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Enhancing body image in motherhood: A randomised controlled trial of *Expand Your Horizon* among mothers of young children

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ABSTRACT

Motherhood can increase vulnerability to body dissatisfaction, but positive body image interventions may mitigate this. *Expand Your Horizon* (Alleva et al., 2015), an online writing intervention, enhances functionality appreciation, an aspect of positive body image. The intervention's demonstrated efficacy and focus on body functionality indicate its potential use among mothers. However, its original 3-session format may be unfeasible for mothers alongside other commitments. Thus, we tested the impact of a single 15-minute *Expand Your Horizon* session on state body appreciation and functionality appreciation. Mothers ($N = 143$) of 0–10-year-olds were randomly allocated to either the intervention group, or an active control group. State body appreciation and functionality appreciation were assessed pre- and post-intervention. Trait self-compassion was tested as a potential moderator. Participants who completed *Expand Your Horizon* reported greater state body appreciation and functionality appreciation post-intervention than those in the control group. Self-compassion moderated the intervention's effect on state functionality appreciation, with effects strongest for those with lower levels of self-compassion. Overall, findings support the intervention's suitability for mothers, particularly those with low self-compassion. Practical implications include possibly tailoring *Expand Your Horizon* and similar interventions to benefit all mothers. Future research directions include longitudinal and qualitative designs, and extension to other specific populations.

1. Introduction

Motherhood is often a time of significant personal change, identified by anthropologists as a unique life stage, termed "matrescence" (Raphael, 1975, p. 66). Body image, defined as the psychological experience of the body (Cash, 2004), is one aspect of the self that can change dramatically during matrescence. In motherhood, there is a complex co-existence of two separate, but related, elements of body image (Raspovic et al., 2022): body dissatisfaction, defined as negative feelings and beliefs about body shape and weight (Crowther & Williams, 2011), and body appreciation, defined as appreciating the body's features, functionality, and health (Tylka & Wood-Barcalow, 2015b). These two constructs follow unique trajectories throughout the lifespan (Tiggemann, 2004, 2015; Tylka & Wood-Barcalow, 2015b), and their differences offer an opportunity to intervene and improve maternal body image.

Comparison of body dissatisfaction and body appreciation in motherhood reveals body dissatisfaction to be relatively stable, with pre-pregnancy body dissatisfaction highly predictive of body image concerns in the postpartum period (Duncombe et al., 2008; Skouteris et al.,

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2005). Commonly, maternal body dissatisfaction occurs in response to changes to physical appearance, such as weight gain and change in body shape (Coad & Dunstall, 2011; Duncombe et al., 2008; Skouteris et al., 2005). Given that these changes often persist after women give birth (Coad & Dunstall, 2011), body dissatisfaction is often exacerbated during the postpartum period by a societal expectation that women's bodies will return to a state that conforms to Western beauty ideals soon after giving birth (Clark et al., 2009). Maternal body dissatisfaction is associated with a range of negative outcomes, including postpartum depression (see Silveira et al., 2015 for a review), excessive exercise (Raspovic et al., 2020), dieting (Montgomery et al., 2010; Rallis et al., 2007) and reduced breastfeeding (Gjerdingen et al., 2009).

Comparatively, body appreciation is a more malleable construct that tends to increase throughout the lifespan (Tiggemann, 2015). It is thought that this increased appreciation is a response to life events that make body functionality, defined as everything the body can do (Alleva & Tylka, 2021), more salient (Swami et al., 2014; Tiggemann, 2015; Tiggemann & McCourt, 2013). Motherhood, comprising a vast array of functions to support the conception, gestation, birth, and nourishment of a baby, is one such event. In line with this, a growing body of evidence documents an association between positive reflection on maternal body functionality and body appreciation. Often this exists despite women also experiencing body dissatisfaction. For example, Duncombe et al. (2008) and Skouteris et al. (2005) found that most women adapted positively to the physical changes of pregnancy, despite, as previously cited, some level of dissatisfaction with these changes. Hodgkinson et al. (2014) suggests this may occur because the functionality of growing a baby takes precedence over ingrained Western beauty ideals such as thinness. Positive reflection on maternal functions is also associated with increased body appreciation in the first year postpartum (Fox & Neiterman, 2015; Gillen et al., 2021), with women reporting pride in response to a positive childbirth experience, and being able to breastfeed. In contrast, women who experience functional challenges during motherhood, such as infertility (Ozen et al., 2019), miscarriage (Ålgars et al., 2011), and difficulty breastfeeding (Gillen et al., 2021), often report increased body dissatisfaction. Thus, positive or, in the face of functional challenges, holistic, reflection on body functionality may be crucial to experiencing increased body appreciation. Of the limited research on body appreciation in mothers of older children, Raspovic et al., (2020, 2022) found that appreciation of maternal functionality persists up to five years postpartum, and Yager et al. (2022) found that mothers of children aged 0–10 years had comparable levels of body appreciation to women who did not have children. However, these studies primarily recruited from online positive body image communities, which limits generalisability to a broader maternal population. Compared to the negative outcomes associated with body dissatisfaction, maternal body appreciation is associated with positive outcomes such as intuitive eating (an eating style promoting positive connection and responsiveness to the body's needs, Lee et al. (2020)) and participating in enjoyable physical activity (Raspovic et al., 2020). In general female populations, body appreciation is also associated with increased self-esteem, and reduced depressive and anxiety symptoms (Avalos et al., 2005; Linardon et al., 2022).

In summary, literature depicts maternal body image as a dynamic configuration of body dissatisfaction and body appreciation, with evidence that these two independent constructs can be simultaneously experienced in motherhood (Raspovic et al., 2022). Commonly, maternal body dissatisfaction has been shown to develop in response to physical appearance, and body appreciation in response to positive reflection on body functionality (Clark et al., 2009; Duncombe et al., 2008; Hodgkinson et al., 2014; Rallis et al., 2007; Raspovic et al., 2020, 2022; Skouteris et al., 2005). The contrasting outcomes associated with maternal body dissatisfaction and body appreciation highlight the importance of improving maternal body image. Given the salience of body functionality during motherhood, this life stage presents a unique opportunity to improve body image, by shifting the focus away from physical appearance, and onto body functionality. In addition, the relatively greater malleability of body appreciation across the lifespan, particularly in response to life events that highlight body functionality (Swami et al., 2014; Tiggemann, 2015; Tiggemann & McCourt, 2013), indicate it as a potentially more effective way of improving body image, compared to trying to shift more persistent body dissatisfaction (Tylka & Wood-Barcalow, 2015b). To achieve this, positive body image interventions may be an effective mechanism (Guest et al., 2019).

1.1. *Expand Your Horizon*

One such intervention is *Expand Your Horizon*, which seeks to enhance body appreciation by increasing functionality appreciation (Alleva et al., 2015). Delivered online, across three 15-minute sessions within one week, participants write about their body's functionality and why it is important to them. In a recent review (Guest et al., 2019), *Expand Your Horizon* was identified as the current most effective positive body image intervention for women, in terms of outcomes and methodological quality of studies evaluating its effectiveness. Through three randomised controlled trials, *Expand Your Horizon* has been shown to improve trait body appreciation, functionality satisfaction and functionality appreciation among young women with body image concerns (Alleva et al., 2015; Alleva, Diedrichs, Halliwell, Martijn, et al., 2018) and women aged 22–70 with rheumatoid arthritis (Alleva, Diedrichs, Halliwell, Peters, et al., 2018). These benefits to trait body image, which reflects how an individual generally feels about their body, most of the time, have been shown to persist up to one month after completing the intervention (Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Alleva, Diedrichs, Halliwell, Peters, et al., 2018).

Expand Your Horizon's focus on body functionality indicates its potential among mothers, and the intervention is backed by strong empirical support (Alleva et al., 2015; Alleva, Diedrichs, Halliwell, Martijn, et al., 2018; Alleva, Diedrichs, Halliwell, Peters, et al., 2018). However, with recent evidence indicating that multiple-session body image interventions may be difficult for mothers to adhere to alongside their other commitments (Wallis et al., 2021), a barrier to completion may be *Expand Your Horizon's* three-session format. Alleva et al. (2016) piloted a modified, single-session version of *Expand Your Horizon* and found that it improved state body image, which reflects how an individual feels about their body in a given moment. Other brief, single-session interventions that focus on body functionality have yielded similar increases in state positive body image in general samples of women (Mulgrew et al., 2017; Mulgrew et al., 2019; Weaver & Mulgrew, 2021). While these improvements are limited to transient state feelings about the body, recent personality research indicates that brief, habitual efforts to temporarily alter one's thoughts can, over time, lead to more enduring changes (Bleidorn et al., 2020; Quintus et al., 2020). Supporting this, Fredrickson's (2001) broaden and build theory argues that the experience of positive emotions such as appreciation, pride, and awe leads to a broadening of one's experiences and the subsequent development of personal resources that can support enhanced wellbeing. Thus, there is justification for testing a single-session version of *Expand Your Horizon* on state body image outcomes that may facilitate adherence among mothers and, over time, achieve the same lasting benefits to trait body image as the original three-session format.

1.2. *Self-compassion and body image*

In addition to positive body image interventions such as *Expand Your Horizon*, self-compassion, a regulatory and coping strategy identified as a protective factor for body image (Tylka & Kroon Van Diest, 2015), may also benefit mothers. Defined as viewing the self with kindness, recognising that everyone experiences failure and difficulty, and taking a mindful approach to these experiences (Neff, 2003), self-compassion may help mothers view their bodies more kindly. A recent review of self-compassion, eating pathology and body image research (Turk &

Waller, 2020) found a moderately strong relationship between self-compassion and body image. Specifically, interventions aimed at improving either self-compassion or body image yielded small to moderate improvements in both of these constructs (Turk & Waller, 2020). Brief interventions were equally effective as longer ones, with some of the strongest effects seen in studies using single, brief writing sessions (for example, Seekis et al., 2017; Stern & Engeln, 2018). Turk and Waller (2020) suggest that one role for self-compassion is as a moderator that either protects against body image threats, or enhances the impact of positive influences, such as interventions. Highly self-compassionate individuals may respond more strongly to interventions than less self-compassionate individuals, but this hypothesis remains untested.

1.3. The current study

Expand Your Horizon's efficacy and focus on body functionality position this program as a promising maternal body image intervention to promote positive body image. A modified, single-session format may be more feasible, from a time perspective, for mothers. Thus, the current study tested the impact of a 15-minute *Expand Your Horizon* writing session on state body appreciation and functionality appreciation among mothers of children aged 0–10 years, and explored whether self-compassion moderated the impact of the intervention. We predicted that participants in the *Expand Your Horizon* group would report greater improvement in state body appreciation and functionality appreciation at post-intervention than participants in an active control group. Additionally, we predicted that, after controlling for pre-intervention measures of each construct, trait self-compassion would moderate the effect of *Expand Your Horizon* on state body appreciation and functionality appreciation, such that the effects would be greater for individuals with higher self-compassion.

2. Method

2.1. Participants

Participants were 143 Australian mothers aged over 18 years, with children aged 0–10 years. They were mainly recruited from the general public (n = 132), with a small number (n = 11) recruited from the University's Research Participation System. Given that mothers are a predominant influence on children's early body image (Hart et al., 2015), we chose to test *Expand Your Horizon* with mothers of 0–10-year-old children.

An a priori power analysis using G*Power (Faul et al., 2007) indicated that at least 136 participants were required to detect a medium effect (η_p^2 =.06) with power of .80 and α = .05 for a two-way mixed analysis of variance (ANOVA). Based on a medium effect (f^2 =.15), power of .80 and α = .05, this number of participants would also be sufficient to detect moderation (Cohen, 1992).

2.2. Design

A 2 (group: *Expand Your Horizon*, control) x 2 (time: pre-intervention, post-intervention) experimental design was used to test the impact of *Expand Your Horizon* on state body appreciation and functionality appreciation, with measures collected pre- and post-intervention. Trait self-compassion was assessed as a potential moderator.

2.3. Materials

The intervention group completed a modified version of the *Expand Your Horizon* writing exercises (Alleva et al., 2015) delivered in a single session (Alleva et al., 2016). With permission from *Expand Your Horizon's* lead author (Alleva et al., 2015), the instructions were tailored to encourage mothers to write about their appreciation of their body functionality in any context they wanted, whether in relation to being a mother or other aspects of their life. Participants were provided with a brief introduction to body functionality, and a list of 61 body functions grouped into 6 categories (Sense and Sensations; Physical Activity and Movement; Health; Creative Endeavours; Self-care; Relationships with Others and Communication). Participants could choose to write about their appreciation of any aspect of their body's functionality, and why these functions were important to them.

The control group completed a writing exercise developed for the current study about the functionality of common items found around a household. Participants were briefly introduced to the concept of functionality for a range of items (e.g., smartphone, desk, pram), and as for the intervention group, encouraged to write about functionality in any context they wanted to. The control writing exercise instructions were identical to the *Expand Your Horizon* instructions, apart from the focus on either item or body functionality. This exercise was pilot tested with a group of 10 researchers prior to fieldwork.

In both groups, participants were told that writing exercises may improve wellbeing. They were asked to keep writing once started, to write for at least 15 minutes, and to re-read what they had written once finished.

2.4. Measures

2.4.1. Screening and demographic items

Participants confirmed their eligibility to participate by indicating that they were an adult female located in Australia, and had at least one child aged 0–10 years. A series of demographic items were also collected, as well as height and weight to calculate Body Mass Index (BMI; kg/m^2).

2.4.2. State body appreciation

To measure state body appreciation, we used Tylka et al.'s (2022) 2-item, short-form of the trait Body Appreciation Scale-2 (BAS-2; Tylka & Wood-Barcalow, 2015a). We opted for this shorter measure in order to reduce respondent burden. Following Homan (2016), we added the modifier "Right now" to the two items to capture state body appreciation. However, to be consistent with other state measures used in the present study, participants indicated how they felt using Visual Analogue Scales (VAS), with anchor points of 0 (*Not at all*) to 100 (*Very much*). VAS have been shown to be more sensitive to state changes following experimental manipulation (Heinberg & Thompson, 1995). Scores on the two items were averaged to create a measure of state body appreciation. Internal consistency was high, both at pre-intervention (α = 0.85) and post-intervention (α = 0.86).

2.4.3. State functionality appreciation

To measure state functionality appreciation, in the absence of a validated state measure, we included two items from the trait Functionality Appreciation Scale (FAS; Alleva et al., 2017) based on discussion with Dr Alleva, one of the original authors. Similar brief measures have been used in their experimental work (Alleva et al., 2014; Alleva et al., 2016). Participants responded to the items, "I feel satisfied with what my body can do" and "I feel appreciation for my body and what it is capable of doing", based on how they felt "right now", using the same VAS as for body appreciation. Scores on the items were averaged to create a measure of state functionality appreciation, which had high internal consistency at pre-intervention (α = 0.87) and post-intervention (α = 0.91).

2.4.4. Trait self-compassion

To measure trait self-compassion, we used the Self-Compassion Scale-Short Form (SCS-SF; Raes et al., 2011). Participants rated each of 12 items (e.g., "I try to see my failings as part of the human condition") on a 5-point scale from 1 (*Almost never*) to 5 (*Almost always*). An overall mean score was calculated, with higher scores indicating higher

self-compassion. Raes et al. (2011) found that the SCS-SF correlated very strongly with the long form of this measure (r = .97), and had strong internal consistency (α = .86). In the current study, internal consistency was similarly high (α = .87).

2.5. Procedure

Ethical approval was obtained from the University's Human Research Ethics Committee (Approval number 5281). The study was promoted as testing the effectiveness of writing exercises in improving the wellbeing of mothers of children aged 0–10 years. Participants were recruited online and through physical locations. Online, the survey was promoted nationally via social media, sharing within mothers' groups, and among social media networks. Physical locations included South Australian childcare centres, kindergyms, playgroups, libraries, recreational facilities, and supermarkets. With permission from these organisations, a promotional flyer was posted on physical and digital noticeboards.

The study was completed and managed online. The flyer recommended completion of the writing exercise on a laptop or desktop computer. Participants first viewed an Information Sheet, and those who wished to participate provided consent, and answered screening items to determine their eligibility to participate. Participants then responded to the demographic questions, the trait measure of self-compassion, and the state measures of body appreciation and functionality appreciation. The state measures were embedded among five items measuring mood, in keeping with the advertised wellbeing focus of the study. Participants were then randomised via the Qualtrics survey platform to complete either the *Expand Your Horizon* or control writing exercise, which they typed into Qualtrics. A timer within this platform let participants know when 15 min had lapsed, although they could write for longer if they wished. Immediately after completing this, they again completed the state measures of mood, body appreciation and functionality appreciation, before receiving an online debrief, and advised that they would be entered into the draw to win one of four $25 gift cards.

2.6. Study flow

Overall, 358 individuals clicked on the study link, of which 228 completed the baseline state measures and were randomised to either the intervention (n = 113) or control (n = 115) group (see Fig. 1, CONSORT diagram, Schulz et al., 2010). Fifty-seven participants viewed, but did not complete, the writing exercise (n = 25 in the intervention group, n = 32 in the control group). Among participants who completed the writing task (n = 171), a small number (n = 3 in the intervention group and n = 2 in the control group) did not complete either the pre- or post-intervention measures and were therefore excluded from analysis. An additional 23 participants were excluded as their responses to the writing task indicated they had been completed by artificial intelligence bots, following promotion of the study on the University's Facebook and LinkedIn pages (n = 12 in the intervention group, n = 11 in the control group). Ultimately, responses for 143 participants (n = 73 in the intervention group, n = 70 in the control group) were included and analysed.

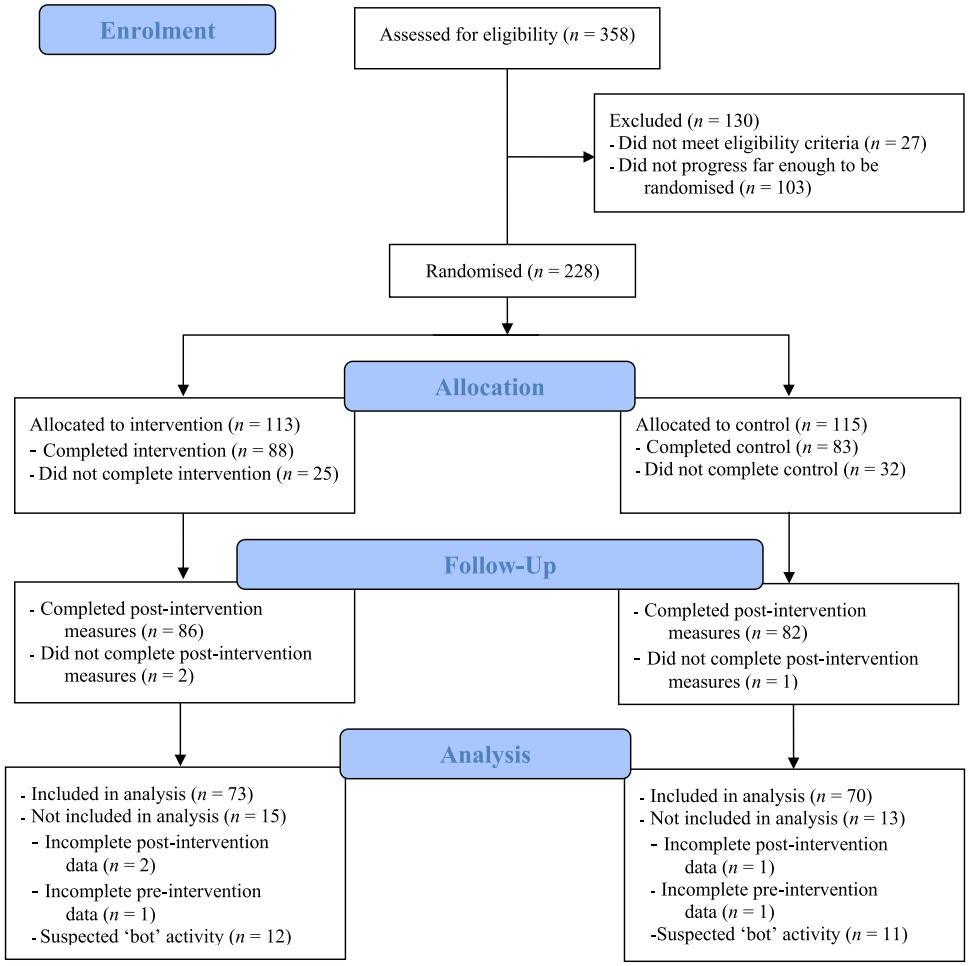

Fig. 1. CONSORT Flowchart of Participants.

3. Results

3.1. Sample characteristics

Participants' demographic characteristics and their scores on the questionnaires at pre-intervention are presented in Table 1. There was no difference between groups on age, $t(141) = 1.72$, $p = .09$, or BMI, $t(134) = 1.87$, $p = .06$. There was also no difference between groups in terms of number of children, χ^2 (2, $N = 143$) $= 1.59$, $p = .81$, age of youngest child, χ^2 (2, $N = 143$) $= 10.50$, $p = .40$, relationship status, χ^2 (1, $N = 143$) $= 0.00$, $p = .92$, or education status, χ^2 (1, $N = 143$) $= 7.29$, $p = .30$. There was, however, a lower proportion of White Australian participants in the intervention group (72.6%) than the control group (90.0%), χ^2 (5, $N = 143$) $= 12.78$, $p = .03$, but the effect was relatively small (Cramer's $V = .30$). All participants indicated that they spoke English well or very well.

Independent samples t-tests indicated that at pre-intervention, both groups had comparable levels of state body appreciation, $t(141) = 0.64$, $p = .52$, state functionality appreciation, $t(141) = 1.61$, $p = .11$, and trait self-compassion, $t(141) = 1.07$, $p = .29$.

3.2. Non-response

To determine if the 57 participants who viewed, but did not complete, their writing exercise differed from the 143 participants who did complete it, we compared the two groups on variables available for both groups. Completers and non-completers were similar, with no differences between groups on the demographic and lifestyle variables of age, number of children, age of youngest child, cultural background, language spoken at home, education status, relationship status, pregnancy status, and breastfeeding status (all $ps > .05$). Completers and non-completers also reported similar levels of pre-intervention state body appreciation, functionality appreciation and trait self-compassion (all $ps > .05$).

Table 1
Means (Standard Deviations) and Percentages for Participant Characteristics, by Group.

Participant characteristic	Intervention ($n = 73$)	Control ($n = 70$)	Total ($n = 143$)
Age	36.99 (5.47)	35.49 (4.92)	36.26 (5.24)
BMI	27.15 (5.61)	29.18 (7.00)	28.15 (6.40)
Number of children			
1	39.7%	40.0%	39.9
2	41.1%	41.4%	41.3
3 or more	19.2%	18.6%	18.9
Age of youngest child			
< 1 year old	20.6%	17.1%	18.9
1 – 5 years old	53.4%	71.5%	62.3
6 – 10 years old	26.0%	11.4%	18.9
Relationship status			
In a relationship	87.7%	87.1%	87.4
Not in a relationship	12.3%	12.9%	12.6
Highest level of education			
University	69.9	61.4	65.8
Other qualification	30.1	38.6	34.2
Cultural background*			
Caucasian	72.6%	90.0%	81.1
Asian	16.4%	4.3%	10.5
Aboriginal or Torres Strait Islander	1.4%	1.4%	1.4
African	0.0%	2.9%	1.4
Middle Eastern	1.4%	0.0%	0.7
Other	8.2%	1.4%	4.9
Speak a language other than English at home*			
No	75.3%	91.4%	83.2
Yes	24.7%	8.6%	16.8
Trait Self-Compassion	2.91 (0.73)	2.79 (0.67)	2.85 (0.70)

Notes. BMI = Body Mass Index in kg/m^2. * = significant difference at $p < .05$. Trait Self-Compassion (SCS-SF) scores could range from 1 to 5.

3.3. Writing exercise compliance

Comparisons between those who completed *Expand Your Horizon* ($n = 73$) and those in the control group ($n = 70$) indicated that compliance with the writing exercise instructions was comparable for the two groups. Both groups wrote a similar number of words (intervention: $M = 263.77$, $SD = 147.12$; control: $M = 249.67$, $SD = 149.87$), $t(141) = 0.57$, $p = .57$, and completed the writing exercise in a similar timespan (intervention: $M = 14.02$ min, $SD = 7.69$; control: $M = 12.85$ min, $SD = 4.27$), $t(141) = 1.11$, $p = .27$. The lead author reviewed writing exercise content for all participants included in analyses, and found it indicative of adherence to the task instructions. The majority of participants wrote about motherhood (intervention: 94.5%, control: 90.0%) for at least some of their writing task, and this was a similar proportion across both groups, χ^2 (1, $N = 143$) $= .49$, $p = .48$.

3.4. Impact of group on state body appreciation and functionality appreciation, over time

Two 2 (group: intervention, control) x 2 (time: pre-intervention, post-intervention) mixed ANOVAs were run to test the hypotheses that the intervention group would show greater improvement in state body appreciation and functionality appreciation at post-intervention than the control group.

For state body appreciation, there was a significant interaction between group and time, $F(1, 141) = 18.31$, $p < .001$, $\eta_p^2 = .12$. There were also main effects of group, $F(1, 141) = 5.71$, $p = .02$, $\eta_p^2 = .04$, and time, $F(1, 141) = 88.66$, $p < .001$, $\eta_p^2 = .39$. While both groups increased in body appreciation over time, there was a significantly greater increase for the intervention group, $t(72) = 9.21$, $p < .001$, $d = 1.08$, compared to the control group, $t(69) = 3.87$, $p < .001$, $d = 0.46$ (see Table 2 and Fig. 2). These findings remained the same when controlling for age of a mother's youngest child and number of children.

Similarly for state functionality appreciation, there was a significant interaction between group and time, $F(1, 141) = 10.81$, $p = .001$, $\eta_p^2 = .07$, as well as main effects of group, $F(1, 141) = 8.97$, $p = .003$, $\eta_p^2 = .06$ and time, $F(1, 141) = 39.66$, $p < .001$, $\eta_p^2 = .22$. While both groups increased in functionality appreciation over time, there was a significantly greater increase for the intervention group, $t(72) = 6.11$, $p < .001$, $d = 0.72$, compared to the control group, $t(69) = 2.46$, $p = .02$, $d = 0.29$ (see Table 2 and Fig. 3). Again, these findings held when controlling for age of a mother's youngest child and number of children.

3.5. Self-compassion as a moderator of the effect of Expand Your Horizon

Two moderated regression analyses using PROCESS Version 4.1 (Hayes, 2018), Model 1, were used to examine the moderating role of self-compassion. For the predictor, group, the control group was the reference group against which the intervention group was compared. Self-compassion was mean-centred, and baseline state body appreciation and functionality appreciation were entered, respectively, as covariates to control for their effects on post-intervention measures of

Table 2
Means (Standard Deviations) for State Body Appreciation and State Functionality Appreciation, by Group and Time.

	Pre-Intervention	Post-Intervention
Body appreciation		
Intervention	50.45 (26.79)	70.85 (22.64)
Control	47.68 (24.98)	55.33 (23.54)
Functionality appreciation		
Intervention	67.87 (23.35)	80.29 (19.24)
Control	61.73 (22.15)	65.63 (23.70)

Note. State Body Appreciation and State Functionality Appreciation could range from 0 to 100.

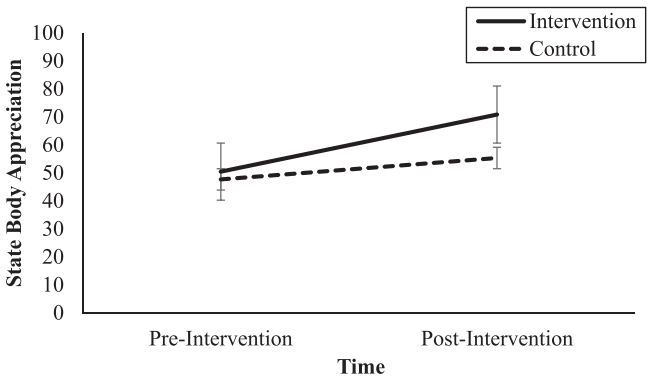

Fig. 2. State Body Appreciation by Group, by Time. Note. State body appreciation could range from 0 to 100. Error bars show standard errors.

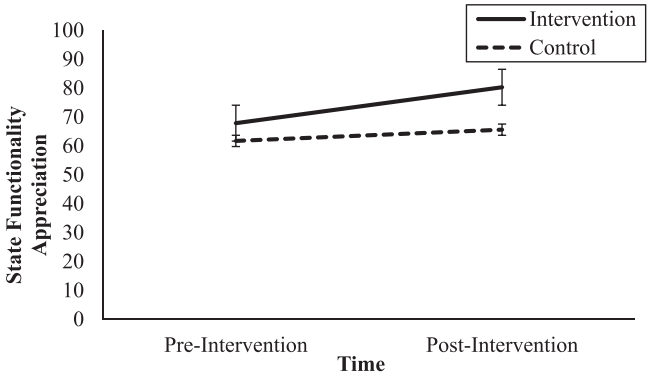

Fig. 3. State Functionality Appreciation by Group, by Time. Note. State functionality appreciation could range from 0 to 100. Error bars show standard errors.

these constructs.

The overall model for state body appreciation explained a significant 62.5% of the variance, $R^2 = .63$, $F(4, 138) = 57.45$, $p < .001$. However, as shown in Table 3, while trait self-compassion was a significant independent predictor, there was no significant interaction, indicating that self-compassion did not moderate the effect of group on body appreciation, $R^2_{change} = .0064$, $F_{change}(1, 138) = 2.37$, $p = .13$.

The overall model for state functionality appreciation explained a significant 63.2% of the variance, $R^2 = .63$, $F(4, 138) = 59.30$, $p < .001$. A significant interaction between group and self-compassion, $R^2_{change} = .012$, $F_{change}(1, 138) = 4.44$, $p = .04$, indicated that trait self-compassion did moderate the effect of group. However, contrary to prediction that the effect of group would be greater at higher levels of self-compassion, this effect was instead observed at lower levels of trait self-compassion (see Table 3).

Simple slopes analysis at one standard deviation (SD) above and below the mean, and at the mean, for self-compassion, indicated that for participants low on self-compassion, completing the intervention resulted in greater state functionality appreciation, $b = 15.12$, $t(138) = 4.56$, $p < .001$, than the control group. For participants with medium self-compassion, the same effect was observed, $b = 10.14$, $t(138) = 4.30$, $p < .001$. However, for participants with high self-compassion, there was no effect of completing the intervention on functionality appreciation, $b = 5.15$, $t(138) = 1.53$, $p = .13$ (see Fig. 4).

Table 3
Outcome of Moderated Regressions Predicting State Body Appreciation and Functionality Appreciation from Group and Trait Self-Compassion.

Body Appreciation Variable	*b*	SE_b	95% CI for *b*	*p*
Expand Your Horizon (vs control)	13.12	2.53	[8.11, 18.13]	< .001
Self-Compassion	8.98	2.89	[3.26, 14.69]	.002
Expand Your Horizon (vs control) x Self-Compassion	-5.63	3.66	[− 12.86, 1.60]	.13
Baseline State Body Appreciation	0.58	0.06	[0.47, 0.70]	< .001
Functionality Appreciation Variable	*b*	SE_b	95% CI for *b*	*p*
Expand Your Horizon (vs control)	10.14	2.36	[5.47, 14.80]	< .001
Self-Compassion	5.85	2.66	[0.59, 11.12]	.03
Expand Your Horizon (vs control) x Self-Compassion	-7.13	3.38	[− 13.82, − 0.44]	.04
Baseline State Functionality Appreciation	0.69	0.06	[0.57, 0.81]	< .001

Note. $N = 143$. *b* = unstandardised coefficient; *SE* = standard error; CI = confidence interval.

4. Discussion

The current study tested the impact of a single session version of the *Expand Your Horizon* (Alleva et al., 2015; Alleva et al., 2016) intervention on state positive body image among mothers of young children. In addition, we examined whether trait self-compassion moderated the effect of *Expand Your Horizon* on body image outcomes. Participants who completed the intervention reported significant increases in state body appreciation and functionality appreciation over time, and had higher levels of these measures at post-intervention, compared to a control group. Trait self-compassion moderated the impact of *Expand Your Horizon* on state functionality appreciation; however, contrary to prediction, it was participants low in self-compassion, rather than those high in self-compassion, who showed greater increases in state functionality appreciation than the control group.

The improvements in body appreciation and functionality appreciation observed in the current study add to maternal body image literature. Specifically, our experimental design demonstrates that focusing on maternal body functionality, and why it is meaningful, can lead to increased body appreciation. This is an important finding given much of this research to date has been qualitative or correlational (e.g. Fox & Neiterman, 2015; Gillen et al., 2021; Raspovic et al., 2020, 2022), and therefore limited in its ability to establish causality. Writing about the diverse range of maternal functions involved in motherhood may make women aware of the impressive abilities of their body. For some, this may be a new, unconsidered perspective given the lifelong objectification many women experience (Fredrickson & Roberts, 1997). A strength of our study was that we demonstrated this positive outcome in a general population of women with children ranging from newborn to primary-school age. Previous maternal body image research (Raspovic et al., 2020, 2022; Wallis et al., 2021; Yager et al., 2022) has often sampled from positive body image communities, which carry risks of selection bias and demand effects, such that participants may have

Fig. 4. Predicted Post-Intervention State Functionality Appreciation, by Self-Compassion and Group. Note. Low and High refer to one SD above and below the mean for self-compassion.

existing high positive body image, or feel the need to report a favourable experience with an intervention. Comparatively, our general public sample was at relatively lower risk of these issues.

Our findings also add to the evidence base for *Expand Your Horizon*. Alleva and colleagues established the original three-session format's effectiveness in improving trait body image among women with body image concerns (Alleva et al., 2015; Alleva, Diedrichs, Halliwell, Martijn, et al., 2018), rheumatoid arthritis (Alleva, Diedrichs, Halliwell, Peters, et al., 2018) and women who have undergone bariatric surgery (Alleva et al., 2023). Our findings add support to the single-session's impact on state body image, demonstrating that mothers, in addition to college-aged women (Alleva et al., 2016) benefit from this brief writing task. These findings point to future research testing the intervention among other groups of women, such as those experiencing menopause, or with different disabilities or chronic diseases that may lead to functional loss or decline.

Additionally, our findings echo those observed in other studies of functionality-based writing interventions (Mulgrew et al., 2017; Mulgrew et al., 2019; Weaver & Mulgrew, 2021), with improvements in state positive body image after short sessions of writing about body functionality. As observed in those studies, our control group also showed a small but significant improvement in positive body image. However, an important distinction between this body of previous work, and the current study, is the nature of the control task. For example, Mulgrew et al. (2019) used an active control task in which participants wrote about stress management, a topic that although not focused on functionality, might be expected to bestow some benefit to wellbeing. Comparatively, we used a passive control task in which participants reflected on the functionality of common household items, with no expectation that participants would experience any benefit to body image. It is possible that the improvements in our control group may have occurred simply from participating in research, or from demand effects. For example, our sample of mothers may have experienced increased wellbeing, which flowed on to their body image, as a result of having time to do something for themselves, whether that be writing about body functionality or something else, or, in the case of demand effects, they may have felt an expectation to report improved body image, regardless of experimental group. However, the considerably larger effects of improvement among the *Expand Your Horizon* participants ($d = 1.08$ for body appreciation; $d = 0.72$ for functionality appreciation), compared to control participants ($d = 0.46$ for body appreciation, $d = 0.29$ for functionality appreciation), provide compelling evidence that writing about body functionality was more beneficial than writing about item functionality.

In light of the growing evidence base showing that brief functionality-based writing tasks can improve state body image, a practical implication to now consider is how these temporary state improvements might contribute to lasting trait change. Given that previous research (Wallis et al., 2021) has shown that a multiple-session intervention may not be feasible, from a time perspective, for mothers, a direction for future research is testing the effect of repeated, spaced administrations of a single *Expand Your Horizon* session on both state and trait body image. For example, rather than three sessions within one week, sessions could be spaced out to once a week or fortnight. Over time, this less time-intensive format may give mothers the opportunity to regularly experience state-based positive emotions and thoughts about their body which, in line with broaden and build theory (Fredrickson, 2001), may translate to enduring improvements in trait positive body image.

Despite these positive findings, an important consideration is the diverse ways in which women experience motherhood, and how this might influence responses to interventions such as *Expand Your Horizon*. One relevant factor here, is the stage of motherhood that a woman is in. The current study included women with children up to the age of 10. However, bodily changes resulting from pregnancy may be more salient to the mother of a newborn baby compared to the mother of a 10-year-old. We made no predictions about how intervention outcomes might vary for women in these various stages of motherhood, and follow-up exploratory analyses revealed that, in our study, the age of a woman's youngest child, or the number of children she had, made no difference to the pattern of results observed in the overall sample. However, age of youngest child and number of children are still important factors to consider in future research.

Other factors that have been associated with increased body dissatisfaction but that were outside of the scope of the present study include functional challenges during motherhood such as infertility (Ozen et al., 2019), miscarriage (Ålgars et al., 2011), and difficulty breastfeeding (Gillen et al., 2021). Women who have experienced these and other functional challenges may find it difficult to reflect positively about their body's functionality. This is especially true given that, much like appearance ideals, a maternal ideal also exists (Rubin & Steinberg, 2011), which is characterised by optimal body functionality during motherhood. Where women perceive they have failed to meet this maternal ideal, focusing on maternal functionality may not improve body image. Alternatively, writing instructions may need to be adjusted to prompt women to focus on appreciation for those aspects of body functionality that are perceived positively, despite any existing or recent challenges. Optimal timing of the intervention could also be investigated and taken into account, for example to determine when *Expand Your Horizon* is likely to be most beneficial in light of perceived functional difficulties.

Having discussed these concerns, we still think that, with sensitive tailoring of intervention instructions, the diverse range of body functions included in *Expand Your Horizon*'s writing prompts may be helpful to all mothers, including those who have experienced functional challenges, or for whom the postpartum period was many years ago. In the current study, we advised mothers that they could write about functionality in any context they wished, including, but not limited to, motherhood. We recommend a similar approach for future evaluations of *Expand Your Horizon*, as these instructions encouraged mothers who had positive or recent maternal functional experiences to capitalise on the benefits of writing about them, but also ensured that women with less positive experiences, or for whom the postpartum period had become less salient over time, were able to reflect on other functions, and experience the same benefits to body image. The majority of our participants (>90%) mentioned motherhood in at least some of their writing task content, however it was beyond the scope of this study to explore if this was done so from a positive or negative perspective. Thus, qualitative analysis of writing content would be an effective method to explore how content valence affects intervention outcomes.

A secondary aim of the present study was to examine the potential moderating role of trait self-compassion. Self-compassion did not moderate the effect of *Expand Your Horizon* on body appreciation, but it did moderate the effect of the intervention on functionality appreciation. However, this was in the opposite direction to what we predicted, with individuals with low initial levels of self-compassion showing larger increases in functionality appreciation. Given that those low in self-compassion tend to be less appreciative of their bodies (Turk & Waller, 2020), mothers low in self-compassion may be particularly vulnerable to the body dissatisfaction that develops, in the absence of more protective positive body image, in cultures where women are objectified (Fredrickson & Roberts, 1997). They may be more likely to internalise this objectified view of the body, and think of their body primarily in terms of its physical appearance. Thus, *Expand Your Horizon's* focus on body functionality may have presented a new, relatively unconsidered perspective of the body for mothers low on self-compassion, shifting their attention away from their physical appearance, towards functionality. This may explain why the moderating effect was only seen for functionality appreciation, not body appreciation. The functionality appreciation items referred to being satisfied with and appreciative of what the body can do, which is what mothers focused on when they completed *Expand Your Horizon*. Comparatively, the body appreciation

items referred to more general feelings of love for, and comfort within, the body. These items may have been more difficult for women with low self-compassion to identify with, and a single writing session may not have been powerful enough to effect changes on these items. Comparatively, highly self-compassionate mothers in our study may have already had high levels of functionality appreciation, leaving little room for improvement from the intervention. Taken together, the differing outcomes for participants with low and high self-compassion indicate that *Expand Your Horizon* is likely to be most effective, and most needed, among participants with low self-compassion.

The finding that this intervention is more beneficial for mothers with low self-compassion presents important practical and clinical considerations. Given the established relationship between self-compassion and body image (Turk & Waller, 2020), mothers with either low self-compassion or body appreciation are more likely to benefit more from *Expand Your Horizon*. A logical point at which to identify women who meet these criteria is in early pregnancy, when most women have contact with at least one medical professional (Australian Institute of Health and Welfare, 2022). Just as pregnant women are routinely screened for depression and anxiety (Department of Health, 2020), a similar process could be used to identify women who may benefit from additional body image support. These women may be identified using body image profiles, such as those pioneered by Raspovic et al. (2022). Given that body dissatisfaction in pregnancy may be predictive of postpartum depression (Riquin et al., 2019), and the capacity for brief self-compassion and body functionality tasks to have a broad spectrum positive benefit for body image and mental health, it would also be prudent to embed these into antenatal education classes.

Despite its strengths, our brief, online experimental design had some limitations. For example, the design was not an appropriate setting to capture information about maternal functional challenges such as infertility, use of assisted reproductive treatment, miscarriage, and difficulties during childbirth and with breastfeeding. Relatedly, we did not capture whether mothers were biological or non-biological (i.e., adoptive, foster) mothers. These are important factors for future research to consider in relation to how women respond to an intervention such as *Expand Your Horizon*. While we analysed time taken to complete the task, and number of words written, and reviewed written content, we were ultimately unable to control what women wrote about during the task. In response to this, we recommend exploration of these sensitive issues via future qualitative research to capture women's maternal experiences and their responses to *Expand Your Horizon* in a supportive, one on one setting.

Additionally, two limitations exist in relation to our measures. Firstly, our brief experimental design relied on a small number of items to measure our key outcomes of state body appreciation and functionality appreciation. To minimise respondent burden and keep measures consistent, we adapted the 2-item short-form version of the BAS-2 (Tylka et al., 2022), rather than using Homan's (2016) 10-item SBAS-2. For functionality appreciation, in the absence of a state measure of this construct, we used two items that captured satisfaction with, and appreciation of, what the body can do. Brief measures such as these lend themselves well to experimental settings capturing immediate state responses to interventions, and have been used previously to measure functionality satisfaction (e.g., Alleva et al., 2014; Alleva et al., 2016). However, they are limited, compared to lengthier measures, in their ability to fully capture the constructs of functionality appreciation and satisfaction. Secondly, we captured participants' BMI as a variable of interest, but acknowledge the general limitations of this measure (Tomiyama et al., 2016) and its potential for harm in maternal populations (Incollingo Rodriguez et al., 2020). There is an established negative relationship between BMI and body image in general female populations (Weinberger et al., 2016), and between increased BMI and the maternal function of breastfeeding (Lyons et al., 2018), with the latter relationship mediated, at least partially, by body image (Swanson et al., 2017). Thus, despite acknowledging BMI's limitations (Tomiyama et al., 2016) and potential for harm (Incollingo Rodriguez et al., 2020), which we minimised by asking optional self-report questions about height and weight, we felt it was important to establish whether there were any between-group differences for BMI, as this may have influenced our results.

Overall, our findings support the use of a brief single session version of *Expand Your Horizon* for mothers, particularly those low in self-compassion, with generalisability to a broader maternal population. Future research directions include testing the intervention in other populations who may struggle with functional challenges, longitudinal testing of the less time-intensive single-session version of the intervention, and qualitative analysis of writing task content. Practical and clinical implications include tailoring of the intervention to encourage holistic appreciation of body functionality and efficient screening of women who may benefit most from the intervention.

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CRediT authorship contribution statement

Philippa Granfield: Methodology, Validation, Formal analysis, Investigation, Data curation, Conceptualization, Writing - original draft, Writing - review & editing. **Eva Kemps:** Supervision, Conceptualisation, Writing – review & editing. **Zali Yager:** Writing – review & editing. **Jessica M. Alleva:** Writing – review & editing. **Ivanka Prichard:** Supervision, Conceptualisation, Methodology, Investigation, Writing – review & editing.

Declaration of Competing Interest

None. 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.

Data Availability

Data will be made available on request.

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