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A randomized control trial of *Expand Your Horizon*: An intervention for women with weight bias internalization

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Abstract

Weight bias internalization (WBI) is associated with a myriad of negative health outcomes, but there are few effective treatments that address this concern. This randomized controlled trial examined the preliminary effectiveness of a previously developed body gratitude journaling intervention (i.e., *Expand Your Horizon*) compared with an active control writing condition (i.e., expressive writing) in emerging adult women with WBI. Participants ($N = 135$) completed baseline measures and were then randomized to either *Expand Your Horizon* ($n = 72$) or the active control condition ($n = 63$). Participants in both conditions completed three writing tasks over one week. Assessments occurred at baseline, post-test, and follow-up (one-week). Participants in both conditions experienced improvements in WBI, functionality appreciation, and self-compassion at follow-up, though improvements were greater in the *Expand Your Horizon* condition. Further, participants in the *Expand Your Horizon* had greater improvement in healthcare stress at follow-up. In sum, *Expand Your Horizon* appeared accessible and demonstrated preliminary effectiveness in a sample of emerging adult women with WBI. Avenues for future research include evaluating this intervention in more diverse populations with a longer follow-up.

Keywords

Body image; Weight stigma; Body functionality; Self-compassion; Emerging adults; Intervention

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CRedit authorship contribution statement

Alexandria E. Davies: Conceptualization, Methodology, Writing – original draft preparation. **Scott G. Ravyts:** Data analysis. **C. Blair Burnette:** Data analysis, Writing – review & editing. **Suzanne E. Mazzeo:** Methodology, Supervision, Writing – review & editing.

Conflict of interest statement

The authors 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 C.: Supporting information

Supplementary data associated with this article can be found in the online version at doi:10.1016/j.bodyim.2021.12.006.

1. Introduction

Surveys indicate weight bias is increasingly common, rising 40% as measured by implicit bias tests from 2007 to 2016 (Charlesworth & Banaji, 2019); this rate outpaces, and cannot be fully explained by, increases in average body weight (Andreyeva, Puhl, & Brownell, 2008). Many individuals internalize this bias, accepting and applying negative weight-related stereotypes to themselves (i.e., weight-bias internalization; WBI; Durso & Latner, 2008). WBI is associated with higher rates of disordered eating, sedentary behaviors, and healthcare avoidance (Mensingher & Meadows, 2017; Mensinger, Tylka, & Calamari, 2018; Schvey & White, 2015).

One factor that might help explain healthcare avoidance in people with WBI is healthcare stress (i.e., anxiety around healthcare encounters). Individuals who internalize weight-related shame and anticipate weight-related comments from their providers may be ambivalent about seeking services (Brown, Thompson, Tod & Jones, 2006; Mensinger et al., 2018). This is a serious public health concern, as avoidance of preventive medical services can affect longevity and quality-of-life (Byrne, 2008). Moreover, evidence shows WBI is a chronic stressor that directly affects health through increased allostatic load, emotional eating, and exercise avoidance (Tomiyama, 2014; Vadiveloo & Mattei, 2017).

WBI also is related to poorer mental health. For instance, WBI is associated with lower self-compassion (Hilbert et al., 2015; Huellemann & Calogero, 2020). Self-compassion, defined as a mindful awareness of one's own pain and the ability to treat oneself with kindness during moments of suffering (Neff, 2003), is an important aspect of psychological well-being (Zessin, Dickhäuser, & Garbade, 2015). Therefore, WBI is harmful, and related to poorer mental and physical health and health behaviors.

Despite these consequences, few studies have specifically targeted WBI (Dunaev, Markey, & Brochu, 2018; Pearl, Hopkins, Berkowitz & Wadden, 2018). One of the few existing WBI interventions used cognitive behavioral strategies to challenge internalized stigma (e.g., using thought records to identify and challenge cognitive distortions related to weight), build self-efficacy, and cope with stigmatizing situations (Pearl et al., 2018). Although results were promising, its format (i.e., groups led by a trained professional) limits its accessibility, affordability, and ultimately its dissemination potential. A journaling-based intervention, however, might be a viable alternative that is more flexible, accessible, affordable, and ultimately more able to be widely disseminated.

Expressive writing interventions (i.e., writing about events and their associated emotions) help people adopt new, more nuanced perspectives (Pennebaker, 1997; Pennebaker & Beall, 1986). Gratitude journaling, a form of expressive writing that involves writing about topics for which one is grateful (Emmons & McCullough, 2003), might build upon these effects by not only changing attitudes but also fostering appreciation. Indeed, several recent body gratitude journaling interventions have yielded improvements in different facets of body image (Alleva et al., 2018b; Alleva, Martijn, Van Breukelen, Jansen & Karos, 2015; Weaver & Mulgrew, 2021).

One such intervention, *Expand Your Horizon*, is a body-focused gratitude journaling intervention that helps individuals change how they see their body and develop appreciation for their body's functions (i.e., functionality appreciation; Alleva et al., 2018b; Alleva, Martijn, Jansen & Nederkoorn, 2014; Alleva et al., 2015; Alleva, Veldhuis, & Martijn, 2016). This intervention is grounded in objectification theory, which posits women learn to fixate on their body's appearance and view their body as a passive object from an outsider's perspective (i.e., self-objectification; Fredrickson & Roberts, 1997). Given the ubiquitous and unrealistic portrayals of women's bodies in the media, this self-objectification often results in body dissatisfaction and body shame (Fredrickson & Roberts, 1997). In contrast, functionality appreciation involves appreciating the body for its physical capacities (e.g., stamina), internal processes (e.g., digesting), bodily senses (e.g., sight), and ability to communicate with others (e.g., talking), and engage in pleasurable activities and creative endeavors (e.g., self-care; Alleva, Tylka, & Kroon Van Diest, 2017). Thus, functionality appreciation may shift one's focus from appearance to a more holistic view of the body, which, in line with objectification theory, is theorized to combat self-objectification. Indeed, research supports this notion, with evidence that emphasizing appreciation for one's body functionality leads to improvements in body satisfaction and may buffer against the negative effects of viewing idealized media images (Alleva et al., 2016; Mulgrew, Prichard, Stalley & Lim, 2019; Weaver & Mulgrew, 2021).

Considerable evidence suggests *Expand Your Horizon* is effective in improving various facets of body image (e.g., body dissatisfaction), but no known trials have tested whether *Expand Your Horizon* can also reduce WBI (Alleva et al., 2018a, 2018b, 2015). Although WBI is consistently associated with body dissatisfaction (see Pearl & Puhl, 2018 for a review), it is nonetheless a distinct construct. Specifically, body dissatisfaction involves a generalized negative attitude towards (parts of) one's body, whereas WBI refers to self-directed negative weight-related stereotypes (Durso & Latner, 2008). Despite the demonstrated effectiveness of body gratitude journaling interventions in reducing body dissatisfaction, there is only one known trial examining whether body gratitude journaling can also reduce WBI (Dunaev et al., 2018). Dunaev et al. (2018) study used a different prompt than *Expand Your Horizon*. Specifically, these authors asked participants in the body gratitude group to write about physical appearance *or* health *or* body functionality, and to elaborate on three aspects they were grateful for (Dunaev et al., 2018). At post-test, participants in the body-focused gratitude journaling condition reported lower WBI and body dissatisfaction compared with control participants (Dunaev et al., 2018). However, because this intervention utilized a post-test only design, its short and long-term impact on WBI reduction is unknown (Dunaev et al., 2018). Additionally, many participants in the body gratitude group wrote about appearance-related gratitude, which might have resulted in self-objectification, a well-known risk factor for disordered eating (Cash, Melnyk, & Hrabosky, 2004; Schaefer et al., 2018; Tiggemann & Williams, 2012). In contrast, as described above, *Expand Your Horizon's* emphasis on body functionality may reduce self-objectification, which could in turn deemphasize the overall importance of body weight thereby reducing WBI (Alleva et al., 2021, 2015; Mensinger et al., 2018).

Further, fostering self-compassion could be an important element of body image interventions because self-compassion reduces striving for unrealistic body ideals that

do not necessarily serve one's long-term values (Braun, Park, & Gorin, 2016; Rahimi-Ardabili, Reynolds, Vartanian, McLeod & Zwar, 2018; Seekis, Bradley, & Duffy, 2020). Self-compassion is associated with functionality appreciation (e.g., Alleva et al., 2017), which is a key component of the *Expand Your Horizon* intervention (Alleva et al., 2015; Rosenbaum, Gillen, & Markey, 2020; Swami et al., 2019). Appreciating one's body functions may also allow more space for one to treat their body with respect and create a more compassionate outlook of oneself as a whole. Therefore, the current study examined whether self-compassion could also be improved through participation in *Expand Your Horizon*.

Moreover, we anticipated *Expand Your Horizon* might improve healthcare stress. Individuals in larger bodies may be ambivalent about seeking preventative health services due to internalized body shame (Brown et al., 2006). Although healthcare avoidance is more prevalent among individuals in larger bodies, the association between higher BMI and healthcare avoidance can partially be explained by internalized body shame (Mensingher et al., 2018). *Expand Your Horizon's* emphasis on functionality appreciation may remove the negative evaluation of higher body weight and lower body shame, which could in turn reduce healthcare stress.

1.1. Current study

The current study aimed to extend previous work by evaluating the effectiveness of *Expand Your Horizon* in reducing WBI in emerging adult women (i.e., ages 18–25). Emerging adult women are especially vulnerable to body-related shame as they are bombarded with idealized media images of models their age, and previous research indicates this demographic group often places a greater emphasis on their appearance (Coyne, Padilla-Walker, & Howard, 2013; Fitzsimmons-Craft, 2011). Indeed, body dissatisfaction and disordered eating often increase during this developmental stage (Fitzsimmons-Craft, 2017; Fitzsimmons-Craft, Harney, Brownstone, Higgins & Bardone-Cone, 2012). Therefore, emerging adulthood is a critical period for body image intervention efforts (Lipson et al., 2017).

Given our emerging adult female sample, we made the following modifications to the original *Expand Your Horizon* protocol. First, rather than receiving only written prompts, participants viewed videos of young women describing appreciation for their bodies' functions because research suggests emerging adults are more engaged with digital (vs. print) media (Twenge, Martin, & Spitzberg, 2019; Villanti et al., 2017). Although these videos served as examples of potential areas for gratitude, we also hypothesized that viewing peers engaging in positive body talk could promote positive body image in young women. The tripartite influence model demonstrates peers are powerful influences on body image (Thompson, Heinberg, Altabe & Tantleff-Dunn, 1999). Moreover, social learning theory posits learning can occur through direct observation of others (Bandura, 1986). Indeed, individuals whose peers engage in self-disparaging appearance comments are more likely to experience body dissatisfaction (Mills & Fuller-Tyszkiewicz, 2016; Shannon & Mills, 2015). Other research has demonstrated that women perceive body-positive media to foster their

own positive body image, by providing them with positive role models of body confidence (Rodgers, Kruger, Lowy, Long & Richard, 2019).

Second, previous *Expand Your Horizon* trials instructed participants to write for 15 min (Alleva et al., 2018b, 2015). Based on feedback from undergraduate women in preparation for this study, we adapted these instructions and asked participants to write for 10 min. Finally, we changed the active control condition from previous *Expand Your Horizon* trials. Rather than receiving the same prompt three times and focusing on creative writing, as in *Expand Your Horizon*, participants in the control group viewed three different videos featuring the same actresses, and reflected on different aspects of themselves. These prompts were similar to writing assignments included in college applications (e.g., write about an engaging hobby). The purpose of this change was to match the number of prompts and videos given in the *Expand Your Horizon* condition, and to reduce boredom.

The current study recruited women with WBI and used a randomized control trial design. Participants were randomly assigned to *Expand Your Horizon* or the active control group. The primary aim was to assess the preliminary effectiveness of *Expand Your Horizon* on WBI, on secondary psychological outcomes (i.e., functionality appreciation and self-compassion), and on health-related attitudes (i.e., healthcare stress). It was hypothesized that participants in *Expand Your Horizon* would demonstrate greater improvements in WBI, functionality appreciation, self-compassion, and healthcare stress relative to participants in the control condition.

2. Method

2.1. Participants

Inclusion criteria included: 1) ages 18–25 years; 2) self-identification as a woman; 3) some degree of WBI at baseline, measured by positively endorsing at least one item of WBI on the WBIS-M scale (details below). Data collection occurred from March 2020 to February 2021.

The final sample ($N = 135$) was 20.84 years ($SD = 2.86$) on average; 6.1% had less than a high school degree, 6.8% had a high school degree/GED, 26.5% were first-year students, 17.4% second-year, 21.2% third-year, 6.8% fourth-year, 3.8% college graduates, and 11.4% graduate students. According to self-reported height and weight, 4.4% reported a BMI > 18.5, 45.2% in the 18.5 - > 25 range, 18.5% in the 25 - > 30 range, and 27.4% in the < 30 range. Of the total sample, 47.4% identified as White, 11.9% Black, 10.4% Latinx, 18.5% Asian, and 11.1% multiracial; 63.2% identified as straight, 3.0% lesbian, 25.6% bisexual, 4.5% queer, and 3.8% “other sexual orientation.”

2.2. Procedures

This IRB-approved study (HM20016491) was a parallel randomized control trial design with assessments at baseline, post-test, and follow-up (one week). All data and writing assignments were collected online via REDCap (Harris et al., 2009). Electronic consent was obtained prior to survey completion. The baseline questionnaire was embedded within a larger, cross-sectional online survey entitled “Body image, mental health, and eating behaviors in women.” To be considered for enrollment in the intervention phase, participants

had to express interest through a yes/no question at the end of the survey. Eligible and interested participants were randomized within one business day to either the control or *Expand Your Horizon* condition. Following randomization, participants received a REDCap link to complete informed consent. On day 1, they received the first video followed by the first writing assignment. On days 3 and 5, they received the second and third videos followed by the second and third writing assignments, respectively. Immediately after completing the third writing assignment and pressing “continue,” participants were routed to complete post-test measures. One week later, they received follow-up measures. Participants received up to two reminder emails if any of the writing assignments or follow-up measures were not completed within 24 and 48 h. Participants were debriefed at follow-up and offered the videos to the other condition. Participants received a \$5 e-gift card for completing post-test measures and a \$5 e-gift card for completing follow-up measures. See Fig. 1 for the study CONSORT flow diagram.

2.2.1. Recruitment—Recruitment for the intervention portion of the study occurred through the Psychology department participant pool (31.7%), a university newsletter (57.4%), and social media advertisements (10.9%). The study was advertised as “body acceptance strategies for women ages 18–25.”

2.2.2. Instructions for both conditions—Participants in both conditions were instructed to: 1) try to write for at least 10 min, 2) keep writing once they had started, and 3) reread what they had written once they had finished.¹ Videos and writing assignments were emailed to participants over a one-week time period. Videos (each three-five minutes in duration) were uploaded to YouTube and each writing assignment followed the videos. Based on social learning theory (Bandura, 1986), these videos showed young adult women answering the various writing prompts as a way to model the condition. The conditions had the same actresses, format, and length.

2.2.3. Expand Your Horizon—The *Expand Your Horizon* intervention was comprised of three different videos featuring women expressing gratitude for their body functions. The first video included an introduction describing the importance of functionality appreciation and a list of examples of different body functions (e.g., gratitude for sight, ability to feel emotions; see Appendix A). Each of the subsequent videos asked participants to focus on a different component of body functions and consider why these functions are personally important to them.

2.2.4. Active control group—The active control group was a general expressive writing intervention featuring the same actresses answering the various prompts. This group received an introduction outlining the importance of expressive writing to well-being (Appendix B). Like the intervention group, participants viewed three different videos of

¹Participants in active control condition were told they “could” re-read what they had written in the first two assignments; whereas, the intervention condition was told they “should” re-read what they had written. This might have introduced variability in time spent on writing tasks in each condition.

Appendix A: Day 1: https://www.youtube.com/watch?v=bL_vNq705kc&feature=youtu.be.

Day 2: <https://www.youtube.com/watch?v=6JaxCa-wu0U&feature=youtu.be>.

Day 3: <https://www.youtube.com/watch?v=n99o-pM70rY&feature=youtu.be>.

similar length and format as the *Expand Your Horizon* condition. These prompts were based on writing assignments for college applications that were not body-focused (e.g., describe an accomplishment or realization [i.e., college acceptance]).

2.3. Expert and peer review feedback of the videos

Prior to recruitment, videos were sent to women ages 18–25 and several body image researchers for feedback. Following recommendations, videos were shortened to no longer than five minutes and each contained an introduction and conclusion slide to remind participants of the prompts. As noted, the writing time was shortened from 15 to 10-minutes. The actresses in the videos were White, 62.5% ($n=5$), Black, 12.5% ($n=1$), South Asian, 12.5% ($n=1$), and multiracial, 12.5% ($n=1$). One actress had a physical disability and used a wheelchair. Expert and peer reviewers appreciated the diversity in ability status, race, and ethnicity, as it helped demonstrate the theorized inclusivity of functionality appreciation.

2.4. Fidelity to writing prompts

A random number generator was used to select 20% of written responses (10% of each group) across three days to examine fidelity to the prompts. All responses were examined by two coders. Interrater reliability had a mean kappa of .93 (range =0.90–0.96), which indicates raters agreed that participants answered the prompts appropriately.

2.5. Measures

All measures were administered at each time point (baseline, post, and one-week follow-up) unless otherwise noted.

2.5.1. Demographic information—At baseline, participants reported their age, year in school, race/ethnicity, sexual orientation, gender, and self-reported height and weight (to calculate BMI).

2.5.2. Validation questions—After completing the writing assignments, participants answered validation questions to ensure attention to content. For this check, participants were instructed to write “I read the instructions” in a comment box that followed on day 1, and to select a certain answer (i.e., “select slightly agree for this question” on the final day of the intervention). Validation questions are shown to enhance reliability of a data set and limit the amount of computerized responses (Bai, 2018; Oppenheimer, Meyvis, & Davidenko, 2009). Three participants were excluded from analyses on treatment completers for not correctly answering the validation questions.

2.5.3. Modified weight bias internalization scale—(WBIS-M; Pearl & Puhl, 2014). The WBIS-M is a self-report measure that examines the degree to which people accept negative weight-related stereotypes and apply these stereotypes to themselves. An example item is: “I hate myself for my weight.” This scale consists of 11 items rated on a seven-point

Appendix B: Day 1: <https://www.youtube.com/watch?v=DG-JcPwLWtk&feature=youtu.be>.

Day 2: <https://www.youtube.com/watch?v=gBxI1zZZ7CY&feature=youtu.be>.

Day 3: <https://www.youtube.com/watch?v=AimTN10w1f0&feature=youtu.be>.

scale (1 = *strongly disagree*, 7 = *strongly agree*). Participants had to positively endorse at least one item to meet eligibility criteria (i.e., select a “5” or above to indicate they agree with at least one statement). Items are averaged to produce a total score with higher scores suggesting stronger internalized weight bias. This scale yields reliable and valid scores (Pearl & Puhl, 2014). In the current study, Cronbach’s alphas were: .89 (baseline), .89 (post), and .90 (follow-up).

2.5.4. Functionality appreciation scale—(FAS; Alleva et al., 2017). The FAS examines the degree to which one appreciates her body’s physical functioning and capabilities. This measure has seven items rated on a five-point scale (1 = *strongly disagree*, 5 = *strongly agree*). A sample item is, “I appreciate my body for what it is capable of doing.” Items are averaged to produce a total score with higher scores reflecting greater functionality appreciation. Reliability and validity of this scale has been established (Alleva et al., 2017). Cronbach’s alphas were: .87 (baseline), .93 (post), and .94 (follow-up) in the current study.

2.5.5. Self-compassion scale-short form—(SCS-SF; Raes, Pommier, Neff & Van Gucht, 2011). This 12-item measure assesses the degree to which one is able to hold their own feelings of suffering with a sense of warmth, connection, and concern. An example item includes, “When I am going through a very hard time, I give myself the caring and tenderness I need.” Items are rated on a five-point scale (1 = *almost never*, 5 = *almost always*). Items are averaged to create a total score, with higher scores suggesting greater self-compassion. Reliability and validity of this scale are established (Raes et al., 2011). Cronbach’s alphas were .84 (baseline), .81 (post), and .90 (follow-up) in the current study.

2.5.6. Healthcare stress—(Mensing et al., 2018). This five-item scale was originally adapted for a study on healthcare anxiety in higher weight women. Participants use a 10-point scale (1 = *No stress*, 10 = *Very stressed*) to indicate their level of stress when thinking about numerous healthcare encounters. An example item is, “Please indicate your level of stress when you think about going to the gynecologist.” Items are averaged to produce a total score with higher scores indicating higher levels of healthcare-related stress. This measure was developed by weight stigma experts. It demonstrated internally consistent scores and validity was established via expected associations with perceived stress and patient trust (Mensing et al., 2018). Cronbach’s alphas were: .73 (baseline), .79 (post), and .82 (follow-up) in the current study.

2.6. Data analysis plan

Data were cleaned and descriptive information calculated using SPSS 27.0. Further analyses were conducted using RStudio (R Core Team, 2018). T-tests revealed no significant differences between groups on demographics or baseline measures, providing confidence in randomization success. Little’s MCAR test demonstrated data were missing completely at random $\chi^2(31) = 18.74, p = .96$ (Meyers, Gamst, & Guarino, 2016) and *t*-tests revealed no significant differences on demographics or baseline measures between treatment completers and non-completers.

To assess preliminary effectiveness, linear mixed models (LMMs) were conducted. We chose this approach over repeated measures analysis of variance (RM-ANOVA) or analysis of covariance (ANCOVA; using pre-test scores as a covariate) because LMMs do not require independence of observations or sphericity, assumptions often violated in repeated measures randomized trials (Gueorguieva & Krystal, 2004; Quené & van den Bergh, 2004). Thus, LMMs result in increased power and reduced Type I error rates. Moreover, whereas ANOVA approaches require complete data, rarely achieved in a clinical trial, LMMs use all available data to estimate parameters via maximum likelihood (ML) estimation (Gueorguieva & Krystal, 2004; Quené & van den Bergh, 2004). Finally, in the context of missing data, evidence suggests LMMs are more powerful than ANCOVA with multiple imputation (Hrshikesh & Gu, 2009; Xi, Pennell, Andridge & Paskett, 2018). We conducted analyses twice, first using all available data to estimate parameters via ML ($N=135$) and again assessing outcome differences in treatment completers only ($n=116$). The `lmerTest` package (Kuznetsova, Brockhoff, & Christensen, 2017) in R was used to conduct LMMs. Time, condition (0 =Active Control, 1 =Expand Your Horizon), and a time x condition interaction were entered as fixed effects, with participant ID entered as a random effect to account for the inherent variability in the sample. WBI, functionality appreciation, self-compassion, and healthcare stress were entered as respective dependent variables (DVs). Intraclass correlation coefficients (ICC[1]) were calculated to ensure sufficient clustering within individuals (i.e., scores on the DV are correlated within participants) to proceed with hierarchical modeling. Simulation research suggests any non-zero ICC(1) is sufficient evidence to proceed (Bliese, 2000). Time was entered as a categorical variable (as assessments were evenly spaced; baseline=0, post-test=1, follow-up=2), which facilitated examination of changes at each time-point without additional post-hoc analyses. We examined BMI as a covariate; because the pattern of results did not change, we present results without BMI for simplicity. Cohen's d , a standardized measure of group differences, is presented as the effect size estimate (Cohen, 1969).

Funding constraints and recruitment during the COVID-19 pandemic limited our recruitment to ~120 participants. Therefore, we calculated the observed power (using the `SIMR` package; Green & MacLeod, 2016) for each time x condition interaction in all models. Observed power was: 57% at post, 73% at follow-up (WBI); 100% at post, 96% at follow-up (functionality appreciation); 80% at post, 100% at follow-up (self-compassion); and 30% at post, 69% at follow-up (healthcare stress). Although some effects were under-powered, LMMs yielded superior observed power relative to RM-ANCOVA. Under-powered interactions will be interpreted with caution.

3. Results

3.1. Linear-mixed models

All analyses showed sufficient clustering for LMM. See Table 1 for an overview of parameter estimates and effect sizes of models estimated with ML using all available data. Marginal means are presented in Table 2. The pattern of results did not differ when examining changes over time in treatment completers only. A table of results for treatment completers ($n=116$) is included in Supplementary Material.

3.1.1. WBI—WBI scores decreased across conditions at both post ($p < .001$) and follow-up ($p < .001$). However, there were significant time x condition interactions on WBI at post ($p = .04$) and follow-up ($p = .01$), with *Expand Your Horizon* participants demonstrating significantly greater reductions in WBI at both time-points.

3.1.2. Functionality appreciation—Functionality appreciation scores increased in both conditions at post ($p < .001$) and follow-up ($p < .001$), but the magnitude of change over time was significantly greater in *Expand Your Horizon* participants at both post ($p < .001$) and follow-up ($p < .001$).

3.1.3. Self-compassion—Both conditions reported increases in self-compassion at both post ($p < .001$) and follow-up ($p < .001$), but scores increased significantly more in the *Expand Your Horizon* condition at both time-points (both $ps < 0.001$).

3.1.4. Healthcare stress—Healthcare stress scores decreased for both conditions at post ($p = .001$) and follow-up ($p < .001$). Although the magnitude of change over time did not differ significantly at post ($p = .17$), *Expand Your Horizon* participants showed significantly greater decreases in HSS over time at follow-up ($p = .02$).

4. Discussion

The current study examined the preliminary effectiveness of *Expand Your Horizon* compared with an active control writing condition in a sample of emerging adult women with WBI. In line with our hypotheses, women in the *Expand Your Horizon* condition experienced greater improvements in WBI, functionality appreciation, self-compassion, and healthcare stress from baseline to follow-up compared to women in an active control condition. These findings are encouraging because *Expand Your Horizon* is a brief and accessible intervention with evidence of improving several body image and mental health variables at a one-week follow-up.

WBI is associated with poorer physical health outcomes (e.g., greater allostatic load) and mental health outcomes (e.g., greater depressive symptoms; Pearl & Puhl, 2018; Vadiveloo & Mattei, 2017). *Expand Your Horizon*'s emphasis on non-appearance aspects of the body (i.e., functionality appreciation) might lower self-objectification and body shame. In turn, this more holistic view of one's body could minimize the overall importance of body weight and reduce WBI (Alleva et al., 2021, 2015; Mensinger et al., 2018).

Further, results suggested *Expand Your Horizon* reduced healthcare stress at a one-week follow-up. It is possible increasing functionality appreciation and decreasing WBI could fortify one's ability to manage potentially stigmatizing experiences in healthcare because one views the value of their body as more than weight. This newfound appreciation for their body might help them more readily cope with healthcare experiences and empower them to advocate for their needs. It is important to note that our analyses for WBI and healthcare stress were under-powered and our results should be interpreted with caution. However, it is promising that *Expand Your Horizon* appeared effective at reducing WBI and healthcare stress at a one-week follow-up.

Participants in the *Expand Your Horizon* condition experienced greater increases in self-compassion than participants in the active control condition. This finding is important because self-compassion is associated with overall well-being, better body image, and lower disordered eating symptomatology (see MacBeth & Gumley, 2012 for a systematic review). Focusing on functionality appreciation might increase body respect thereby creating a more compassionate outlook of oneself as a whole. Body ideals are unattainable and ever-shifting, and self-compassion allows individuals to not base their self-esteem solely on how well their bodies align with these ideals. In other words, self-compassion creates space for individuals to accept themselves even when they feel inadequate, which could mitigate body image issues and disordered eating symptomatology (Braun et al., 2016; Messer, Anderson, & Linardon, 2021; Rahimi-Ardabili, et al., 2018; Seekis et al., 2020). In sum, *Expand Your Horizon* increased functionality appreciation and self-compassion, both important targets of body image and disordered eating interventions.

Although the magnitude of change was greater for the *Expand Your Horizon* condition, it is important to note the active control group also experienced improvements in WBI, functionality appreciation, and self-compassion. The active control condition's prompts were general expressive writing exercises, which can increase emotional regulation skills and promote better mental health and body image (Lepore, Greenberg, Bruno & Smyth, 2002; O'Connor et al., 2011). Further, the control condition asked participants to reflect on non-appearance related aspects of their lives (e.g., achievements), which could have reduced self-objectification, an important target for body image interventions. However, another possible explanation for the positive outcomes in both groups is that most participants were recruited through a university newsletter advertising the intervention as "body acceptance strategies." Thus, it is possible that individuals were actively seeking strategies to improve their body image and intervention participation resulted in a placebo effect.

4.1. Strengths and limitations

The current study has several strengths. First, to our knowledge, it was the first to examine an intervention with demonstrated efficacy in improving body image, *Expand Your Horizon* (Alleva et al., 2018b, 2015), on WBI using a randomized controlled design with a follow-up measurement point. Second, data collection occurred from March 2020 to February 2021 during the COVID-19 pandemic. These writing interventions are promising because their online modalities allow them to be widely disseminated and expand treatment access to diverse individuals, even during a public health crisis. Finally, the videos from our intervention, rather than the original printed directions from *Expand Your Horizon*, might be more appealing to emerging adults, as this age group is more likely to engage with digital media than traditional print media (Twenge et al., 2019; Villanti et al., 2017). For example, Generation Z (i.e., individuals born between 1995 and 2012) spends six hours/day on average using digital media (e.g., social media), compared to less than one hour/day on print media (e.g., books; Twenge et al., 2019).

This study also has limitations. Although the actresses in our videos were relatively racially/ethnically diverse, future work could recruit more actors with greater body size diversity and various gender identities. Moreover, clinicians should also consider using other modalities

to disseminate the intervention for individuals without reliable internet access. In the present study, we did not assess whether reductions in self-objectification helped explain the decrease in WBI; thus, future research should examine the intervention's impact on self-objectification. Finally, the current study had a short term (i.e., one-week) follow-up. Thus, the longer-term durability of intervention effects is unknown.

5. Conclusion

WBI is associated with poorer mental and physical health. The current study evaluated an accessible, affordable treatment modality in a group of emerging adult women with WBI. The primary aim of this study was to examine the preliminary effectiveness of a previously developed body gratitude journaling intervention (i.e., *Expand Your Horizon*) in reducing WBI and healthcare stress and increasing self-compassion and body functionality appreciation. *Expand Your Horizon* yielded significantly greater improvements in WBI, functionality appreciation, self-compassion, and healthcare stress compared to an active control condition (i.e., general expressive writing). Results support the potential of *Expand Your Horizon* to improve women's body-related esteem.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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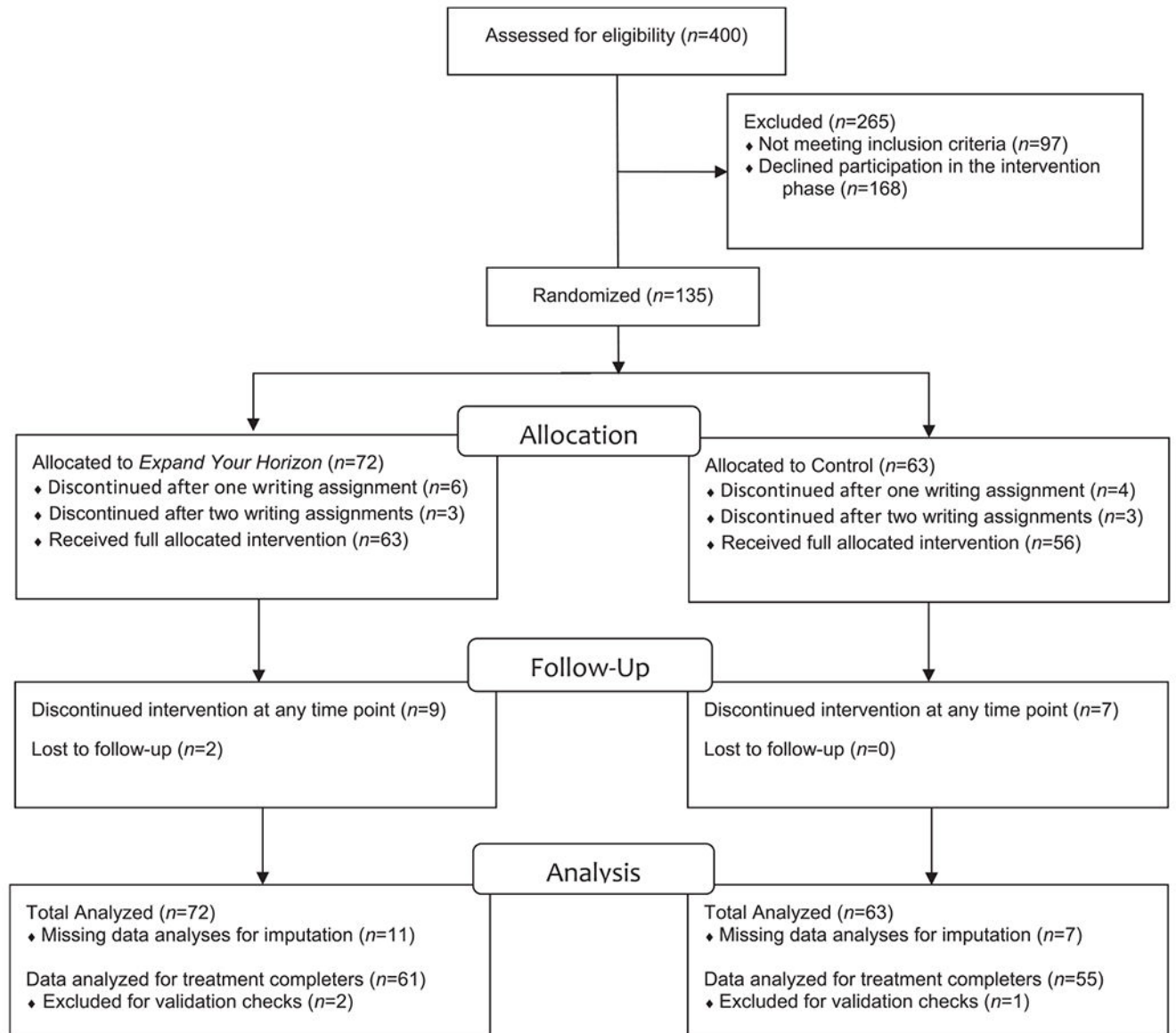


Fig 1.
CONSORT flow diagram.

Table 1

Overview of linear mixed model results with all available data.

	<i>b</i> (SE)	<i>t</i>	<i>p</i>	<i>d</i>
WBI				
Condition	.32 (0.14)	-1.57	.12	0.24
Post	-0.75 (0.10)	-7.71	<.001	-1.01
FU	-0.97 (0.10)	-9.84	<.001	-1.28
Condition*Post	-0.29 (0.14)	2.03	.04	-0.26
Condition*FU	-0.38 (0.14)	2.66	.008	-0.35
FAS				
Condition	.03 (0.11)	-0.25	.80	0.04
Post	.63 (0.06)	10.59	<.001	1.38
FU	.56 (0.06)	9.43	<.001	1.23
Condition*Post	.39 (0.09)	-4.47	<.001	0.58
Condition*FU	.31 (0.09)	-3.51	<.001	0.46
SCS				
Condition	-0.08 (0.10)	.78	.44	-0.12
Post	.34 (0.05)	6.27	<.001	0.82
FU	.45 (0.05)	8.37	<.001	1.09
Condition*Post	.19 (0.08)	-2.42	.02	0.32
Condition*FU	.37 (0.08)	-4.64	<.001	0.61
HSS				
Condition	.02 (0.33)	-0.07	.94	0.01
Post	-0.49 (0.15)	-3.33	.001	-0.44
FU	-0.74 (0.15)	-4.99	<.001	-0.65
Condition*Post	-0.30 (0.21)	1.38	.17	-0.18
Condition*FU	-0.53 (0.22)	2.45	.02	-0.32

Note. (Cohen, 1988) conventions for interpreting *d* effect size estimates are .20 = small, .50 = medium, 0.80 = large. WBI=weight-bias internalization; FAS=functionality appreciation; SCS=self-compassion; HSS=healthcare stress.

Table 2

Estimated marginal means at each time-point, by condition.

	<i>Expand Your Horizon</i>			Control		
	Pre	Post	FU	Pre	Post	FU
WBI	4.84[4.57, 5.12]	4.09[3.81, 4.39]	3.88[3.59, 4.16]	4.52[4.23, 4.82]	4.06[3.76, 4.36]	3.94[3.64, 4.24]
FAS	3.90[3.76, 4.05]	4.53[4.38, 4.68]	4.46[4.31, 4.62]	3.88[3.72, 4.03]	4.12[3.96, 4.28]	4.13[3.97, 4.29]
SCS	2.53[2.39, 2.67]	2.87[2.72, 3.01]	2.98[2.84, 3.12]	2.61[2.46, 2.75]	2.75[2.60, 2.91]	2.69[2.54, 2.85]
HSS	5.95[5.49, 6.40]	5.46[4.99, 5.92]	5.21[4.74, 5.67]	5.92[5.44, 6.40]	5.73[5.24, 6.22]	5.71[5.22, 6.21]

Note. Estimated marginal means represent group means at each time-point when accounting for other variables in the model. Means are followed by 95% CIs. WBI=weight-bias internalization; FAS=functionality appreciation; SCS=self-compassion; HSS=healthcare stress.