



The Effect of Body-Focused Positive Psychology Interventions on Behavioural Intentions, Body Esteem, and Body Compassion

Amelia Dennis¹ · Jane Ogden²

Accepted: 16 October 2023
© The Author(s) 2023

Abstract

Positive psychology interventions increase well-being and some health outcomes. In this experimental study, we assessed three positive psychology interventions (nostalgia, gratitude, and best possible self (BPS) as a means to manage weight, diet and activity and increase body esteem. Participants ($n=178$) who had gained weight during the pandemic were randomly assigned to one of four interventions: nostalgia, gratitude, BPS, or control. Participants completed pre- and post-intervention measures of behavioural intentions and body esteem, as well as outcome measures of body compassion and affect. The results showed significant differences by intervention for intention to lose weight, intention to diet, intention to exercise, body kindness, and positive and negative affect. The BPS intervention increased intention to lose weight, whereas the gratitude intervention increased intention to exercise, aspects of body compassion, positive affect, but reduced the intention to lose weight and negative affect. Overall, positive psychology interventions promote body compassion and positive health behaviour intentions and therefore may have the potential to help manage weight.

Keywords Nostalgia · Gratitude · best Possible self · body Beliefs · Behaviour

✉ Amelia Dennis
ad2746@bath.ac.uk

¹ University of Bath, Bath, UK

² University of Surrey, Guildford, UK

1 Introduction

The prevalence of obesity has risen since the start of the COVID-19 pandemic in 2020 (Office for Health Improvements and Disparities, 2022). In light of this increase and the links between COVID and more serious health outcomes (Yang et al., 2021), public health campaigns such as “Better Health” (Department of Health and Social Care, 2020) were run to promote weight loss. These public health campaigns, however, were often deemed to be stigmatising and fear-mongering (Stewart & Ogden, 2022; Bristow et al., 2020; Simpson et al., 2019). Furthermore, traditional weight management interventions involving behaviour change techniques show only marginal weight losses and high levels of weight loss regain (Gloy et al., 2013).

One more novel approach to improving health and reducing the prevalence of obesity is the use of positive psychology interventions. Sin and Lyubomirsky (2009) defined positive psychology interventions as activities that increase positive emotions, behaviours, or cognitions. In this study, we focus on three positive psychology interventions: nostalgia, gratitude, and best possible self (BPS) as a means to promote weight-related health outcomes.

Nostalgia is a mixed emotion defined as “a sentimental longing or wistful affection for the past” (The New Oxford Dictionary of English, 1998). Nostalgia has been shown to increase well-being and positive emotions (Hepper & Dennis, 2022). In terms of eating, after a short nostalgia induction (vs. control) people reported more favourable attitudes towards healthy eating and engaged in less unhealthy food consumption, to a small effect (Lasaleta et al., 2021). In addition, a short nostalgia intervention, compared to a control, increased positive health attitudes and physical activity to medium effects (Kersten et al., 2016).

Gratitude is a positive emotion that has been defined as a sense of thankfulness and joy (Emmons, 2004; Fredrickson, 2004). Meta-analyses have shown that gratitude interventions increase well-being, happiness, and positive affect (Davis et al., 2016; Dickens, 2017). A systematic review demonstrated that gratitude interventions increased physical health such as sleep quality, blood pressure, asthma control, and eating behaviour (Boggiss et al., 2020). Gratitude has also been shown to increase body esteem while reducing dysfunctional eating and body dissatisfaction (Wolfe & Patterson, 2017). Last, in adapting a gratitude intervention to be body-focused, Dunaev et al. (2018) found gratitude, compared to a control, increased body satisfaction and reduced internalised weight bias, to a small effect size.

Optimism is the tendency to believe that the future has positive outcomes (Peters et al., 2010). The BPS intervention induces optimism by asking participants to describe their best possible future self in which everything has worked out well for them (Peters et al., 2010). BPS has been shown to increase well-being and positive affect (Carrillo et al., 2019; Heckerens & Eids, 2021). BPS also has been shown to have a positive impact on health through reducing health centre visits and physical illness symptoms, both to a medium effect (Maddalena et al., 2014).

As we can see, all three positive psychology interventions have been shown to have a positive impact on well-being. However, only nostalgia and gratitude have been shown to aid health attitudes, healthy eating, and body satisfaction (e.g., Dunaev et al., 2018; Kersten et al., 2016; Lasaleta et al., 2021) and the role of BPS on health

behaviours and body beliefs has not yet been examined. Previous research has compared the impact of nostalgia, gratitude, and the best possible self during the COVID-19 pandemic. First, Dennis et al. (2022) found that gratitude and BPS immediately led to greater social connectedness than nostalgia and BPS led to greater positive affect than the nostalgia intervention. Second, Dennis and Ogden (2022) looked at the impact of nostalgia, gratitude, and BPS over two weeks showing that at a one-week follow-up nostalgia, gratitude, and BPS reduced fear of COVID-19 compared to a control.

In the current study, we adapted three positive psychology interventions to have a body-focus to test the suitability of positive psychology interventions as methods of increasing physical health in the context of weight management. In doing this, we aimed to identify and compare the effects of nostalgia, gratitude, and BPS on weight-related behavioural intentions (to lose weight, diet, increase activity), body esteem, body compassion, and positive and negative affect. In this study, we capitalise on inducing short (two-minute) positive psychology interventions. Previous research (e.g., Dunaev et al., 2018; Keresten et al., 2016; Lasaleta et al., 2021) has also shown that short and single interventions have small to medium effects (compared to control). These short interventions have also been repeated across several weeks to produce increases in well-being (e.g., Dennis et al., 2022; Layous et al., 2022) and when these interventions are run repeatedly over a longer period, they can have greater effects (Bolier et al., 2013). However, in this study, we aimed to examine if one session of a positive psychology intervention has an impact on body compassion, body esteem, and behavioural intentions.

2 Method

2.1 Participants

Participants were 178 individuals who had gained weight during the COVID-19 pandemic and resided in the United Kingdom. The average participant was 36 years old, a woman, white, worked full-time and had not exercised in the last two weeks, see Table 1.

A priori power calculation (G*Power; Faul et al., 2007) indicated a required sample size of 172 based on an ANCOVA with medium effect size ($\eta_p^2=0.06$), power at 0.8, alpha at 0.05, four groups, and one covariate (the pre-measures). All participants were recruited through Prolific academic in exchange for monetary reward. We initially recruited 191 participants but 13 were removed due to not finishing the questionnaire ($n=7$), not completing the intervention ($n=2$), and taking over an hour to complete the questionnaire ($n=4$).

2.2 Measures

Participants completed demographics relating to age, gender, relationship status, occupation, ethnicity, and exercise levels at baseline. Although we had asked in a pre-screening question, we asked participants again if they had gained weight during

COVID-19 (“Have you gained weight during the COVID-19 pandemic?”). Participants then completed measures of behavioural intentions (to lose weight, diet and increase activity) and body esteem (face and body satisfaction) before and immediately after the intervention and additional measures of body compassion and positive and negative affect after the intervention. The latter measures were only completed after the intervention to avoid priming effects. Further details of the materials and data are available on the Open Science Framework (<https://osf.io/836jq/>). The reliability of variables was assessed using Cronbach’s alphas, both before and after the intervention where appropriate, see Table 2 for the Cronbach’s alpha of all variables.

2.2.1 Behavioural Intentions

Participants rated behavioural intentions for weight loss, dieting and increasing activity (Ogden & Arulgnanaseelan, 2017) for the following week on a scale ranging from Not at all (1) to Very much (5). Participants rated the following: (i) intention to change their diet (3 items e.g., “intend to eat more healthily”; “intend to eat less”; “intend to change your diet”); (ii) intention to be more active (3 items e.g., “intend to do more exercise”; “intend to be more active”; “intend to be less sedentary”); (iii) intention to lose weight (e.g., 2-items e.g., “intend to become a healthy weight”; “intend to manage your weight”).

We then assessed whether the eight items fit the three-factor structure. To do this, we ran a confirmatory factor analysis with a robust maximum likelihood estimator using the lavaan package in R (Rosseel, 2012). The model fits the data, $\chi^2(17) = 31.29$, $p = .018$, CFI = 0.98, RMSEA = 0.07 (90% CI [0.03, 0.11]), with latent variable variance ranging from 0.15 to 0.75.

2.2.2 Body Esteem

Body esteem was assessed in terms of face and body satisfaction using the Face and Body cathexis scale (Furnham & Greaves, 1994). Participants rated their satisfaction with 18 body parts (e.g., “waist”) and their overall appearance from Very dissatisfied (1) to Very satisfied (5). All items were summated for face and body satisfaction.

2.2.3 Body Compassion

Body compassion was measured using the Body Compassion and Criticism Scale (BoCCS; Beadle, 2020). The scale includes four subscales all comprising of 4-items: body kindness (e.g., “I accept the flaws in my body, even if I don’t like them”), common humanity (e.g., “I am sure everyone has insecurities about their bodies”), motivation action (e.g., “I am trying to become more accepting of my body”), and body criticism (e.g., “I am starting to think that I worry about my body too much”). All items were rated on a scale from Not at all (1) to Very much (5).

Table 1 Participants Demographics by Intervention

	All (n=178)					Control (n=42)	F	p
	M (SD)	Nostalgia (n=44)	Gratitude (n=47)	BPS (n=45)	Control (n=42)			
Age (range: 18 to 69 years old)	35.90	12.51	12.47	12.87	34.69	12.10	12.83	0.43
Gender								11.85
Woman	n (%) = 135	75.8	88.6	33	30	66.7	33	78.6
Man	n (%) = 41	23.0	11.4	14	13	28.9	9	21.4
Non-binary	n (%) = 2	1.1	0	2	2	4.4		
Relationship Status								12.92
Single	n (%) = 60	33.7	15	34.1	11	23.4	15	33.3
Dating one or more people	n (%) = 9	5.1	3	6.8	1	2.1	3	6.7
In a committed relationship	n (%) = 43	24.2	11	25.0	17	36.2	7	15.6
Engaged/married	n (%) = 65	36.5	15	34.1	18	38.2	19	42.2
Other	n (%) = 1	0.6	0	0.0	0	0.0	1	2.2
Occupation								21.11
Student	n (%) = 25	14.0	6	13.6	5	10.6	8	17.7
Employed full-time	n (%) = 76	42.7	19	43.2	22	46.8	20	44.4
Employed part-time	n (%) = 27	15.2	5	11.4	9	19.1	3	6.7
Parent/carer/home-maker	n (%) = 10	5.6	2	4.5	3	6.4	2	4.4
Self-employed	n (%) = 19	10.7	4	9.1	6	12.8	7	15.6
Retired	n (%) = 5	2.8	1	2.3	1	2.1	2	4.4
Unable to work	n (%) = 9	5.1	3	6.8	1	2.1	3	6.7
Unemployed	n (%) = 6	3.4	3	6.8	0	0.0	0	0.0
Other	n (%) = 1	0.6	1	2.3	0	0.0	0	0.0
Ethnicity								7.04
Asian	n (%) = 14	7.9	5	11.4	2	4.3	3	6.7
Black	n (%) = 11	6.2	3	6.8	2	4.3	4	8.9
White	n (%) = 146	82.0	34	77.3	42	89.4	36	80.0
Mixed	n (%) = 6	3.4	2	4.5	1	2.1	2	4.4
Other	n (%) = 1	0.6	0	0.0	0	0.0	0	0.0
Number of times outside in the last two weeks for exercise?								14.94
Not at all	n (%) = 93	52.2	29	65.9	17	36.2	25	55.6
								22
								52.4

Table 1 (continued)

	All (<i>n</i> =178)	Nostalgia (<i>n</i> =44)	Gratitude (<i>n</i> =47)	BPS (<i>n</i> =45)	Control (<i>n</i> =42)	χ^2	<i>F</i>	<i>p</i>
Several times a week	53 <i>n</i> (%) = 29.8	7 15.9	18 38.3	12 26.7	16 38.1			
Once a day	24 <i>n</i> (%) = 13.5	5 11.4	10 21.3	7 15.6	2 4.8			
More than once a day	8 <i>n</i> (%) = 4.5	3 6.8	2 4.3	1 2.2	2 4.8			

Table 2 Cronbach's Alpha of Variables

	Pre-Intervention	Post-Intervention
Intention To Change Diet	0.71	0.77
Intention To Become More Active	0.86	0.88
Intention To Lose Weight	0.79	0.84
Body Esteem	0.89	0.92
Body Kindness		0.88
Common Humanity		0.84
Motivation Action		0.75
Body Criticism		0.69
Positive Affect		0.88
Negative Affect		0.92
Nostalgia Manipulation Check		0.95
Gratitude Manipulation Check		0.92
Optimism Manipulation Check		0.87

2.2.4 Positive and Negative Affect

State affect was measured using the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988). Participants rated how much they are experiencing 20 emotions, 10 positive (e.g., “Excited”) and 10 negative emotions (e.g., “Scared”), all rated on a scale from Not at all (1) to Very much (5).

2.2.5 Manipulation Check

The effectiveness of the interventions to induce nostalgia, gratitude, or optimism was assessed using manipulation checks. Each scale had three items and all items were rated on a scale from Strongly Disagree (1) to Strongly Agree (6). We used the Nostalgia Manipulation Check (Wildschut et al., 2006; e.g., “I had nostalgic feelings”) to measure state nostalgia. We used an adapted version of gratitude-related feelings (Emmons & McCollough, 2003; e.g., “I felt grateful”) to measure state gratitude. Last, an adapted version of the dispositional Life Orientation Test-Revised (Scheier et al., 1994; e.g., “I thought good things will happen to me”) was used to measure state optimism.

2.2.6 Intervention

The study used an experimental design with four interventions: nostalgia, gratitude, BPS and control.

2.3 Nostalgia

Participants in the nostalgia intervention completed an adapted version of the Event Reflection Task (ERT; Sedikides et al., 2015b). Participants were provided with a definition of nostalgia (‘sentimental longing for the past’) and asked to “Please think

of aspects of your body, from before the COVID-19 pandemic, that you are nostalgic about. This can be anything, including your health, physical appearance, or the functionality of your body. Specifically, try to think of a pre-COVID-19 event that makes you feel most nostalgic about aspects of your body. Bring this nostalgic experience to mind. Immerse yourself in the nostalgic experience. How does it make you feel?" Participants were asked to write a short summary of their nostalgic experience.

2.4 Gratitude

Participants in the gratitude intervention completed the body gratitude induction (Dunaev et al., 2018). Participants were asked to "Please think about aspects of your body that you are grateful for. This can be anything, including your health, physical appearance, or the functionality of your body. Try to come up with at least three things. Take a minute and really think about those things, picturing them in your mind." Participants then wrote about three aspects of their body they were grateful for and for each item they also wrote why they were grateful for this.

2.5 Best Possible Self

Participants in the BPS intervention completed an adapted version of Peters et al.'s (2010) BPS intervention. Participants were asked to think about their best possible self in terms of aspects of their body: 'Think about your best possible self in terms of aspects of your body' means that you imagine yourself in the future, after the COVID-19 pandemic has ended, you have worked hard and succeeded at accomplishing all the goals for your body. Think of this as the realization of your dreams, and that you have reached your full body potential, this can be anything, including your health, physical appearance, or the functionality of your body. Thus, you identify the best possible way that things might turn out." Then participants were asked to write down a short summary of their thoughts and feelings.

2.6 Control

Participants in the control completed a previously used control (Dennis et al., 2022; Dennis & Ogden, 2022). Participants were asked to "think of a plot of a show that you have watched recently" and then participants wrote a short summary of the plot.

2.7 Procedure

Participants all completed the study online through Qualtrics. Participants first completed measures of demographics, behavioural intentions and face and body satisfaction. Then participants were then randomly assigned to one of four interventions: nostalgia, gratitude, BPS, or control. In each intervention, they had to stay on the page for two minutes before they could move on to the next question. Following the intervention, participants completed the measures of behavioural intentions, body esteem, body compassion, positive and negative affect, and the manipulation checks.

3 Results

3.1 Data Analysis

Data was analysed using a series of ANOVAs and ANOCVAs to assess the manipulation effects and the impact of the interventions.

3.2 Manipulation Check

We conducted manipulation checks through one-way ANOVAs and further examined using post hoc tests with Bonferroni correction (see Table 3). The results showed that participants in the nostalgia intervention reported significantly higher state nostalgia than those in the gratitude, BPS, and control interventions. Second, participants in the gratitude intervention showed significantly higher state gratitude than those in the nostalgia, BPS, or control intervention. Last, participants in the BPS and gratitude intervention reported significantly higher state optimism than participants in the nostalgia and control.

3.3 Difference by Intervention

3.3.1 Changes in Body Compassion and Affect

To examine the effect of the intervention, we ran a series of ANOVAs to assess the difference by intervention on body compassion (body kindness, common humanity, motivation action, body criticism), positive affect, and negative affect (see Table 4). The results showed significant differences by intervention for body kindness, positive affect, and negative affect. Participants in the gratitude intervention reported higher body kindness than participants in the BPS and control intervention, to a medium effect. Participants in the gratitude intervention showed greater positive affect than participants in the nostalgia intervention, to a medium effect. Further, participants in the gratitude intervention reported less negative affect than those in the nostalgia, BPS, or control intervention, with small and medium effects.

3.4 Changes in Intentions and Body Esteem

To examine the effect of the intervention on change in intentions and body esteem we ran a 2 (time: pre, post) X 4 (intervention: nostalgia, gratitude, BPS, control) mixed ANOVA on body cathexis, intention to lose weight, intention to increase activity, intention to diet and body esteem (see Table 5).

We found a significant time by intervention interaction on the intention to lose weight and the intention to increase activity. Post hoc analyses using paired sample t-tests showed that there was a significant increase in intention to lose weight from pre- to post-intervention in the BPS intervention ($t[44]=3.65, p<.001, d=0.65$), to a medium effect. There was a significant decrease in intention to lose weight from pre- to post-intervention in the gratitude intervention [$t(46)=2.11, p=.020, d=0.38$], to a small effect. However, there were no significant differences in intention to lose

Table 3 Manipulation Checks by Intervention

	All N=178		Nostalgia (1) n=44		Gratitude (2) n=47		BPS (3) n=45		Control (4) n=42		Main effect of intervention		Post hoc	
	M	SD	M	SD	M	SD	M	SD	M	SD	F(1, 177)	p		η_p^2
Nostalgia Manipulation	3.50	1.36	4.31	1.13	3.15	1.23	3.37	1.20	3.20	1.58	7.78	0.000	0.12	1 > 2, 3, 4*** d=0.94, d=0.78, d=0.70
Gratitude Manipulation	3.89	1.31	3.50	1.26	4.40	1.09	3.79	1.28	3.83	1.46	3.93	0.010	0.06	2 > 1***, 3*, 4* d=0.71, d=0.48, d=0.39
Optimism Manipulation	3.78	1.19	3.42	1.20	4.06	0.94	4.07	1.18	3.53	1.29	3.97	0.009	0.06	3 > 1**, 4* d=0.54, d=0.42 2 > 1**, 4* d=0.53, d=0.41

Table 4 Outcome Variables by Intervention

	All N=178		Nostalgia (1) n=44		Gratitude (2) n=47		BPS (3) n=45		Control (4) n=42		Main effect of intervention		Post hoc	
	M	SD	M	SD	M	SD	M	SD	M	SD	F(1, 177)	p		η_p^2
Body Kindness	2.92	1.01	2.94	0.94	3.34	0.89	2.73	1.07	2.65	1.01	4.45	0.005	0.07	2>3, 4*** d=0.57, d=0.68
Common Humanity	4.13	0.73	4.15	0.61	4.12	0.87	4.12	0.75	4.14	0.67	0.02	0.996	0.00	
Motivation Action	3.49	0.72	3.60	0.79	3.58	0.64	3.35	0.72	3.41	0.74	1.34	0.264	0.02	
Body Criticism	2.55	0.82	2.59	0.75	2.34	0.81	2.61	0.84	2.68	0.87	1.58	0.197	0.03	
Positive Affect	2.74	0.75	2.50	0.83	2.94	0.67	2.71	0.76	2.80	0.68	2.79	0.042	0.05	2>1* d=0.53
Negative Affect	1.90	0.83	2.05	0.80	1.56	0.65	2.00	0.93	2.01	0.86	3.63	0.014	0.06	1***, 3*, 4*** > 2 d=0.61, d=0.47, d=0.52

Note. *** p<.005, **p<.010, *p<.050

Table 5 Pre- and Post- Outcome Variables by Intervention

	All N=178		Nostalgia n=44		Gratitude n=47		BPS n=45		Control n=42		Time by interven- tion interaction F(3, p 174)	η_p^2	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post			
Body Esteem	3.04 (0.64)	3.19 (0.72)	3.08 (0.67)	3.24 (0.73)	3.23 (0.65)	3.37 (0.66)	2.97 (0.66)	3.20 (0.72)	2.85 (0.51)	2.94 (0.72)	0.69	0.559	0.01
Weight Loss Intentions	3.80 (0.77)	3.87 (0.78)	3.85 (0.85)	3.81 (0.96)	3.79 (0.66)	3.67 (0.66)	3.84 (0.68)	4.20 (0.48)	3.71 (0.88)	3.83 (0.77)	7.95	<0.001	0.12
Physical Activity Intentions	3.72 (0.81)	3.85 (0.84)	3.61 (0.91)	3.72 (0.90)	3.82 (0.60)	4.00 (0.66)	3.73 (0.70)	4.03 (0.79)	3.71 (1.00)	3.65 (0.97)	3.27	0.023	0.05
Diet Intentions	3.63 (0.77)	3.69 (0.80)	3.73 (0.84)	3.77 (0.93)	3.53 (0.74)	3.58 (0.83)	3.63 (0.64)	3.73 (0.54)	3.62 (0.84)	3.71 (0.86)	0.22	0.884	0.00

weight from pre- to post-intervention in the nostalgia ($t[43]=0.87, p=.196, d=0.04$) and control ($t[41]=1.43, p=.080, d=.25$) intervention.

In terms of intention to increase activity, post hoc analyses showed that there was a significant increase from pre-intervention to post-intervention intention to increase activity scores in the gratitude ($t[46]=2.78, p=.004, d=0.45$) and BPS intervention ($t[44]=3.41, p<.001, d=0.60$), to a small and medium effect, respectively. However, there was no significant change from pre- to post-intervention intention to increase activity scores in the nostalgia ($t[43]=1.35, p=.092, d=0.12$) and control ($t[41]=3.41, p=.274, d=0.06$).

There were no significant interacting effects of time or intervention on body esteem (body or face satisfaction) or intention to diet.

4 Discussion

In the current study, we aimed to explore and compare the effects of three positive psychology interventions (nostalgia, gratitude, and BPS) on health behavioural intentions, body compassion, body esteem, and affect. The findings demonstrated that those in the gratitude intervention increased intention to exercise but a reduced intention to diet. In addition, gratitude increased body kindness and positive affect while lowering negative affect, relative to the control. In contrast, BPS increased the intention to exercise and the intention to lose weight. In doing this we extend the findings of previous studies (e.g., Dennis et al., 2022; Dennis & Ogden, 2022) to show the application of positive psychology interventions to health behaviour intentions.

In this study, gratitude led to greater body compassion, to a medium effect. This is in line with previous research on body image, which has found repeated gratitude interventions increased a positive body image however effect sizes have ranged from small to large effects in these studies (Geraghty et al., 2010; Wolfe & Patterson, 2017). Specifically, body-focused gratitude has been shown to reduce internalised weight bias to a small effect (Dunaev et al., 2018). We suggest the gratitude intervention increases body compassion which in turn increases the intention to exercise. Positive body image predicts greater physical activity (Deforche et al., 2006; Markland & Ingledew, 2007; Markland, 2009; Sun et al., 2018), regardless of individuals' Body Mass Index (Kantanista et al., 2015). Body compassion could increase the motivation to engage in physical activity by decreasing the pressure to conform to societal standards as seen with body image (Markland & Ingledew, 2007; Teixeira et al., 2012). Beyond increased physical activity, a more positive body image leads to greater weight loss (Palmeira et al., 2009, 2010). However, in this study, participants in the gratitude intervention showed decreases in intention to lose weight, but only to a small effect. As we only explored short-term changes from the intervention, we do not know the effect that reduction in intention to weight loss will have on behaviour but overall, as the gratitude intervention is shown to increase body compassion and intention to exercise, therefore, may provide an effective intervention to reduce obesity.

BPS resulted in changes in behavioural intentions: BPS increased the intention to lose weight, to a medium effect size. This supports findings that show greater opti-

mism in goal attainment predicts greater weight loss (Benyamini & Raz, 2007) and suggests that body-related optimism is beneficial for weight loss intention and behaviour. BPS also led to increased intention to exercise. Anderson et al. (2020) found that optimism positively correlated with exercise self-efficacy, which in turn predicts next-day exercise behaviour (Kangas et al., 2015). Therefore, the optimism induced through BPS may increase exercise self-efficacy in turn increasing intentions to exercise, this could go on to potentially increase exercise behaviour. BPS increasing both intentions to lose weight and exercise supports previous research showing BPS has a positive impact on health behaviour. For example, BPS aids diabetes management and reduces health centre visits, both to a medium effect size (Gibson et al., 2021; Maddalena et al., 2014). Altogether these findings suggest that BPS has a beneficial impact on health behaviour intentions.

Nostalgia did not impact health behavioural intentions. This is not in line with previous research that found nostalgia increases favourable attitudes towards healthy eating and reduces unhealthy food consumption, to a small effect (Lasaleta et al., 2021). Previous research has also shown nostalgia's health benefits such as more positive health attitudes (Kersten et al., 2016). A recent review suggests nostalgia may lead to better eating behaviour by increasing self-control through social support (Kersten & Cox, 2023), therefore, it may be that adapting the intervention to have a body-focus limits the effects of nostalgia.

Together, the results demonstrate the potential of positive psychology interventions for weight loss, health behaviours, body esteem and affect. It has been previously suggested that weight loss treatments should also aim to improve well-being (e.g., Hill & Billington, 2002; Wadden et al., 2002), however, this research suggests that well-being interventions could be used for weight loss or management treatments. Interventions that work on well-being, as well as health behaviours, may facilitate the use of psychological resources and thus greater adherence to health behaviours (Palmeria et al., 2010). Thus, positive psychology interventions could be used as interventions for weight loss.

4.1 Limitations

Our study has limitations. First, we looked at the immediate effect of two minutes in engaging in one of three positive psychology interventions, therefore, this study only shows the short-term effects of the interventions and does not show any potential longer-term impacts. However, these interventions may also have longer-term impacts. Interventions that are run longer-term show greater effects on outcomes (Bolier, 2013). Second, we had a small sample size and consequently small experimental groups, with less than 50 participants undergoing each intervention and as a result, the current study may lack statistical power. Therefore, future studies should use a larger sample to assess the longer-term effects of these positive psychology interventions on body compassion and behavioural intentions. Third, we assessed behavioural intentions rather than the actual behaviour of losing weight, dieting, and increasing physical activity. Therefore, future studies should assess whether positive psychology interventions can impact behaviour alongside behavioural intentions. Fourth, we measured if participants gained weight using self-report measures that

may be biased. Further to this, we did not measure how much weight participants had gained during the COVID-19 pandemic, future research should assess whether amount of weight gained has an influence on the effectiveness of these interventions.

5 Conclusions

In conclusion, we found that using body-focused positive psychology interventions improved health behaviour intention, body compassion, and affect. This can lead to future work examining whether positive psychology interventions can be harnessed to promote weight loss, behaviour change, body esteem and improved affect. Further, the results show that different interventions resulted in different changes. In particular, gratitude led to higher body kindness, intention to exercise, and positive affect, but reduced negative affect and intention to lose weight; whereas, the BPS intervention increased the intention to lose weight. This demonstrates positive psychology interventions' greater applicability and potential benefit in treating obesity.

Funding None.

Data Availability The data that support the findings of this study are available on the Open Science Framework (<https://osf.io/836jq>).

Ethical Approval Ethical approval was gained by the University of Surrey's Research Integrity and Governance Office prior to recruiting participants. All participants provided informed consent prior to participation. The procedure of the study is in line with relevant guidelines and regulations such as the BPS Code of Ethics and Conduct and GDPR.

Conflict of Interest None.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- Anderson, C. L., & Feldman, D. B. (2020). Hope and Physical Exercise: The contributions of Hope, Self-Efficacy, and Optimism in Accounting for Variance in Exercise frequency. *Psychological Reports, 123*(4), 1145–1159. <https://doi.org/10.1177/0033294119851798>.
- Beadle, E. (2020). Body Shame, Body Compassion and Physical Activity [Doctoral Thesis, University of Hertfordshire]. <https://doi.org/10.18745/th.22613>.
- Benyamini, Y., & Raz, O. (2007). I can tell you if I'll really lose all that weight: Dispositional and situated optimism as predictors of weight loss following a group intervention. *Journal of Applied Social Psychology, 37*(4), 844–861. <https://doi.org/10.1111/j.1559-1816.2007.00189.x>.

- Boggiss, A. L., Consedine, N. S., Brenton-Peters, J. M., Hofman, P. L., & Serlachius, A. S. (2020). A systematic review of gratitude interventions: Effects on physical health and health behaviors. *Journal of Psychosomatic Research*, *135*, 110165. <https://doi.org/10.1016/j.jpsychores.2020.110165>.
- Bolier, L., Haverman, M., Westerhof, G. J., Riper, H., Smit, F., & Bohlmeijer, E. (2013). Positive psychology interventions: A meta-analysis of randomized controlled studies. *BMC Public Health*, *13*(1), 1–20. <https://doi.org/10.1186/1471-2458-13-119>.
- Bristow, C., Meurer, C., Simmonds, J., & Snell, T. (2020). Anti-obesity public health messages and risk factors for disordered eating: A systematic review. *Health Promotion International*, *35*(6), 1551–1569. <https://doi.org/10.1093/heapro/daaa018>.
- Carrillo, A., Rubio-Aparicio, M., Molinari, G., Enrique, Á., Sánchez-Meca, J., & Baños, R. M. (2019). Effects of the best possible self intervention: A systematic review and meta-analysis. *PLoS One*, *14*(9), e0222386. <https://doi.org/10.1371/journal.pone.0222386>.
- Davis, D. E., Choe, E., Meyers, J., Wade, N., Varjas, K., Gifford, A., & Worthington, E. L. Jr. (2016). Thankful for the little things: A meta-analysis of gratitude interventions. *Journal of Counseling Psychology*, *63*(1), 20. <https://doi.org/10.1037/cou0000107>.
- Deforche, B. I., De Bourdeaudhuij, I. M., & Tanghe, A. P. (2006). Attitude toward physical activity in normal-weight, overweight and obese adolescents. *Journal of Adolescent Health*, *38*(5), 560–568. <https://doi.org/10.1016/j.jadohealth.2005.01.015>.
- Dennis, A., & Ogden, J. (2022). Nostalgia, gratitude, or optimism: The impact of a two-week intervention on well-being during COVID-19. *Journal of Happiness Studies*, 1–22. <https://doi.org/10.1007/s10902-022-00513-6>.
- Dennis, A., Ogden, J., & Hepper, E. G. (2022). Evaluating the impact of a time orientation intervention on well-being during the COVID-19 lockdown: Past, present or future? *The Journal of Positive Psychology*, *17*(3), 419–429. <https://doi.org/10.1080/17439760.2020.1858335>.
- Department of Health and Social Care (2020). New obesity Strategy unveiled as country urged to lose weight to beat coronavirus (COVID-19) and protect the NHS. Available from: <https://www.gov.uk/government/news/new-obesity-strategy-unveiled-as-country-urged-to-lose-weight-to-beat-coronavirus-covid-19-and-protect-the-nhs>.
- Dickens, L. R. (2017). Using gratitude to promote positive change: A series of meta-analyses investigating the effectiveness of gratitude interventions. *Basic and Applied Social Psychology*, *39*(4), 193–208. <https://doi.org/10.1080/01973533.2017.1323638>.
- Dunaev, J., Markey, C. H., & Brochu, P. M. (2018). An attitude of gratitude: The effects of body-focused gratitude on weight bias internalization and body image. *Body Image*, *25*, 9–13. <https://doi.org/10.1016/j.bodyim.2018.01.006>.
- Emmons, R. A. (2004). Gratitude. In C. Peterson, & M. E. P. Seligman (Eds.), *Character strengths and Virtues* (pp. 553–568). Oxford University Press.
- Emmons, R. A., & McCullough, M. E. (2003). Counting blessings versus burdens: An experimental investigation of gratitude and subjective well-being in daily life. *Journal of Personality and Social Psychology*, *84*(2), 377–389. <https://doi.org/10.1037/0022-3514.84.2.377>.
- Faul, F., Erdfelder, E., Lang, A. G., & Buchner, A. (2007). G* power 3: A flexible statistical power analysis program for the social, behavioral, and biomedical sciences. *Behavior Research Methods*, *39*(2), 175–191. <https://doi.org/10.3758/BF03193146>.
- Fredrickson, B. L. (2004). Gratitude, Like other positive emotions, broadens and builds. In R. A. Emmons, & M. E. McCullough (Eds.), *The psychology of gratitude* (pp. 145–166). Oxford University Press. <https://doi.org/10.1093/acprof:oso/9780195150100.003.0008>.
- Furnham, A., & Greaves, N. (1994). Gender and locus of control correlates of body image dissatisfaction. *European Journal of Personality*, *8*(3), 183–200. <https://doi.org/10.1002/per.2410080304>.
- Geraghty, A. W., Wood, A. M., & Hyland, M. E. (2010). Attrition from self-directed interventions: Investigating the relationship between psychological predictors, intervention content and dropout from a body dissatisfaction intervention. *Social Science & Medicine*, *71*(1), 30–37. <https://doi.org/10.1016/j.socscimed.2010.03.007>.
- Gibson, B., Umeh, K. F., Newson, L., & Davies, I. (2021). Efficacy of the best possible self protocol in Diabetes self-management: A mixed-methods approach. *Journal of Health Psychology*, *26*(2), 332–344. <https://doi.org/10.1177/1359105318814148>.
- Gloy, V. L., Briel, M., Bhatt, D. L., Kashyap, S. R., Schauer, P. R., Mingrone, G., & Nordmann, A. J. (2013). Bariatric surgery versus non-surgical treatment for obesity: a systematic review and meta-analysis of randomised controlled trials. *BMJ; (clinical research ed.)*, *347*, 1–16. <https://doi.org/10.1136/bmj.f5934>.

- Heckerens, J. B., & Eid, M. (2021). Inducing positive affect and positive future expectations using the best-possible-self intervention: A systematic review and meta-analysis. *The Journal of Positive Psychology*, 1–26. <https://doi.org/10.1080/17439760.2020.1716052>.
- Hepper, E. G., & Dennis, A. (2022). From rosy past to happy and flourishing Present: Nostalgia as a resource for hedonic and eudaimonic wellbeing. *Current Opinion in Psychology*. <https://doi.org/10.1016/j.copsyc.2022.101547>.
- Hill, J. O., & Billington, C. J. (2002). Obesity: Its time has come. *American Journal of Hypertension*, 15(7), 655–656. [https://doi.org/10.1016/S0895-7061\(02\)02936-9](https://doi.org/10.1016/S0895-7061(02)02936-9).
- Kangas, J. L., Baldwin, A. S., Rosenfield, D., Smits, J. A. J., & Rethorst, C. D. (2015). Examining the moderating effect of depressive symptoms on the relation between exercise and self-efficacy during the initiation of regular exercise. *Health Psychology*, 34(5), 556–565. <https://doi.org/10.1037/hea0000142>.
- Kantanian, A., Osiński, W., Borowicz, J., Tomczak, M., & Król-Zielińska, M. (2015). Body Image, BMI, and physical activity in girls and boys aged 14–16 years. *Body Image*, 15, 40–43. <https://doi.org/10.1016/j.bodyim.2015.05.001>.
- Kersten, M., & Cox, C. R. (2023). The past promotes the picture of health: Nostalgia as a resource for physical well-being. *Current Opinion in Psychology*, 101522. <https://doi.org/10.1016/j.copsyc.2022.101522>.
- Kersten, M., Cox, C. R., & Van Enkevort, E. A. (2016). An exercise in nostalgia: Nostalgia promotes health optimism and physical activity. *Psychology & Health*, 31(10), 1166–1181. <https://doi.org/10.1080/08870446.2016.1185524>.
- Lasaleta, J. D., Werle, C. O., & Yamim, A. P. (2021). Nostalgia makes people eat healthier. *Appetite*, 162, 105187. <https://doi.org/10.1016/j.appet.2021.105187>.
- Layous, K., Kurtz, J. L., Wildschut, T., & Sedikides, C. (2022). The effect of a multi-week nostalgia intervention on well-being: Mechanisms and moderation. *Emotion*, 22(8), 1952–1968. <https://doi.org/10.1037/emo0000817>.
- Maddalena, C. J., Saxey-Reese, R., & Barnes, E. L. (2014). Targeting writing interventions to emotional processing level: A factorial experimental design. *Quality & Quantity*, 48(6), 2939–2962. <https://doi.org/10.1007/s11135-013-9933-2>.
- Markland, D. (2009). The mediating role of behavioural regulations in the relationship between perceived body size discrepancies and physical activity among adult women. *Hellenic Journal of Psychology*, 6(2), 169–182.
- Markland, D., & Ingledew, D. K. (2007). The relationships between body mass and body image and relative autonomy for exercise among adolescent males and females. *Psychology of Sport and Exercise*, 8(5), 836–853. <https://doi.org/10.1016/j.psychsport.2006.11.002>.
- Office for Health Improvements and Disparities (2022). Obesity Profile update: July 2022. Available from: <https://www.gov.uk/government/statistics/obesity-profile-update-july-2022>.
- Ogden, J., & Arulgnanaseelan, J. (2017). Medically managing obesity: Offering hope or a disincentive to change? *Patient Education and Counseling*, 100(1), 93–97. <https://doi.org/10.1016/j.pec.2016.08.016>.
- Palmeira, A. L., Markland, D. A., Silva, M. N., Branco, T. L., Martins, S. C., Minderico, C. S., & Teixeira, P. J. (2009). Reciprocal effects among changes in weight, body image, and other psychological factors during behavioral obesity treatment: A mediation analysis. *International Journal of Behavioral Nutrition and Physical Activity*, 6(1), 1–12. <https://doi.org/10.1186/1479-5868-6-9>.
- Palmeira, A. L., Branco, T. L., Martins, S. C., Minderico, C. S., Silva, M. N., Vieira, P. N., & Teixeira, P. J. (2010). Change in body image and psychological well-being during behavioral obesity treatment: Associations with weight loss and maintenance. *Body Image*, 7(3), 187–193. <https://doi.org/10.1016/j.bodyim.2010.03.002>.
- Peters, M. L., Flink, I. K., Boersma, K., & Linton, S. J. (2010). Manipulating optimism: Can imagining a best possible self be used to increase positive future expectancies? *The Journal of Positive Psychology*, 5(3), 204–211. <https://doi.org/10.1080/17439761003790963>.
- Rosseel, Y. (2012). Lavaan: An R package for structural equation modeling. *Journal of Statistical Software*, 48, 1–36. <https://doi.org/10.18637/jss.v048.i02>.
- Scheier, M. F., Carver, C. S., & Bridges, M. W. (1994). Distinguishing optimism from neuroticism (and trait anxiety, self-mastery, and self-esteem): A reevaluation of the life orientation test. *Journal of Personality and Social Psychology*, 67(6), 1063–1078. <https://doi.org/10.1037/0022-3514.67.6.1063>.

- Sedikides, C., Wildschut, T., Routledge, C., Arndt, J., Hepper, E. G., & Zhou, X. (2015). To nostalgize: Mixing memory with affect and desire. In *Advances in experimental social psychology* (Vol. 51, pp. 189–273). Academic Press. <https://doi.org/10.1016/bs.aesp.2014.10.001>.
- Simpson, C. C., Griffin, B. J., & Mazzeo, S. E. (2019). Psychological and behavioral effects of obesity prevention campaigns. *Journal of Health Psychology, 24*(9), 1268–1281. <https://doi.org/10.1177/1359105317693913>.
- Sin, N. L., & Lyubomirsky, S. (2009). Enhancing well-being and alleviating depressive symptoms with positive psychology interventions: A practice-friendly meta-analysis. *Journal of Clinical Psychology, 65*(5), 467–487. <https://doi.org/10.1002/jclp.20593>.
- Stewart, S. J. F., & Ogden, J. (2022). Motivating or stigmatising? The public health and media messaging surrounding COVID-19 and obesity: A qualitative think aloud study. *Health Education, 122* No(4), 374–386. <https://doi.org/10.1108/HE-04-2021-0067>.
- Sun, W., Chen, D., Wang, J., Liu, N., & Zhang, W. (2018). Physical activity and body image dissatisfaction among pregnant women: A systematic review and meta-analysis of cohort studies. *European Journal of Obstetrics & Gynecology and Reproductive Biology, 229*, 38–44. <https://doi.org/10.1016/j.ejogrb.2018.07.021>.
- Teixeira, P. J., Carraça, E. V., Markland, D., Silva, M. N., & Ryan, R. M. (2012). Exercise, physical activity, and self-determination theory: A systematic review. *International Journal of Behavioral Nutrition and Physical Activity, 9*(1), 1–30. <https://doi.org/10.1186/1479-5868-9-78>.
- The New Oxford Dictionary of English (1998). *Oxford University Press*.
- Wadden, T. A., Brownell, K. D., & Foster, G. D. (2002). Obesity: Responding to the global epidemic. *Journal of Consulting and Clinical Psychology, 70*(3), 510. <https://doi.org/10.1037/0022-006X.70.3.510>.
- Watson, D., Clark, L. A., & Tellegen, A. (1988). Development and validation of brief measures of positive and negative affect: The PANAS scales. *Journal of Personality and Social Psychology, 54*(6), 1063. <https://doi.org/10.1037/0022-3514.54.6.1063>.
- Wildschut, T., Sedikides, C., Arndt, J., & Routledge, C. (2006). Nostalgia: Content, triggers, functions. *Journal of Personality and Social Psychology, 91*(5), 975–993. <https://doi.org/10.1037/0022-3514.91.5.975>.
- Wolfe, W. L., & Patterson, K. (2017). Comparison of a gratitude-based and cognitive restructuring intervention for body dissatisfaction and dysfunctional eating behavior in college women. *Eating Disorders, 25*(4), 330–344. <https://doi.org/10.1080/10640266.2017.1279908>.
- Yang, J., Hu, J., & Zhu, C. (2021). Obesity aggravates COVID-19: A systematic review and meta-analysis. *Journal of Medical Virology, 93*(1), 257–261. <https://doi.org/10.1002/jmv.26237>.

Publisher's Note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.