all pre- and post-intervention questionnaires, and 53 (51.46 %) completed the 3-month follow-up. In the control group, 103 (89.57 %) completed the PFS, 95 (82.61 %) completed all pre- and post-intervention questionnaires, and 66 (57.39 %) completed the 3-month follow-up. To calculate intervention duration, outliers were removed using the interquartile range (IQR) method, excluding observations more than 1.5 times the IQR below the first quartile or above the third quartile. Participants spent an average of 24.51 min on Project Body Neutrality ($SD = 20.32$) and an average of 8.85 min on the Sharing Feelings Project ($SD = 10.25$).

3.3. Intervention acceptability

Participants who completed Project Body Neutrality found it highly acceptable ($M = 4.51$; $SD = 0.45$), significantly more so than the Sharing Feelings Project ($M = 4.29$; $SD = 0.47$; $t = 3.34$; $p = 0.001$; $d = 0.47$). Age was not a significant predictor of Project Body Neutrality acceptability ($t = 1.87$, $p = 0.064$). 13-year-olds rated Project Body Neutrality an average of 4.33/5 ($SD = 0.69$), 14-year-olds also rated it 4.33/5 ($SD = 0.71$), 15-year-olds rated it 4.53/5 ($SD = 0.39$), 16-year-olds rated it 4.44/5 ($SD = 0.40$), and 17-year-olds rated it 4.60/5 ($SD = 0.38$). The means and standard deviations for each individual item of the PFS, computed separately for Project Body Neutrality and the Sharing Feelings Project, are in Table 2.

3.4. Intervention effects on primary outcomes: eating disorder psychopathology and depression symptoms

There were no significant between-group differences in pre-intervention to 3-month follow-up changes in mean depression scores ($p = 0.924$, $d_s = 0.00$, 95 % CI = -0.26 , 0.27) or changes in global ED psychopathology ($p = 0.113$, $d_s = -0.21$, 95 % CI = -0.48 , 0.06). Regarding the EDE-Q subscales, there were similarly no significant between-group differences (dietary restraint: $p = 0.142$, $d_s = -0.17$, 95 % CI = -0.44 , 0.10 ; preoccupation and eating concern: $p = 0.217$, $d_s = -0.18$, 95 % CI = -0.44 , 0.09 ; shape/weight overvaluation: $p = 0.155$, $d_s = -0.18$, 95 % CI = -0.45 , 0.08).

At the within-group level, Project Body Neutrality participants reported significant medium to large reductions in depression symptoms ($d_{av} = -0.78$, 95 % CI = -1.00 , -0.56) and global ED psychopathology ($d_{av} = -0.65$, 95 % CI = -0.86 , -0.44) from baseline to 3-month follow-up. Participants randomized to the Sharing Feelings Project reported similar significant 3-month reductions in depression symptoms ($d_{av} = -0.81$, 95 % CI = -1.02 , -0.60) and global ED psychopathology ($d_{av} = -0.55$, 95 % CI = -0.75 , -0.35). In terms of EDE-Q subscales, Project Body Neutrality participants reported significant 3-month reductions

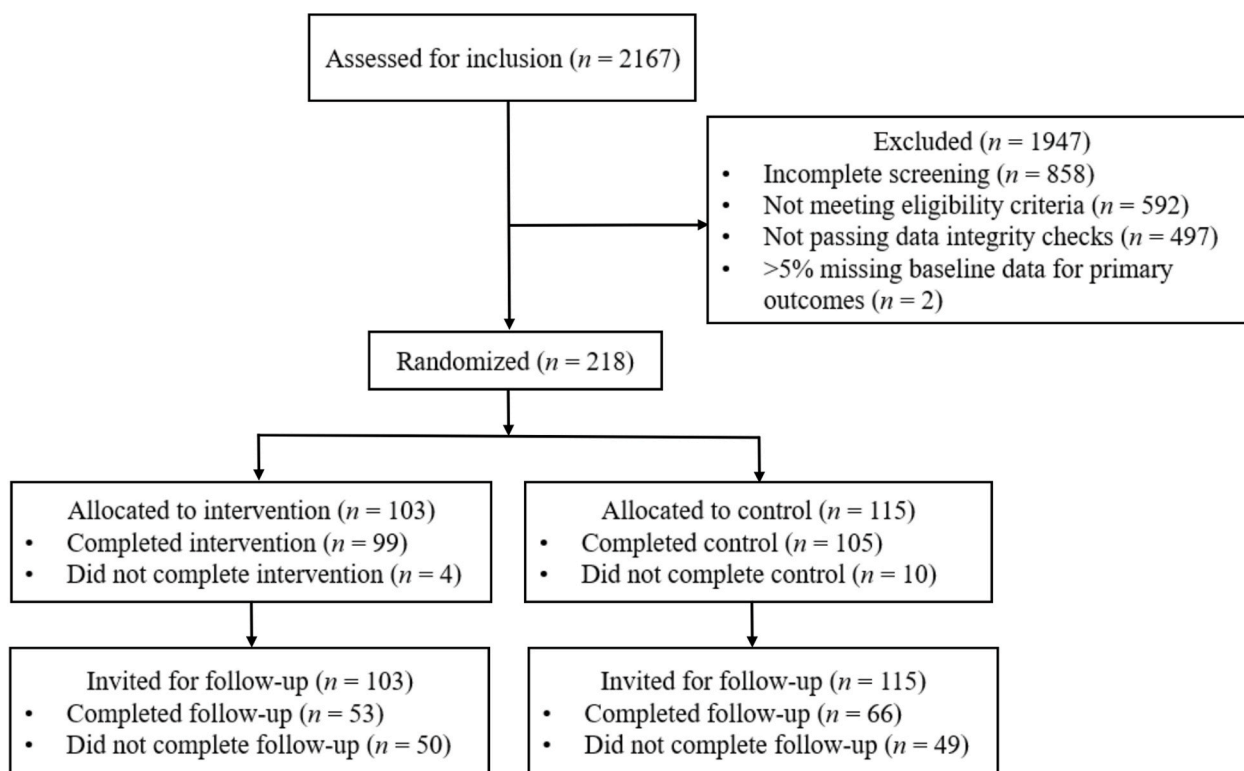


Fig. 1. Study flow.

Table 1
Sample characteristics for full randomized sample.

	Project Body Neutrality (N = 103)	Sharing Feelings Project (N = 115)
	n (%)	n (%)
Sex assigned at birth		
Male	10 (9.71)	15 (13.04)
Female	93 (90.29)	100 (86.96)
Gender identity		
Man/Boy	18 (17.48)	29 (25.22)
Woman/Girl	48 (46.60)	50 (43.48)
Transgender	18 (17.48)	22 (19.13)
Female to male transgender	18 (17.48)	19 (16.52)
Male to female transgender	2 (1.94)	1 (0.87)
Trans male/Trans masculine	17 (16.51)	20 (17.39)
Trans female/Trans feminine	2 (1.94)	0 (0)
Genderqueer	19 (18.45)	17 (14.78)
Gender expansive	4 (3.88)	6 (5.22)
Androgynous	8 (7.77)	13 (11.30)
Nonbinary	19 (18.45)	24 (20.87)
Two-spirited	0 (0)	1 (0.87)
Third gender	1 (0.97)	0 (0)
Agender	1 (0.97)	9 (7.83)
Not sure	6 (5.83)	10 (8.70)
Other		
Sexual orientation		
Straight/Heterosexual	3 (2.91)	0 (0)
Gay/Lesbian/Homosexual	2 (1.94)	43 (37.39)
Bisexual	5 (4.85)	36 (31.30)
Pansexual	6 (5.83)	11 (9.57)
Queer	0 (0)	5 (4.35)
Asexual	4 (3.48)	4 (3.48)
Other	5 (4.35)	5 (4.35)
Unsure/Questioning	3 (2.61)	3 (2.61)
I do not use a label	8 (6.96)	8 (6.96)
I do not want to respond	0 (0)	0 (0)
Race and ethnicity		
American Indian or Alaskan Native	7 (6.80)	1 (0.87)
Asian	11 (10.68)	6 (5.22)
Black/African American	14 (13.59)	23 (20.00)
Hispanic/Latinx/Latine	18 (17.48)	18 (15.65)
Native Hawaiian or other Pacific Islander	0 (0)	2 (1.74)
White/Caucasian	66 (64.08)	84 (73.04)
Other	1 (0.97)	1 (0.87)
Prefer not to answer	2 (1.94)	0 (0)
Food insecure		
Yes	30 (29.13)	41 (35.65)
No	73 (70.87)	73 (63.48)
Prefer not to answer	0 (0)	1 (0.87)
Depression treatment at baseline		
Currently receiving treatment	58 (56.31)	63 (54.78)
Currently in need of treatment	68 (66.02)	86 (74.78)
Eating disorder treatment at baseline		
Currently receiving treatment	20 (19.42)	19 (16.52)
Currently in need of treatment	69 (66.99)	83 (72.17)

Participants could select multiple responses for gender identity and race/ethnicity. No participants identified as intersex. Participants could endorse both currently receiving treatment and feeling in need of more treatment than they are receiving. Participants were on average 15.88 years old (*SD* = 1.19), and participant age did not differ by condition.

(dietary restraint: $d_{av} = -0.53$, 95 % CI = $-0.74, -0.32$; preoccupation and eating concern: $d_{av} = -0.54$, 95 % CI = $-0.75, -0.34$; shape/weight overvaluation: $d_{av} = -0.67$, 95 % CI = $-0.88, -0.45$), as did Sharing Feelings Project participants (dietary restraint: $d_{av} = -0.42$, 95 % CI = $-0.61, -0.22$; preoccupation and eating concern: $d_{av} = -0.44$, 95 % CI

Table 2
Item-level acceptability results for Program Feedback Scale completers.

	Project Body Neutrality (N = 97)		Sharing Feelings Project (N = 103)	
	M	SD	M	SD
Enjoyed	4.33	0.66	3.96	0.79
Understood	4.66	0.56	4.50	0.59
Easy to use	4.67	0.53	4.58	0.62
Tried my hardest	4.56	0.59	4.56	0.54
Helpful to other kids	4.48	0.74	4.13	0.84
Would recommend to a friend	4.20	0.87	3.82	0.99
Agree with message	4.64	0.54	4.48	0.57

Participants with incomplete Program Feedback Scale data were excluded from these descriptives.

= $-0.63, -0.25$; shape/weight overvaluation: $d_{av} = -0.48$, 95 % CI = $-0.67, -0.28$).

Means and standard deviations for the primary outcomes are available in Table 3 and regression results are available in Table 4. Fig. 2 graphically depicts these outcomes. Outcomes for treatment-on-the-treated analyses are available in Appendix A (no differences between the intent-to-treat and treatment-on-the-treated analyses emerged).

3.5. Intervention effects on proximal outcomes: hopelessness, perceived agency, state body satisfaction, and functionality appreciation

Participants randomized to Project Body Neutrality reported significantly greater changes in all proximal outcomes from pre- to post-intervention compared to the control. They reported greater decreases in hopelessness ($p_{adjusted} < 0.001$, $d_s = -0.49$, 95 % CI = $-0.76, -0.22$) and greater increases in perceived agency ($p_{adjusted} = 0.004$, $d_s = 0.41$, 95 % CI = $0.14, 0.68$), state body satisfaction ($p_{adjusted} < 0.001$, $d_s = 0.66$, 95 % CI = $0.38, 0.93$), and functionality appreciation ($p_{adjusted} < 0.001$, $d_s = 0.65$, 95 % CI = $0.38, 0.92$). None of these between-group differences in proximal outcomes retained significance at 3-month follow-up.

Both groups showed significant within-group changes in proximal outcomes from pre-intervention to post-intervention and pre-intervention to 3-month follow-up. Project Body Neutrality

Table 3
Means and standard deviations for full randomized sample.

	Project Body Neutrality (N = 103)		Sharing Feelings Project (N = 115)	
	M	SD	M	SD
Hopelessness				
Pre-intervention	6.73	2.88	6.64	2.76
Post-intervention	4.65	2.48	5.54	2.80
3-month follow-up	4.96	2.03	5.38	2.40
Perceived agency				
Pre-intervention	14.08	4.39	14.54	4.36
Post-intervention	16.53	4.59	15.49	4.29
3-month follow-up	15.78	3.21	15.34	3.04
State body satisfaction				
Pre-intervention	18.93	8.04	20.10	7.86
Post-intervention	26.86	7.89	23.67	7.85
3-month follow-up	26.53	7.29	26.39	6.75
Functionality appreciation				
Pre-intervention	22.63	6.08	23.19	5.21
Post-intervention	27.82	5.14	25.57	4.69
3-month follow-up	26.49	4.26	26.08	4.15
Depression symptoms				
Pre-intervention	17.40	5.18	17.55	4.89
3-month follow-up	13.37	5.10	13.50	5.11
Eating disorder symptoms				
Pre-intervention	3.45	1.54	3.36	1.45
3-month follow-up	2.52	1.32	2.66	1.12

Missing outcomes data was imputed per the data analysis plan.

Table 4
Results of multiple linear regressions for full randomized sample.

	Between-Group Effects			Within-Group Effects: Project Body Neutrality (N = 103)		Within-Group Effects: Sharing Feelings Project (N = 115)	
	t-value	p-value	Cohen's d_s [95 % CI]	Cohen's d_{av} [95 % CI]	Cohen's d_z [95 % CI]	Cohen's d_{av} [95 % CI]	Cohen's d_z [95 % CI]
Hopelessness							
Post-intervention	-3.92	<0.001 ^a	-0.49 [-0.76, -0.22]	-0.78 [-1.00, -0.55]	-1.00 [-1.24, -0.76]	-0.39 [-0.58, -0.20]	-0.56 [-0.75, -0.36]
3-month follow-up	-1.94	0.053	-0.22 [-0.49, 0.05]	-0.72 [-0.94, -0.50]	-0.73 [-0.94, -0.51]	-0.49 [-0.68, -0.29]	-0.57 [-0.77, -0.37]
Perceived agency							
Post-intervention	2.87	0.004^a	0.41 [0.14, 0.68]	0.55 [0.34, 0.75]	0.54 [0.33, 0.75]	0.22 [0.03, 0.40]	0.35 [0.17, 0.54]
3-month follow-up	1.53	0.128	0.22 [-0.05, 0.48]	0.45 [0.24, 0.65]	0.42 [0.22, 0.63]	0.22 [0.03, 0.40]	0.19 [0.01, 0.37]
State body satisfaction							
Post-intervention	4.89	<0.001 ^a	0.66 [0.38, 0.93]	0.99 [0.76, 1.23]	1.08 [0.83, 1.32]	0.45 [0.26, 0.65]	0.61 [0.41, 0.81]
3-month follow-up	0.88	0.380	0.18 [-0.08, 0.45]	0.99 [0.75, 1.23]	1.08 [0.84, 1.33]	0.86 [0.65, 1.07]	0.86 [0.65, 1.07]
Functionality appreciation							
Post-intervention	5.23	<0.001 ^a	0.65 [0.38, 0.92]	0.93 [0.69, 1.15]	1.02 [0.78, 1.26]	0.48 [0.29, 0.67]	0.67 [0.47, 0.87]
3-month follow-up	1.25	0.212	0.19 [-0.08, 0.46]	0.75 [0.53, 0.96]	0.69 [0.47, 0.90]	0.62 [0.42, 0.82]	0.64 [0.44, 0.84]
Depression symptoms							
3-month follow-up	-0.10	0.924	0.00 [-0.26, 0.27]	-0.78 [-1.00, -0.56]	-0.78 [-1.00, -0.56]	-0.81 [-1.02, -0.60]	-0.76 [-0.97, -0.55]
Eating disorder symptoms							
3-month follow-up	-1.59	0.113	-0.21 [-0.48, 0.06]	-0.65 [-0.86, -0.44]	-0.93 [-1.16, -0.70]	-0.55 [-0.75, -0.35]	-0.64 [-0.84, -0.44]

Missing outcomes data was imputed per the data analysis plan. Bolding indicates significance. Cohen's d_s reflects the magnitude of between-group differences and was standardized against the standard deviation of change scores (Lakens, 2013). Cohen's d_{av} and Cohen's d_z reflect the magnitude of within-group changes, with Cohen's d_{av} being standardized against the average standard deviation at both timepoints and d_z being standardized against the standard deviation of change scores (Lakens, 2013).

^a False discovery correction was applied.

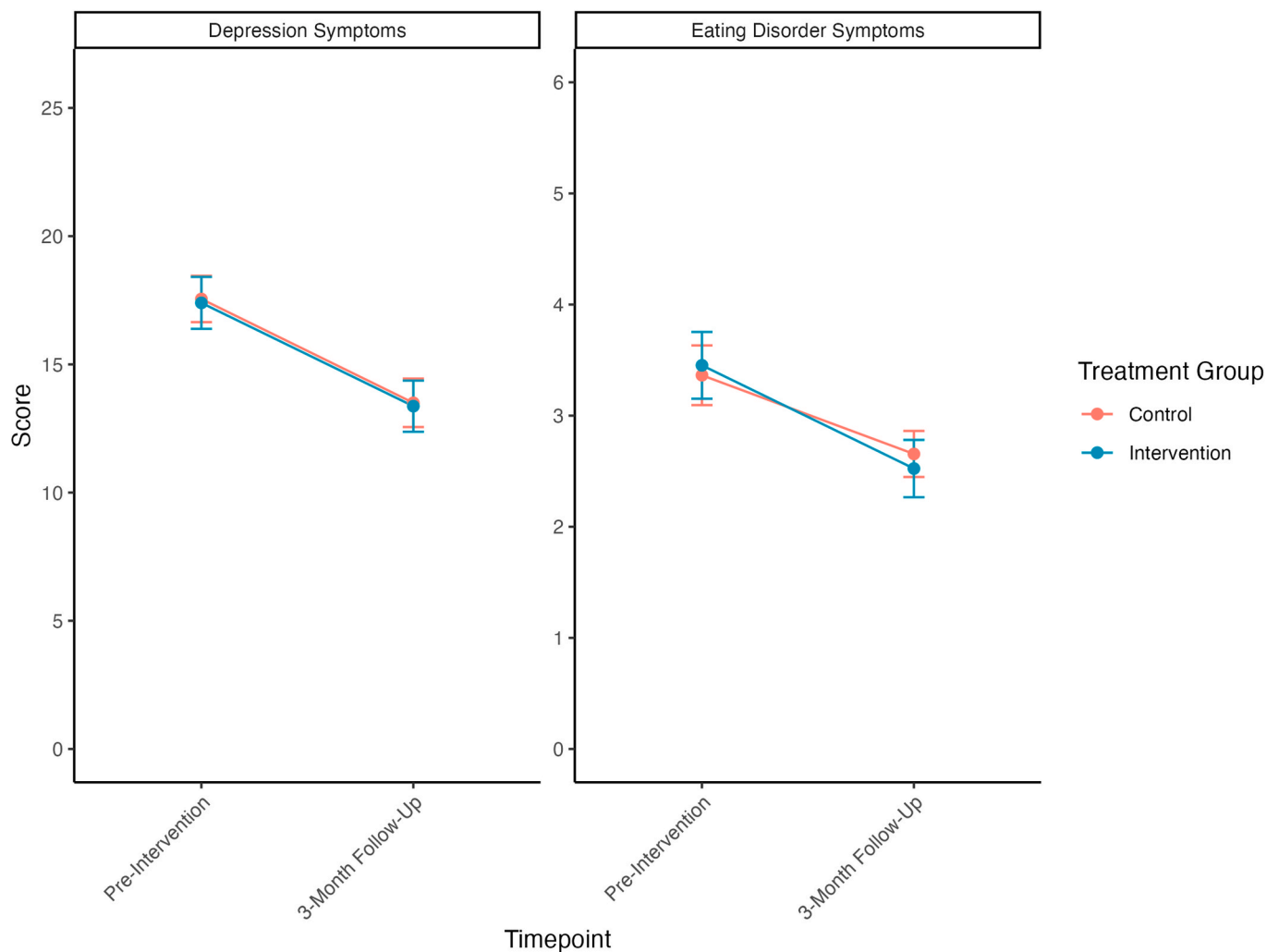


Fig. 2. Effect of Project Body Neutrality on primary outcomes for full randomized sample. The error bars are the 95 % CIs.

participants reported medium to large improvements in hopelessness (post-intervention: $d_{av} = -0.78$, 95 % CI = $-1.00, -0.55$; follow-up: $d_{av} = -0.72$, 95 % CI = $-0.94, -0.50$), perceived agency (post-intervention: $d_{av} = 0.55$, 95 % CI = $0.34, 0.75$; follow-up: $d_{av} = 0.45$, 95 % CI = $0.24, 0.65$), state body satisfaction (post-intervention: $d_{av} = 0.99$, 95 % CI = $0.76, 1.23$; follow-up: $d_{av} = 0.99$, 95 % CI = $0.75, 1.23$), and functionality appreciation (post-intervention: $d_{av} = 0.93$, 95 % CI = $0.69, 1.15$; follow-up: $d_{av} = 0.75$, 95 % CI = $0.53, 0.96$). Similarly, Sharing Feelings Project participants improved in hopelessness (post-intervention: $d_{av} = -0.39$, 95 % CI = $-0.58, -0.20$; follow-up: $d_{av} = -0.49$, 95 % CI = $-0.68, -0.29$), perceived agency (post-intervention: $d_{av} = 0.22$, 95 % CI = $0.03, 0.40$; follow-up: $d_{av} = 0.22$, 95 % CI = $0.03, 0.40$), state body satisfaction (post-intervention: $d_{av} = 0.45$, 95 % CI = $0.26, 0.65$; follow-up: $d_{av} = 0.86$, 95 % CI = $0.65, 1.07$), and functionality appreciation (post-intervention: $d_{av} = 0.48$, 95 % CI = $0.29, 0.67$; follow-up: $d_{av} = 0.62$, 95 % CI = $0.42, 0.82$).

Means and standard deviations for all proximal outcomes by condition, assessed at all timepoints, are available in Table 3. Table 4 provides regression results, between-group (Cohen's d_s) and within-group effect sizes (Cohen's d_{av} and Cohen's d_z), and 95 % CIs. Fig. 3 graphically depicts these outcomes. Appendix A includes these analyses replicated for the treatment-on-the-treated sample (no differences between the intent-to-treat and treatment-on-the-treated analyses emerged).

3.6. Intervention effects on treatment seeking

119 randomized participants completed the follow-up survey on treatment-seeking and were included in this analysis. At follow-up, 37.74 % of Project Body Neutrality participants reported new depression help-seeking and 28.30 % reported new ED help-seeking, compared to 54.55 % and 37.88 % of Sharing Feelings Project participants, respectively. There was no significant difference for depression treatment seeking ($p = 0.085$, OR = 0.52 , 95 % CI = $0.24, 1.09$) or ED treatment seeking ($p = 0.260$, OR = 0.64 , 95 % CI = $0.28, 1.39$). A treatment-on-the-treated analysis was also conducted with these data (see Appendix A).

Exploratory Analyses: Effects of Baseline Symptom Severity and Identification within the LGBTQ+ Community.

There was an interaction effect between condition assignment and baseline EDE-Q global severity on 3-month changes in ED psychopathology. The interaction effect was not significant in the intent-to-treat analysis ($p = 0.071$) but was significant in the treatment-on-the-treated analysis ($p = 0.048$). Among participants with lower baseline EDE-Q scores ($n = 81$), those randomized to Project Body Neutrality reported significantly greater reductions in ED psychopathology compared to those in the Sharing Feelings Project ($p = 0.007$, $d_s = -0.65$, 95 % CI = $-1.10, -0.20$). Project Body Neutrality participants with lower baseline symptoms reported significant medium decreases in symptoms ($d_{av} = -0.49$, 95 % CI = $-0.81, -0.16$) while the Sharing

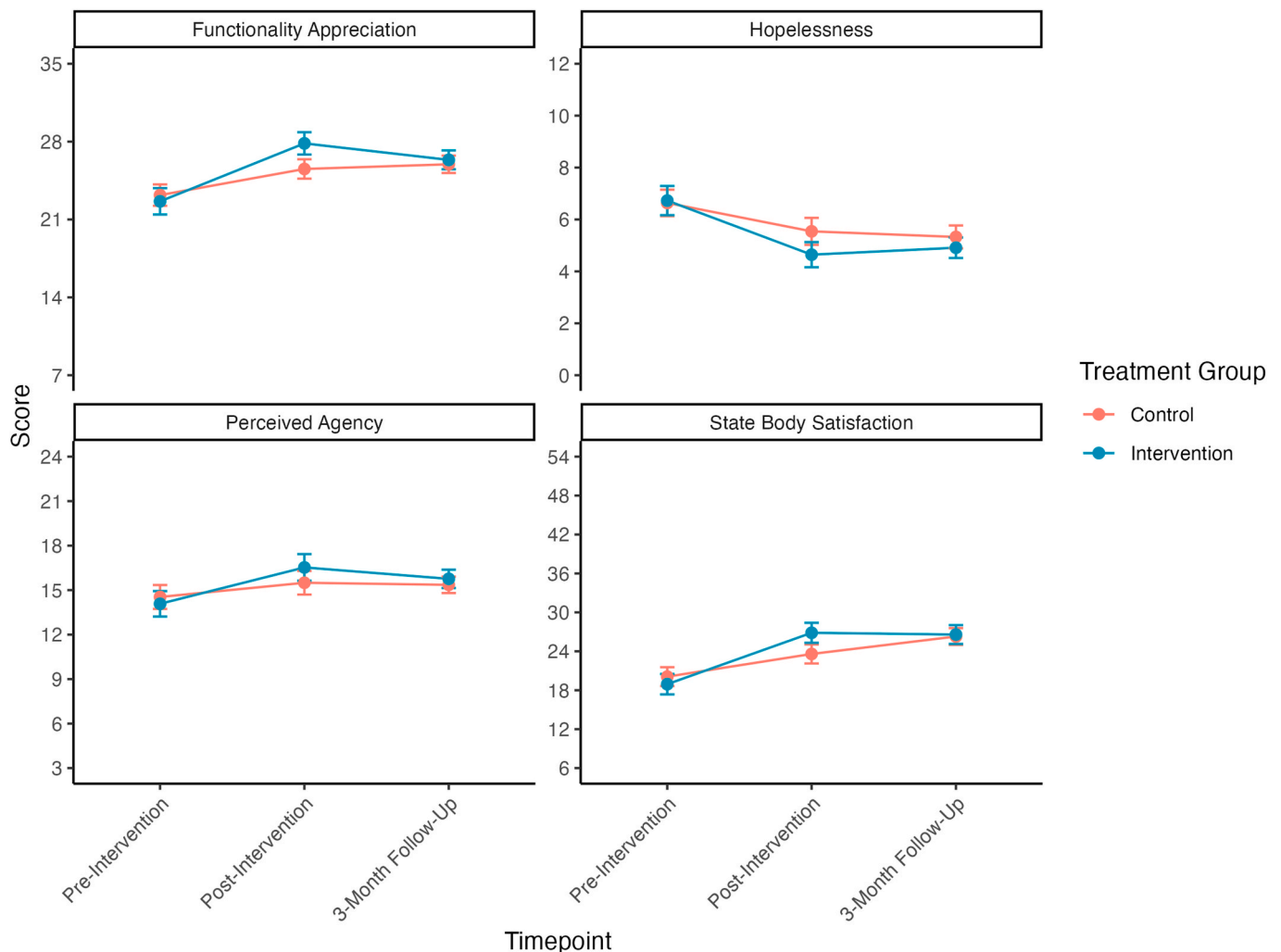


Fig. 3. Effect of Project Body Neutrality on proximal outcomes for full randomized sample. The error bars are the 95 % CIs.

Feelings Project participants reported no significant changes ($d_{av} = 0.17$, 95 % CI = $-0.15, 0.48$). For participants with higher baseline EDE-Q scores ($n = 137$), there was no significant difference between groups ($p = 0.633$, $d_s = -0.17$, 95 % CI = $-0.50, 0.17$). The Project Body Neutrality participants with higher baseline symptoms reported significant large decreases in symptoms ($d_{av} = -1.20$, 95 % CI = $-1.52, -0.87$), as did the Sharing Feelings Project participants ($d_{av} = -1.15$, 95 % CI = $-1.44, -0.85$). These results are visualized in Fig. 4. Similar findings were produced for the treatment-on-the-treated analyses (which are reproducible using the code and de-identified data at <https://osf.io/w82bf/>). The interaction effect for the depression model did not approach significance in the intent-to-treat ($p = 0.766$) or treatment-on-the-treated analyses ($p = 0.776$), so no follow-up analyses on subgroup effects were conducted.

Regarding potential differences between transgender/gender diverse and cisgender non-heterosexual participants, there was no significant difference between these groups in the acceptability of Project Body Neutrality ($t = -0.324$; $p = 0.747$). Furthermore, the interaction between condition assignment and gender identity on ED psychopathology was not significant in the intent-to-treat analysis ($p = 0.697$) or the treatment-on-the-treated analysis ($p = 0.547$). Likewise, the interaction effect on depression symptoms was not significant in the intent-to-treat analysis ($p = 0.699$) or the treatment-on-the-treated analysis ($p = 0.674$). In the treatment-on-the-treated analysis only, there was a significant difference between transgender/gender diverse and cisgender non-heterosexual youth in baseline depression symptoms ($t = -2.17$, $p = 0.031$). Specifically, using the full randomized sample for consistency, transgender/gender diverse participants reported higher depression scores than cisgender non-heterosexual participants at baseline ($M = 18.05$ vs $M = 16.78$). No other baseline differences in primary outcomes were detected and baseline scores were controlled for in the regressions.

3.7. Qualitative analysis of open-ended feedback from Project Body Neutrality completers

Of the 158 responses from Project Body Neutrality participants included in the qualitative analysis, 93 responses highlighted components of the intervention that participants appreciated. Among these, 27 responses focused on the general appeal of the intervention. Specifically, participants noted their appreciation for the diverse types of images used throughout the intervention ($n = 16$) and the inclusivity of the intervention ($n = 11$). For example, one participant shared “i liked how diverse everyone looked and how they had pronouns next to their names”. Participants also emphasized that the intervention addressed various experiences of body image dissatisfaction and reflected diverse gender identities, ability statuses, and racial/ethnic backgrounds. In particular, participants shared “My favorite part was you took into account different types of body issues, like feeling too skinny” and “I really liked the representation of trans and disabled folks”. Conversely, of the 65 responses to the question about what participants would change, several general recommendations were observed. These included the suggestion to “Make it shorter” along with comments on platform limitations that affected some adolescents’ ability to engage with program features ($n = 20$). Participants noted that “The format was hard to type on phone” and that “the multiple choice page with a lot of choices was kinda hard to navigate”. The following theme-building section provides a detailed analysis of participants’ feedback regarding the aspects of the intervention they liked and the areas they would change.

Among the components participants found most valuable, the theme *Interactive Agency Building* emerged prominently. This theme, reflected in approximately 46 % of responses, highlights how the intervention’s interactive activities engaged participants with the concept of body neutrality and encouraged them to apply what they learned in meaningful ways. For example, one participant shared that they “enjoyed the little interactive stories about different people! They really showed how body neutrality works in real life situations, and it helped me understand

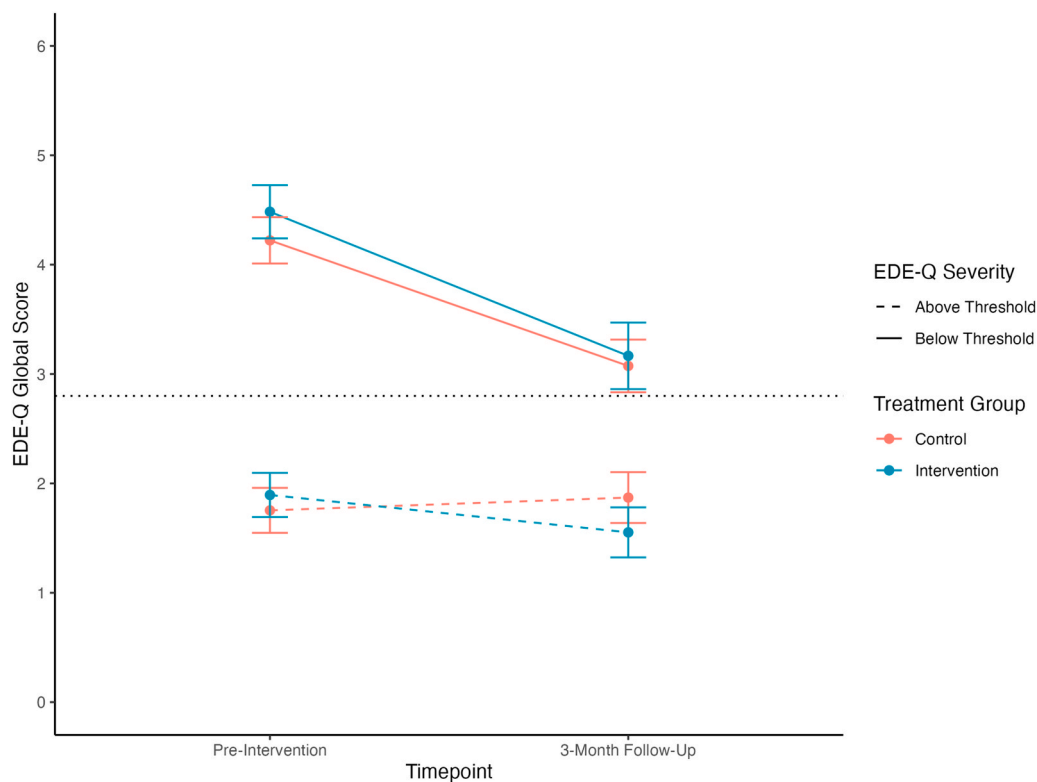


Fig. 4. Interaction between pre-intervention EDE-Q scores and treatment group for full randomized sample. The error bars are the 95 % CIs. The black dotted line at $y = 2.8$ represents the suggested clinical threshold for the EDE-Q (Mond et al., 2008).

the topic more!" and another participant stated that "It was very interactive and taught me body neutrality in a really simple way. It gave me personal steps to follow afterwards and I really like that". Participants specifically noted that opportunities to provide "feedback" or "advice" to others not only helped them feel more in control of their own concerns but also gave them a sense of agency in improving their well-being. One participant stated, "I liked when I got to give the advice to someone else, it made me feel like I had some power over my thoughts and can think of solutions." Another participant shared, "I enjoyed being able to comfort Liz, by doing so I was able to comfort myself." The second main theme identified was *User-Friendly Design*, which was reflected in 38 % of responses. While some participants reiterated their appreciation for the diversity of images, many responses focused on how "simple" and "easy" the intervention was to navigate, with one participant stating that "The formatting combined with the clear and concise text made for an understandable and streamlined experience." Participants also noted the clarity of the language and how body neutrality was explained. One participant remarked, "Personally, I really liked learning about Body Neutrality because Body Positivity doesn't work for me. I've heard of Body Neutrality before, but the explanation for it was really clear!"

Regarding changes to the intervention, the theme *Tailoring the Content to Specific Populations* was reflected in 40 % of the 65 responses. Participants offered a range of individual recommendations for tailoring the intervention to better reflect diverse identities and needs. Suggestions included addressing how "height related image issues" and other non-weight-related body image concerns contribute to body image dissatisfaction, with one participant noting that the SSI "really focused on weight when there are many other factors that lead to body negativity". Furthermore, participants requested tailoring content for specific groups, such as dancers ("I felt like I didn't see a lot of representation of dancers. And that's one of the sports that causes the most eating disorders"), adolescents from religious backgrounds ("I would like to see more emphasis on religion topics on here, that's what I relate to"), and adolescents with autism ("I was wondering if you guys could provide something autism related?"). The most common feedback within this theme was that the intervention appeared to be more suited to younger adolescents. Many participants felt the stories and activities were too "childish" for older teens to relate to. For example, one participant noted, "I felt too old for the activity. I think it would be useful for people in middle school, around 12 years old, but as a junior in high school, it didn't really change how I see myself. The message behind it is great, it just isn't that easy to change a mindset I've had years to develop about my body."

4. Discussion

This study demonstrates the acceptability of the Project Body Neutrality SSI, gives strong evidence for its effectiveness on short-term cognitive outcomes, and suggests that it may have long-term benefits for ED psychopathology in at-risk LGBTQ+ adolescents. Immediately after completing their assigned condition, LGBTQ+ youth who were randomized to Project Body Neutrality experienced significantly greater improvements in hopelessness, perceived agency, functionality appreciation, and body satisfaction. At 3-month follow-up, however, the between-group differences in these proximal outcomes were not retained. Participants in the control condition reported delayed improvement and intervention participants retained most of their immediate gains. Both groups reported significant reductions in depression and ED symptoms. Exploratory analyses suggested that reductions in ED symptoms may be moderated by baseline symptom severity. Among participants with body dissatisfaction who did not meet the clinical threshold for an ED, Project Body Neutrality was significantly more effective than the Sharing Feelings Project. These at-risk/subclinical participants experienced significant reductions in ED symptoms when randomized to Project Body Neutrality, but no significant changes in ED symptoms when randomized to the Sharing Feelings Project control.

Our results are the first to document the benefits of SSIs for LGBTQ+ adolescents who are seeking support online for body image and mood concerns. LGBTQ+ adolescents report high and unmet need for mental health services (Lund & Burgess, 2021; Nath et al., 2024; Parmar et al., 2021). In our sample, despite reporting elevated depression and ED symptoms, approximately two-thirds of participants reported needing more mental health support than they were getting at baseline. Although a portion of participants in both conditions reported seeking additional help within the 3 months following the baseline survey, it is unlikely that all adolescents who wanted more support were able to get it given the systemic barriers that limit youth treatment access (Mora Ringle et al., 2024). Self-guided, digital interventions therefore fill a major service gap when they are disseminated to social media users whose risky activity suggests they need support (K. Cohen et al., 2023; Dobias et al., 2022; Nemesure et al., 2022), or as in this trial, to those actively seeking help via a self-screening tool (Fitzsimmons-Craft et al., 2022, 2024). When deployed via online platforms with broad reach, highly scalable interventions like Project Body Neutrality are uniquely capable of reaching youth in moments of need, where they are.

The qualitative feedback from youth who completed Project Body Neutrality contextualizes the benefits participants derived from the SSI and reveals areas for improvement. Specifically, qualitative results indicate that the intervention's interactive activities promoted engagement with the concept of body neutrality and encouraged participants to apply their learning in meaningful, personal ways. These findings align with the quantitative data showing that participants who completed Project Body Neutrality experienced significant reductions in hopelessness, along with increased perceived agency, functionality appreciation, and body satisfaction. The experience of advising others may have played a role in these outcomes: some participants reported that this activity reinforced their confidence in their ability to address challenges and support others. By engaging in problem-solving and empathetic interactions, participants may have internalized the body neutrality mindset that the SSI is designed to help them adopt, aligning with our team's theories about how SSIs work (Schleider et al., 2020). Regarding constructive feedback on the SSI, some participants noted that Project Body Neutrality seemed more tailored to younger adolescents. However, acceptability ratings broken down by age were all above the pre-registered benchmark, and age was not a statistically significant predictor of the SSI's acceptability. Additionally, some felt that their experiences were not fully represented in the stories included in the intervention (e.g., non-weight-related body image concerns, considerations for specific identities such as dancers, religious youth, youth with autism). Future iterations could address these concerns by tailoring the intervention for specific groups and incorporating more personalized content. Although exciting efforts to develop and evaluate personalized treatments for EDs are underway (Levinson et al., 2023), personalization is a common challenge in digital mental health interventions that are designed to be *scalably delivered* at the population level (Hornstein et al., 2023).

A noteworthy finding is that *both* Project Body Neutrality and the Sharing Feelings Project were associated with significant 3-month reductions in ED and depression symptoms. One possible explanation, supported by emerging data from other SSI trials, is that the Sharing Feelings Project, might be unexpectedly effective among certain populations. In large studies *not* focused on LGBTQ+ youth, the Sharing Feelings project has *not* led to depression symptom reductions relative to active SSIs teaching cognitive-behavioral skills (Schleider et al., 2022; Schleider & Weisz, 2018). For example, in a large nationwide RCT, the active SSIs outperformed the Sharing Feelings Project (Schleider et al., 2022). However, for a subsample of LGBTQ+ youth in this large nationwide RCT who reported living in areas with high structural stigma, the Sharing Feelings Project performed equally well compared to the active SSIs (Hollinsaid et al in preparation). Similarly, in the current study, the subsample of LGBTQ+ youth with higher ED psychopathology reported benefits after completing either Project Body Neutrality or

the Sharing Feelings Project, whereas the Sharing Feelings Project was not effective for at-risk/subclinical participants. Perhaps youth with higher need (e.g., those experiencing more severe ED symptoms; LGBTQ+ youth in high-stigma environments) may benefit from receiving a wide variety of face-valid interventions. Another explanation for the results of the current trial is that, rather than Project Body Neutrality and the Sharing Feelings Project both producing effects, participants randomized to either condition regressed to the mean. Even without being randomized to active interventions, participants in digital intervention trials for depression experience symptom remission (Tong et al., 2023). More research is needed to systematically assess for whom and in what contexts the Sharing Feelings Project may benefit youth mental health.

Project Body Neutrality may have performed better for participants with at-risk/subclinical levels of ED psychopathology than for those with clinically elevated symptoms. The significant between-group effect on ED psychopathology found for the at-risk/subclinical participants ($d_s = -0.65$) is larger than the effects shown in a review of Internet-based ED prevention programs (Wade & Wilksch, 2018). Findings from our exploratory analysis suggest that Project Body Neutrality may be best suited to reduce ED risk as an indicated prevention program. However, this finding should be interpreted with caution given that the analysis was exploratory and that the intent-to-treat interaction effect was not significant, whereas the treatment-on-the-treated interaction effect was significant. Furthermore, our trial was not designed to test true prevention in terms of ED onset, and research on symptom severity as a moderator in ED prevention trials is mixed (Melioli et al., 2016; Müller & Stice, 2013; Völker et al., 2014), requiring a need for further research. The literature has clearer signals regarding the features of successful prevention programs. Like Project Body Neutrality, evidence-based prevention programs target one or more ED risk factors and include interactive content (Ciao et al., 2014). Literature to date also indicate that most successful ED prevention programs include multiple sessions and there is some evidence that more sessions is related to effect sizes (Ciao et al., 2014; Stice et al., 2019). However, SSIs for ED prevention are understudied (Schleider et al., 2023), and a meta-analysis of youth psychotherapy indicates that there is no significant relationship between the number of sessions and treatment effects (Weisz et al., 2017). Furthermore, a reliance on multiple sessions to achieve strong effects may be problematic given the high attrition rates observed in digital ED prevention programs (Ali et al., 2022), indicating the need for effective, single-session options.

Unlike with ED psychopathology, baseline depression severity did not moderate outcomes. The absence of a unique benefit for depression reduction among participants randomized to Project Body Neutrality contrasts with robust research supporting the effectiveness of active SSIs for adolescent depression (Schleider et al., 2025). In our study, it is possible that no differential reductions in depression emerged because depression symptoms may not have been as salient as ED symptoms while participants completed their assigned SSI. Although the inclusion criteria required participants to report poor body image and mood, a large proportion of our sample was recruited from ED-focused nonprofits. That is, many participants were specifically seeking online information and support for ED-focused concerns at the time of study participation. In doing so, participants may have focused on applying the skills taught within the SSI to their ED concerns rather than depression. Furthermore, compared to other SSIs focused on adolescent depression (Schleider et al., 2022), Project Body Neutrality may not have included as many activities that directly target mediators of depression. Lastly, it is possible that short-term improvements in body satisfaction did lead to some improvement in depression symptoms, but that these improvements were not sustained at 3-month follow-up. This pattern would be consistent with previous research showing that interventions targeting body dissatisfaction tend to have short-term effects on depression-related outcomes that wane over time (Ahuvia et al., 2022). Future research should investigate the impact of recruitment

source on SSI outcomes as well as improvements that may drive transdiagnostic utility. There is a great clinical demand for transdiagnostic interventions that address both ED and depression symptoms (Becker, 2016). Furthermore, perceived need and treatment preferences are important factors to consider for young people who experience EDs as well as co-occurring mental health conditions (D'Adamo et al., 2023).

Our final exploratory moderation analysis considered differential intervention effects between transgender/gender diverse and cisgender non-heterosexual participants. It is important to recognize that LGBTQ+ youth with different identities often have different needs. For example, elevations in ED psychopathology are particularly high for transgender/gender diverse youth (Diemer et al., 2015; Heiden-Rootes et al., 2023; The Trevor Project, 2022). Furthermore, transgender/gender diverse youth may benefit from intervention adaptations such as addressing gender dysphoria in tandem with ED symptoms (Nagata et al., 2024), but this was not a focus of Project Body Neutrality. Nevertheless, we did not find an interaction effect between condition assignment and gender identity, suggesting that gender identity did not moderate intervention effects. Additionally, we found that Project Body Neutrality was equally, highly acceptable for transgender/gender diverse and cisgender non-heterosexual adolescents. However, these findings should be interpreted with caution given their exploratory nature and the small sample size.

This RCT includes limitations. To ensure data integrity, we retroactively excluded 30 participants due to suspected fraud, reducing our sample size. Although our study was still adequately powered to detect small to medium effects, a larger sample size may yield more precise estimates and improve the accuracy of our findings. For example, a larger sample size would have resulted in better power for the exploratory moderation analyses and allowed for investigating if there was an indirect effect of condition assignment on the primary outcomes as mediated by the proximal outcomes. Relatedly, the limited nature of our sample impacts the generalizability of our findings. The majority of the sample was White and assigned female at birth. Given cross-cultural and gender differences in body image constructs (Abdoli et al., 2024; Choukas-Bradley et al., 2023), future research is needed to examine how body neutrality is conceptualized and how the Project Body Neutrality SSI is received with larger and more diverse samples. Importantly, this research should include measures of body size and experiences of weight stigma since weight stigma is associated with disordered eating in LGBTQ+ youth and can influence intervention outcomes (Himmelstein et al., 2019; Mensinger et al., 2016). Additionally, while this study focused on functionality appreciation since it is a central component of body neutrality, future research could examine the SSI's impact on other aspects of positive body image—such as body appreciation—which has been more extensively studied in LGBTQ+ populations (Paquette et al., 2022; Soulliard et al., 2025; Soulliard & Vander Wal, 2019). Other study limitations concern the control condition. Despite the structural similarities of Project Body Neutrality and the Sharing Feelings Project, the Sharing Feelings Project took, on average, less time to complete and contained less interactive components, which may limit the comparability of the interventions. Moreover, since participants experienced relatively strong improvements after completing the Sharing Feelings Project and found it helpful, it may be worthwhile to compare Project Body Neutrality to a more ecologically valid “treatment-as-usual” condition (which is often, at best, a referral to resources). Furthermore, although a strength of this study includes the collection of quantitative and qualitative data, the brevity of the qualitative responses limited possibilities for interpretive depth and thorough triangulation of the data sources. In order to more fully understand adolescents' perceptions of Project Body Neutrality and SSIs for EDs in general, it would be worthwhile to conduct semi-structured interviews and engage in richer qualitative analyses.

Future research is needed to address these limitations and to expand understandings of how SSIs may best support youth with body image and mood concerns. Concerning LGBTQ+ youth in particular, a future

study could evaluate the potential benefits of integrating content from Project Body Neutrality and Project RISE—an effective SSI specifically designed for LGBTQ+ youth facing minority stress. Notably, prior research found that internalized stigma moderated the effectiveness of an LGBTQ-affirmative digital intervention, such that it was only effective for youth with high levels of internalized stigma (Pachankis et al., 2023). Thus, an SSI that integrates content from Project Body Neutrality and Project RISE may be especially beneficial for LGBTQ+ youth facing high rates of minority stress (Shen et al., 2023). In parallel, it is worthwhile to explore the ways SSIs can best serve youth at various stages of their treatment journey. For example, specific interventions may be most relevant and effective across different “pivotal moments” including support at the stage of initial help-seeking, in tandem with available care, and in assistance with maintenance post-discharge (Schleider et al., 2024). The exploratory results of the current study, with its broad inclusion criteria, suggest that when made available online to people at any moment in their treatment journey, Project Body Neutrality may be most effective for individuals at-risk for EDs. Importantly, a pre-registered replication of the baseline symptom severity moderation analysis and/or a study testing Project Body Neutrality specifically with an at-risk sample would be appropriate. Additionally, this prevention-focused work may benefit from investigating if Project Body Neutrality reduces clinical ED onset via categorical diagnostic assessment (Becker, 2016). Expanding to other pivotal moments, it is also worth exploring how Project Body Neutrality may support individuals as an adjunct to treatment and employing user-centered design methods to develop an SSI that may be most potent for those experiencing more acute ED presentations. Furthermore, since research on the implementation and maintenance of digital interventions for EDs is limited (Nacke et al., 2021), future work should consider barriers and facilitators to implementing Project Body Neutrality outside of the research context. One consideration for broader implementation is if Project Body Neutrality should be targeted to LGBTQ+ youth (as in the current trial) or made available to all youth given the comparable outcomes between LGBTQ+ and non-LGBTQ+ youth (Roberts et al., in preparation). Expanding research on SSIs for EDs will help ensure that interventions are accessible in the real world and effective across the full spectrum of need.

In conclusion, our study demonstrates that Project Body Neutrality is a highly acceptable intervention that differentially improves short-term hopelessness, perceived agency, functionality appreciation, and body satisfaction among LGBTQ+ adolescents. Further research is needed to determine for whom Project Body Neutrality reduces ED symptoms over the longer-term. SSIs are a highly scalable method for connecting youth with support, highlighting their potential as an innovative, efficient, and accessible approach to ED intervention (Schleider et al., 2023). Continuing to push the boundaries of traditional treatment modalities and incorporating concepts that resonate with end users—such as body neutrality—offers a promising path forward in enhancing engagement and outcomes in ED care.

CRediT authorship contribution statement

Arielle C. Smith: Writing – review & editing, Writing – original draft, Visualization, Project administration, Investigation, Formal analysis, Data curation, Conceptualization. **Isaac L. Ahuvia:** Writing – review & editing, Methodology, Investigation, Formal analysis, Conceptualization. **Juan Pablo Zapata:** Writing – review & editing, Writing – original draft, Methodology, Investigation, Formal analysis. **Katherine A. Cohen:** Writing – review & editing, Project administration. **Andrea K. Graham:** Writing – review & editing, Supervision. **Jessica L. Schleider:** Writing – review & editing, Supervision, Methodology, Funding acquisition, Conceptualization.

Data statement

All the de-identified data and analytic code used for the quantitative analysis, as well as the open-ended responses included in the qualitative analysis, are available on Open Science Framework (<https://osf.io/w82bf/>).

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Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests:

Arielle C. Smith reports financial support was provided by National Science Foundation. Katherine A. Cohen reports financial support was provided by National Institutes of Health. Jessica L. Schleider reports financial support was provided by National Institutes of Health. Jessica L. Schleider reports financial support was provided by Upswing Fund for Adolescent Mental Health. Jessica L. Schleider reports financial support was provided by National Science Foundation. Jessica L. Schleider reports financial support was provided by Health Research and Services Administration. Jessica L. Schleider reports financial support was provided by Society of Clinical Child and Adolescent Psychology. Jessica L. Schleider reports financial support was provided by Hopelab. Jessica L. Schleider reports financial support was provided by Child Mind Institute. Jessica L. Schleider reports financial support was provided by Alongside. Jessica L. Schleider reports financial support was provided by Kooth. Jessica L. Schleider reports financial support was provided by Klingenstein Third Generation Foundation. Katherine A. Cohen reports a relationship with Lyra Health that includes: employment. Jessica L. Schleider reports a relationship with Walden Wise that includes: board membership. Jessica L. Schleider reports a relationship with Koko that includes: board membership. Jessica L. Schleider reports a relationship with United Health that includes: consulting or advisory. Jessica L. Schleider reports a relationship with Woebot that includes: consulting or advisory. Jessica L. Schleider reports a relationship with New Harbinger that includes: employment. Jessica L. Schleider reports a relationship with Little, Brown Book Group that includes: employment. Jessica L. Schleider reports a relationship with Oxford University Press that includes: employment. Jessica L. Schleider reports a relationship with Navi that includes: board membership and equity or stocks. If there are other authors, they declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.brat.2025.104809>.

Data availability

De-identified data and code used for the quantitative analysis, and the open-ended responses included in the qualitative analysis, are available on Open Science Framework (<https://osf.io/w82bf/>).

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