

MEDIATORS FOR PAST AND FUTURE BEST POSSIBLE SELVES

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The Different Effects of Temporal Orientation on Optimism and Life Satisfaction in the Relationship between a Best Possible Self Intervention and Well-Being

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Abstract

Background. BPS interventions are defined as a future-oriented exercise, while it is still unknown whether the future time frame is responsible for the beneficial effects on well-being (Carillo et al., 2020). Different temporal orientations can be attributed to positive emotions, which BPS exercises aim to increase: Research has related life satisfaction as a positive emotion to the past, and optimism to a future timeframe (Seligman, 2004). In this sense and with respect to traditional research on the difference between past and future selves (Berntsen & Bohn, 2010; Westerhof & Bohlmeijer, 2012; Sools et al., 2015), a past, as well as future temporal orientation should be respected when studying the efficacy of BPS interventions.

Aim. The purpose of this study was to examine the effects of a past and future BPS intervention over a control condition. Central to this work was to explore the association between a past BPS-condition and well-being as mediated by life satisfaction and the association between the future BPS-condition and well-being as mediated by optimism.

Methods. This study used a randomized controlled trial, allocating a sample of 290 participants to either a past ($n = 100$), future ($n = 95$) or a control ($n = 95$) BPS-condition. The two-week intervention was delivered via a guided mobile application. Participants in the BPS-future condition imagined their future BPS across different domains for two weeks. Participants in the BPS-past condition visualized their best version of themselves in the past for the first week, while in the second week, they were guided in imagining their future BPS. Participants in the control condition visualized their activities from the last 24 hours. Outcome measures were well-being, life satisfaction, and optimism, assessed at baseline, during, and after the intervention.

Results. Outcomes of RM-ANOVA revealed significant increases in well-being, life satisfaction, and optimism over time compared to baseline measures. No significant differences emerged between the conditions. PROCESS mediation analysis showed that neither life satisfaction nor optimism mediated the association between the past vs. future BPS-condition and well-being.

Conclusion. This study extends previous work by giving insights into the working mechanisms of an app-delivered BPS intervention. The nonsignificant differences between the past and future BPS in increasing optimism and life satisfaction, justify the absence of the expected mediation effects. Following, the processes of building a past and future BPS may interrelate (Addis et al., 2007) and equally contribute to people's well-being by promoting optimism and life satisfaction.

Keywords: Best Possible Self Intervention, past and future-BPS, working mechanisms

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The Different Effects of Temporal Orientation on Optimism and Life Satisfaction in the Relationship between a Best Possible Self Intervention and Well-Being

Living a wholesome and happy life is a goal shared by most people. Consequently, research on Positive Psychology strives towards shifting the focus away from what threatens a wholesome and happy life, towards developing new ways to promote it (Keyes et al., 2011). To put into practice the promotion of a happy and virtuous life, Positive Psychological Interventions (PPI) have emerged, aimed at increasing people's wellbeing by evoking positive feelings, cognitions, or behaviours (Chakhssi et al., 2018). The resulting positive emotions broaden the attention-scope of individuals engaging in PPIs and thus encourage gains in resources and novel exploratory thoughts and behaviours (Fredrickson, 2004). A well-established PPI that has been successful in promoting favourable outcomes such as higher well-being, optimism, and life satisfaction is the Best Possible Self (BPS) intervention (Sheldon & Lyubomirsky, 2006).

The BPS intervention is an imaginary exercise which, over the course of multiple days, prompts participants to imagine, and write about the best version of themselves in a future, where they have achieved their valued goals after working hard towards them (King, 2001). In addition, participants can also be asked to formulate steps for reaching their best possible self (Shapira & Mongrain, 2011). The intervention has been implemented in different settings, being online environments (e.g., Shapira & Mongrain, 2010; Auyeung & Mo, 2019), in-person contexts (e.g., Layous et al., 2013), or in small groups (e.g., Sheldon & Lyubomirsky, 2006). The positive effects of BPS interventions have been explored by a large scope of research. Hence, multiple studies demonstrated that BPS-exercises increase favourable psychological outcomes such as positive affect (Sheldon & Lyubomirsky, 2006), positive outcome expectancies (Peters et al., 2010), self-efficacy (Carillo et al., 2020), well-being (King 2001), life satisfaction (Summerfield, 2016) and optimism (Peters et al., 2010; Liao et al., 2016). Accordingly, these outcomes have their own positive contributions to the life of people including reduced illness visits, feeling less upset (King, 2001), reduced risk of mental health disorders, improved productivity, and more meaningful relationships (Auyeung & Mo, 2018). Altogether, BPS interventions in different settings stimulate the experience of a range of well-being boosting emotions and encourage individuals to create a positive outlook on their future.

Past research has not yet identified which underlying mechanisms of BPS interventions contribute to and explain its positive effects (Carillo, 2018). Rather, authors have attempted to

explain how PPIs may work in general (Lyubomorsky & Layous, 2013). In this context, past research has argued that imagery and visualization components in various BPS studies are one of the driving forces in promoting positive emotions (Holmes, 2007; Peters et al., 2010). This is because, positive imagery involves deeper cognitive processing as compared to writing and is acknowledged as more absorbing, believable, and less likely to result in unfavourable self-comparison than verbal processing of positive material (Holmes et al., 2007; Peters et al., 2010; Meevissen et al., 2011). In a study conducted by Peters et al. (2013), a single session of BPS imagery led to more positive expectancies about the future. Therefore, visualisation and imagery, as used in multiple BPS-studies (Peters et al., 2013; Enrique et al. 2017), represent an underlying mechanism encouraging the positive effects of BPS interventions. Nevertheless, research claims that working mechanisms such as mediators by which BPS interventions improve well-being are kept in the dark, although being an important source of information for the advancement of BPS interventions in clinical settings (Wellenzohn et al., 2016; Carillo, 2018; Heekerens & Heinitz, 2019; Schotanus-Dijkstra et al., 2019; Auyeung & Mo, 2019).

Worth considering is the temporal orientation of BPS-exercises as an underlying mediating mechanism influencing the well-established relationship between building a BPS and well-being. Recent work by Carillo et al. (2020) has targeted the mechanism of temporality, by establishing a narrative BPS intervention in which participants were instructed to think back, imagine, and document their BPS. According to Carillo et al. (2020), it is still unknown whether the future orientation of BPS-exercises is relevant to gain increases in well-being. This lack of knowledge becomes an issue when considering that participants of BPS interventions may show personal preferences “on the temporal frame they would like to work on, or difficulties in some of the temporal frames (e.g., a past trauma, anxiety about their future due to a life-threatening illness)” (Carillo et al., 2020, p.18). Thereupon attention should be paid to the mediating role of timeframes in BPS and their belonging positive emotions targeted by BPS interventions.

The scholarly attention to narrative selves in the past and future has a long tradition in research, giving a first theoretical framework to explain temporal orientation in BPS interventions. Regarding the development of narrative past selves, scholars have addressed concepts such as life review and autobiographical memory (Westerhof & Bohlmeijer, 2012). Life review entails the recollection and evaluation of positive and productive memories and involves a process of attributing new meanings to negative memories (Westerhof, 2015). This process

contributes to the identification of past positive memories and the self. Further evidence emphasising the benefits of looking back on one's past comes from research on autobiographical memories, which refer to a unique human system that integrates memories of past events into a life narrative (Fivush, 2011). The recollection of positive autobiographical memories can be effective in reducing negative moods and increasing well-being (Westerhof & Bohlmeijer, 2012). In contrast, future narratives have been a studied field with regard to the concept of episodic future thinking which is "a projection of the self into the future to mentally pre-experience an event" (Berntsen & Bohn, 2010, p.265). In this sense, narrative futuring "can be viewed as the future-oriented counterpart of life-review" (Sools et al., 2015, p.362). Equally to looking backward, narrative futuring stimulates the reflection of what makes life worthy of living and encourages living up to the imagined values (Sools et al., 2015). Concluding, scholars have emphasised the narrative processes of imagining the future and remembering the past in support of people's mental health. Although both narrative techniques rely on overlapping mental processes (Gryzman et al., 2013), each may contribute differently to the field of BPS and common positive emotions targeted by BPS-exercises.

Temporality of Optimism and Life Satisfaction in BPS interventions

Positive emotions, which BPS interventions aim to increase, are categorized as emotions related to the past and future (Seligman, 2004, p.23). In detail, optimism is meant to express positive emotions in the *future*, while life satisfaction expresses positive emotions about the *past* (Seligman, 2004, p.23; Kardas et al., 2019). Preceding studies demonstrated that optimism itself consists of having "favourable expectations for the future" (Malouff & Schutte, 2016, p.594). It was found that people high in optimism will less likely become depressed in the future and benefit from lower mortality over the course of many years (Malouff & Schutte, 2016). Hence, it is suggested that "because of its future focus, the best possible self-technique might also be specifically suitable for increasing optimism" (Peters et al., 2013, p.94). In their study, Peter et al. (2013) found that one week of a BPS intervention led to increases in optimism. Following, future-oriented BPS interventions may be specifically effective in increasing future optimism because of their temporal nature. In this sense, a future-oriented BPS intervention may be helpful for individuals who seek support in developing a more optimistic outlook on their future and grow resilience. Taking these results into account and respecting the future-oriented focus of optimism (Seligman, 2004, p.23), the question arises whether optimism plays a mediating role in

the association between a future-oriented BPS intervention and well-being. The theoretical base for this assumed mediation is built upon earlier research on future-focused BPS-exercises (Sheldon & Lyubomirsky, 2006) and similar narrative futuring techniques (Sools et al., 2015) which both have been related to positive well-being effects. As well-being is related to positive emotions such as optimism (Keyes & Waterman, 2003; Conversano et al., 2014), the future-oriented focus of optimism (Peters et al., 2013) may present an underlying mechanism specifically explaining the association between a future BPS and well-being.

In contrast, well-being in terms of optimal human functioning is often concerned with *past* life satisfaction defined as the “cognitive evaluation of life, less experience of negative feelings and more frequent experience of positive feelings” (Kardas et al., 2019). Explaining this perspective, it is suggested that “individuals use their view of how life satisfaction has changed from the past to the present... to inform their overall well-being” (Hong, 2019, p.4). In support, a study conducted by Przepiorka and Sobol-Kwapinska (2020) examined that a positive view of one’s past was associated with life satisfaction and well-being. This further aligns with the therapeutic purpose of life review, encouraging individuals to look back at and evaluate their past self to identify themselves with positive memories in support of increasing their life satisfaction (Westerhof & Bohlmeijer, 2012). Concerning BPS-exercises, studies have demonstrated that life satisfaction can be increased by the deployment of BPS interventions (Proctor & Linley, 2014; Summerfield, 2016). Concluding, a past-oriented BPS intervention may be supportive for individuals who have difficulties accepting their past and encourage them to build a positive narrative identity to increase personal resources in the future (Carillo et al., 2020). The central role of past life satisfaction in maintaining as well as increasing well-being gives rise to the question of whether life satisfaction has a mediating role in the association between a past-oriented BPS intervention and well-being. The theoretical evidence explaining the assumed mediation is the large body of literature linking past-oriented BPS-like methods, such as life review and the autobiographical memory, to increases in well-being and life satisfaction (Westerhof & Bohlmeijer, 2012). As life satisfaction influences well-being, its past-directed focus may present a mechanism explaining the association between a past BPS and well-being.

Opposing the notion that BPS interventions increase life satisfaction when being past-oriented and increase optimism when being future-oriented are the results from a randomized controlled trial study by Carillo et al. (2020). These researchers found that after a BPS

intervention with different temporal conditions (past, present, and future), optimism and life satisfaction increased within all temporal conditions respectively. However, the researchers did not examine whether differences in life satisfaction and optimism mediated the effect on well-being in the different temporal conditions. Consequently, literature is lacking evidence about the mediating role of temporal orientations in BPS. Nevertheless, key components of human well-being, being optimism, and life satisfaction are classified in different temporal categories. Thus, it is important to explore further, whether a past and future-oriented BPS intervention could support people in increasing their past life satisfaction and future optimism and after all, their well-being.

The present study

The BPS intervention has been recognized as a future-oriented exercise, while it is still unknown whether the future-focused nature is responsible for its beneficial effects on well-being (Carillo et al., 2020). Past research has already emphasised how building positive selves in the past and future remarkably contribute to the well-being of people. Recollecting memories of a positive past self has been found to stimulate people in positively reframing their past and in identifying with positive past experiences eliciting life satisfaction (Westerhof & Bohlmeijer, 2012). Besides, imagining a positive future self has encouraged people in becoming more aware of their values, priorities, and goals promoting positive emotions such as optimism (Sheldon & Lyubomirsky, 2007). Although in their study, Carillo et al. (2020) did not find differences regarding the efficacy of a BPS intervention with different temporal conditions on well-being levels, the mediating role of temporality of life satisfaction and optimism was not considered. Accordingly, the present paper complements past research, by arguing for differences in optimism and life satisfaction as caused by differences in temporal orientation, being optimism as related to the future, and life satisfaction as related to the past.

This study aims to examine the effects of a past and future BPS on well-being, optimism, and life satisfaction and intends to explore the underlying working mechanism of a mobile-based BPS intervention. As the majority of BPS interventions have been implemented through a written online medium, leaving room for technological advancement (Loveday et al., 2019), this study aims to provide insights into the efficacy of mobile-delivered BPS interventions. Accordingly, the following research questions will be answered and are central in guiding this work:

- (1) What is the effect of temporal orientation in a BPS intervention on well-being, optimism, and life satisfaction?

- (2) To what extent is the association between a past-oriented BPS intervention and well-being mediated by life satisfaction?
- (3) To what extent is the association between a future-oriented BPS intervention and well-being mediated by optimism?

Methods

Design

The study design was a four-wave randomized controlled trial with three conditions: past BPS-condition (BPS), future BPS-condition (BPS), and control BPS-condition. Online measurements were taken at baseline (T0), one week after the start of the intervention (T1), after two weeks of the intervention (T2), and at a four-week follow-up (T3). This study was approved by the local Ethics Committee of the Faculty of Behavioural Science (ECBMS) at the University of Twente and given the registration number BCE16337. The study was registered in the United States National Institute of Health Registration System (NCT03024853) and implemented through the mobile application “TIIM”.

Participants

Inclusion criteria for participants to be eligible for taking part in the BPS intervention were (1) an age of 18 years or older; (2) the availability of a smartphone with an Internet connection; (3) a valid email address; (4) sufficient proficiency of the Dutch language, and (5) a signed informed consent. Besides, participants were excluded when (6) showing low to moderate levels of anxiety, as indicated by a score ≤ 15 on the GAD-7 (Spitzer et al., 2006); (7) low to high levels of depressive symptoms, as determined by a score ≤ 34 on the CES-D (Radloff, 1977), to guarantee that participants from specific populations were not excluded (Thomas et al., 2001); and (8) low to moderate levels of well-being, as determined by the MHC-SF (Lamers et al., 2011).

Baseline characteristics of each BPS-condition are summarized in Table 1, whereas the flow of participants (inclusion/exclusion) is pictured in Figure 1. From the total sample of 745 participants, a number of 563 participants met the eligibility criteria and were invited to fill out the baseline questionnaire. Excluded participants possessed high levels of well-being ($n = 98$), high levels of anxiety and/or depression ($n = 84$). Of the 563 participants who were invited to

continue with the baseline assessment, 359 participants were randomized. The participants who did not respond to the baseline assessment ($n = 146$), who showed an incomplete baseline questionnaire ($n = 17$), or who did not download the intervention mobile app ($n = 41$) were excluded. Consequently, 204 participants were excluded, and 359 participants were randomized to one of the three BPS-conditions (control condition, future condition, and past condition). After randomization, 70 participants did not open the mobile app and were excluded from further analysis. In total, 95 participants were analysed in the future Best Possible Self condition, 100 participants were analysed in the past Best Possible Self condition and 95 participants were analysed in the control condition.

Within the total sample of $N = 290$ participants, the majority was female 267 (92.1%), while $n = 23$ (7.9%) were male participants. The age of participants within the total sample ranged from 19 to 72 years, $M_{\text{age}} = 46.78$, $SD_{\text{age}} = 10.3$. Further, the sample comprised mostly Dutch participants with the exception of one person. Most outstanding with regard to educational levels was that most participants obtained a moderate education ($n = 166$, 73.4%) as their highest educational level (i.e., high-school diploma). Second most represented within the sample were participants with a university degree $n = 70$ (24.1%). Following, the majority of participants in this study are employed ($n = 193$, 66.5%). Chi-square and ANOVA analysis showed that randomization was successful, there were no differences in demographics between the conditions ($p > .05$).

Figure 1

Flowchart of the Procedure

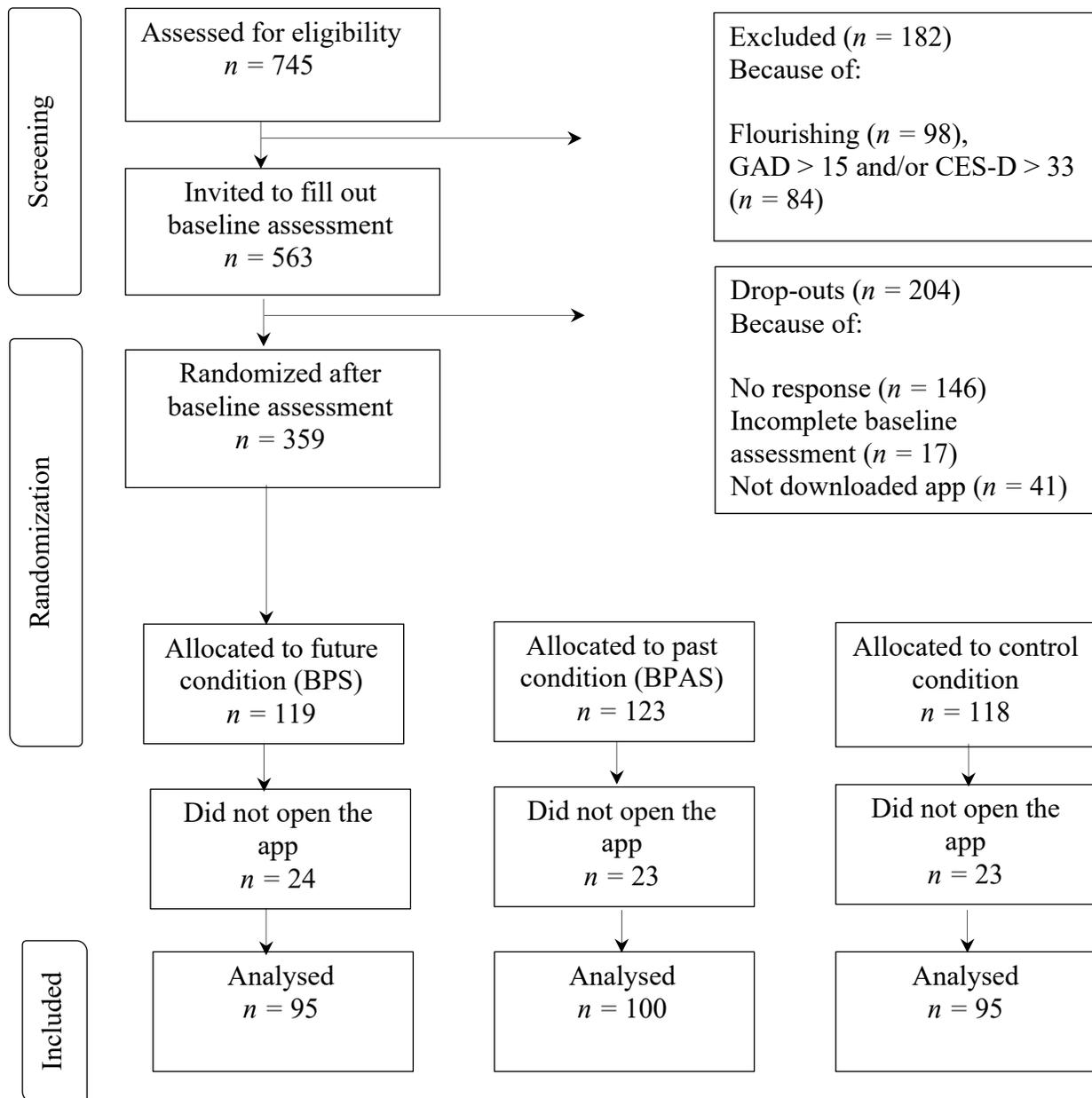


Table 1

Sociodemographic characteristics of participants at baseline (N= 290)

	Condition						Total Data Set		Chi-Square
	Past		Future		Control				
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>sig.</i>
Gender									.50
Female	94	94.0	85	89.5	88	92.5	267	92.1	
Male	6	6.0	10	10.5	7	7.4	28	7.9	
Nationality									.39
Dutch	99	99.0	95	100	95	100	289	99.7	
<i>Other</i>	1	1.0					1	0.3	
Educational Level									.95
Low education (elementary school etc.)	1	1.0	1	1.1	1	1.1	3	1.03	
Moderate education (VMBO, secondary/high school etc.)	72	72.0	70	73.7	71	74.8	166	73.45	
Higher education (university)	26	26.0	23	24.2	21	22.1	70	24.14	
<i>Other</i>	1	1.1	1	1.1	2	2.1	4	1.38	
Occupation									.16
Employed	58	58.0	66	69.5	69	72.6	193	66.55	
Self-employed	10	10.0	14	14.7	15	15.8	39	13.45	
Not working (retired, student etc.)	29	29.0	14	14.9	8	8.5	51	17.59	
<i>Other</i>	3	3.0	1	1.1	3	3.2	7	2.41	
Marital Status									.51
Married or in partnership	41	41.0	47	49.5	47	49.5	135	46.55	
Divorced	20	20.0	16	16.8	21	22.1	57	19.66	
<i>Other</i> (widowed/single)	27	28.5	32	33.7	27	28.5	98	33.79	
Living-Situation									.33
Single household	25	25.0	28	29.5	17	17.9	70	24.1	
Together with partner and children	29	29.0	35	36.8	30	31.6	94	32.4	
Together with partner	29	29.0	21	22.1	29	30.5	79	27.2	
With others (parents etc.)	17	17.0	11	11.6	19	20.0	47	16.3	
Age	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M_{total}</i>	<i>SD_{total}</i>	<i>ANOVA sig.</i>
	47.36	10.19	46.92	9.93	46.19	10.32	46.78	10.31	.67

Procedure

The participant recruitment procedure for this study, started with a message via an advertisement on Facebook putting forward the question: *“Do you want to grow your confidence? Soon we will start with a study in which you will boost your confidence, happiness, and satisfaction with life through exercises presented on a mobile application for a two-week period”*. Resultingly, a self-selected ‘well-being seeking’ sample was recruited. The advertisement included a link to the research web page on which people received information about the study purpose and were able to register for their participation by filling out a screening questionnaire. Participants who were excluded due to their high scores on the GAD-7 and CES-D were advised to contact their general practitioner if they felt distressed by their complaints or when complaints persisted for a long period of time.

Subsequent to finishing the initial screening procedure, participants received an invitation mail to take part in the study and a link to the first online questionnaire. Together with the initial screening, this constituted the baseline assessment (T0). After completion of the questionnaire, participants received instructions to download the mobile application. All participants who downloaded the app were randomized to the BPS condition, BPAS/BPS condition, or control condition. The random sequences generator on www.random.org was used to perform an unrestricted randomization. Each participant had an equal probability of being assigned to the different conditions. To reduce dropout rates, several strategies were used: Email reminders were sent for completing questionnaires. Additionally, one gift card worth 100 euros, five gift cards worth 50 euros, and 20 gift cards worth 10 euros to be spent at an online store were raffled among participants who completed all assessments.

Intervention and Application

To support guidance in and promote adherence to the BPS mobile application, all participants were introduced to ‘Dan’, an animated intervention guide (see Fig. 2), in the first day. In particular, Dan explained his teaching role to the participants and how the use of imagination leads to improvements in wellbeing. Besides, Dan announced the intervention procedure, specifically, the duration of two weeks containing daily imagination exercises which last for five to ten minutes. To demonstrate the power of imagination, Dan introduced a practice exercise and instructed participants to visualize a lemon, its shape, and taste. After this practice

exercise, Dan introduced further imagination exercises based on the different BPS-conditions. Every imagination exercise, regardless of the conditions, started with guiding the participants to find a quiet place without disturbances, to practice a straight posture, to close their eyes, and pay attention to their breathing. To promote adherence, Dan noticed and explained on several occasions during the two-week training that a wandering mind is normal during the imagination exercise and that practice would make the exercise easier. For motivational reasons, after the imagination exercise was completed, Dan complimented the participants and showed their progress in the training.

Figure 2

Animated Intervention Guide for the Purpose of Explaining, Guiding and Encouraging Participants in using the BPS Mobile Application



Best Possible Future Self

The BPS future condition encourages the visualisation and imagery of oneself in the future after everything has gone as well as it possibly could (King, 2001; Sheldon & Lyubomirsky, 2006; Meevissen et al., 2011). Exercises in this condition entailed the imagination of best possible future selves in various domains such as personal strengths, social relationships, professional achievements, and leisure time. Implementing differences between the imagination exercises added variation in the course of the two-week intervention and was based on previous research (Meevissen et al., 2011).

Best Possible Past Self/Best Possible Future Self

This condition entailed exercises focusing on building best possible past and future selves: In the first week, participants were instructed to recall and visualize themselves in a time in the past when they felt they displayed the best version of themselves, focusing on the goals they had achieved and the best features they had at that time (Carillo et al., 2020). In the second week, the instructions changed, and participants were asked to visualize their best possible future selves. In both weeks, the same variances in exercises were provided as in the BPS future condition.

Control Condition

In the control condition, participants were instructed to visualize the activities they did during the last 24 h (Sheldon and Lyubomirsky, 2006; Meevissen et al., 2011; Enrique et al. 2017; Carillo et al., 2020). To provide variation, participants had to focus on the activities they engaged with at different time points in the morning, afternoon, and evening.

Materials

Screening

Depression. Depression symptomatology was assessed at baseline using the Center for Epidemiologic Studies Depression Scale (CES-D) by Radloff (1977). The CES-D contains 20 items, such as “*I thought my life had been a failure*”, measuring how often, over the past week symptoms associated with depression, such as restless sleep or feeling lonely were experienced. Respondents rate on a range from 0 (*rarely or none of the time*) to 3 (*most or almost all the time*) for each item. Total sum scores range from 0 to 60, with higher scores indicating greater depressive symptoms. For reasons of eligibility, a cut-off score of > 33 was used as an exclusion criterion. The CES-D has been found reliable ($\alpha = .85$) in previous research (Hann et al., 1999). In this study, a good internal consistency for the CES-D at baseline was detected $\alpha = .81$.

Generalized Anxiety. Following, anxiety symptomatology was measured at baseline using the Generalized Anxiety Disorder Scale GAD-7 (Spitzer et al., 2006). The GAD scale consists of seven items measuring the experience of diagnostic features of GAD such as feeling nervous and anxious. Hence, the GAD-7 poses the question “*over the last two weeks, how often have you experienced the following problems?*” and provides response items such as “*worrying too much about different things*”. Respondents rate on a 4-point Likert scale ranging from 0 (*not at all*) to 3 (*nearly every day*). Total sum scores range from 0 to 21 with higher scores indicating

greater GAD symptoms. In this sense, scores between 0 and 4 show minimal anxiety, scores between 5 and 9 show mild anxiety, scores between 10 and 14 indicate moderate anxiety, and a score between 15 and 21 reflects severe anxiety. In this study, a cut-off score of > 15 was used as an exclusion criterion. Research suggests that the GAD-7 is a valid and reliable screening tool for GAD by providing an alpha of .85 (Rutter & Brown, 2017). In this study, an acceptable internal consistency for the GAD-7 at baseline was found $\alpha = .76$.

Screening and Primary Outcomes

Well-Being. For screening purposes and primary outcome measures, well-being was assessed using the Mental Health Continuum-Short Form (MHC-SF) questionnaire (Westerhof & Keyes, 2009). The MHC-SF comprises 14 items of which three items measure emotional well-being, six items psychological well-being, and five items assess social well-being. Hence, the MHC-SF poses the question “*during the past month, how often did you experience the following?*” and provides response items such as “*that people are basically good*”. Respondents rate their feelings in the past month on a 6-point Likert scale from 1 (*never*) to 6 (*every day*). Total sum scores range from 0 to 84, with higher scores indicating higher levels of well-being. Besides, the MHC-SF provides a standard for the categorization of levels of positive mental health (Keyes, 2018): Individuals are diagnosed as ‘flourishing’ if they feel one of the three hedonic well-being symptoms, six of the 11 positive functioning symptoms in the past month “*every day*” or “*almost every day*”. Individuals who ‘languish’ experience one of the three hedonic well-being symptoms, six of the 11 positive functioning symptoms “*never*” or “*once or twice a month*”. In this study, participants labeled as flourishing were excluded. Well-Being was measured at baseline (T0), after 1 week within the intervention (T1), at a 2-week post-intervention assessment (T2), and at a 4-week follow-up assessment (T3). As demonstrated by Luijten et al. (2019), the MHC-SF shows high internal consistency with Cronbach’s alpha ranges from $\alpha = .80$ to $.91$. Confirming the good psychometric properties, reliability analysis in this study revealed a good to excellent internal consistency for the MHC-SF with Cronbach’s alpha ranges from $\alpha = .82$ at baseline to $\alpha = .92$ at the four-week follow-up assessment.

Mediators

Optimism. To measure the construct optimism, the Life Orientation Test-Revised (LOT-R) was used (Scheier et al., 1994). The questionnaire comprises 10 items, of which three items measure optimism (e.g., “*I am always optimistic about my future*”) and three reverse-coded items

assess pessimism (e.g., “*If something goes wrong for me, it will*”). The remaining four items serve as fillers. Respondents rate their agreement on a 5-point Likert scale ranging from 1 (*I agree a lot*) to 5 (*I disagree a lot*). Total sum scores are computed with higher scores implying higher levels of optimism. Optimism was measured at baseline (T0), after 1 week within the intervention (T1), at a 2-week post-intervention assessment (T2), and at a 4-week follow-up assessment (T3). The original LOT-R revealed good reliability measures ($\alpha = .86$). In this study, reliable Cronbach’s alpha values for the assessment points were obtained and ranged from $\alpha = .72$ at baseline to $\alpha = .73$ at the four-week follow-up assessment.

Life Satisfaction (LS). LS has been identified as a key ingredient of well-being measures (Lombardo et al., 2018) and was assessed using the Temporal Satisfaction with Life Scale (TWLS) by Pavot et al. (1998). The TWLS includes 15 items with response items such as “*I am satisfied with my life in the past*” on which participants rate their agreement on a 7-point Likert scale ranging from 1 (*strongly agree*) to 7 (*strongly disagree*). A global LS score is computed by adding all items together and higher scores showing higher global LS. LS was measured at baseline (T0), after 1 week within the intervention (T1), at the 2-week post-intervention assessment (T2), and at the 4-week follow-up assessment (T3). Cronbach’s alphas for the global scale ranged from $\alpha = .91$ to $.93$ in the original study (Pavot et al., 1998). Within this study, strong alpha values were obtained ranging from $\alpha = .87$ at baseline to $\alpha = .92$ at the four-week follow-up assessment.

Data Analysis

For the data analysis, the statistical program for social sciences (IBM SPSS, version 27) was used. The variables measured in this research were BPS-condition (future and past) as the independent variable, well-being as the dependent variable, and life satisfaction and optimism as independent mediator variables. Prior to statistical analysis, multiple imputation was carried out to account for missing data.

Preliminary Analysis

Descriptives such as total mean scores (M), standard deviations (SD), and the total number of participants (N) for all scales, were calculated for every assessment point (T0, T1, T2, and T3) per condition (past, future, and control).

Main Analyses

Repeated Measures ANOVA. To answer the first research question, a 3x4 repeated measures ANOVA was used, with condition (past, future, and control) as a between-factor and time (T0, T1, T2, T3 assessments) as a within-factor for each measure. The within-subject variables included were well-being, optimism, and life satisfaction. Accordingly, pre-post intervention changes in the outcome measures between conditions were analysed. Main effects and interactions were significant at a $p < .05$ level. If a significant interaction was found, post hoc analyses, using Bonferroni-adjustment were conducted to determine which group comparisons were significant. Comparisons were significant at a $p < .05$ level.

Mediation Analysis. To answer the second and third research questions, simple mediation analyses were performed using the PROCESS macro for SPSS by Hayes (2017). The first analysis was conducted with life satisfaction and optimism at T1 as mediators and well-being at T2 as the dependent variable. The second analysis was performed with life satisfaction and optimism at T2 as mediators and well-being at T3 as the dependent variable. For both analyses, BPS-condition was used as the independent variable ('BPS-past = 1' and 'BPS-future = 0'), while the control condition was omitted from the mediation analysis. The bias-corrected nonparametric bootstrapping method of 5,000 samples was used to analyse the extent to which BPS-conditions (past and/or future) on well-being is mediated by life satisfaction and optimism. The method of bootstrapping was utilized, due to its high statistical power and accurate controls for type I faults (Hayes, 2017). Indirect and direct effects were measured between the predictor and outcome variables. The mediation effect was considered statistically significant if the 95 % bootstrapped confidence intervals did not contain zero. Moreover, a significance level of $p < .05$ was used to analyse the significance of single pathways in the mediation analysis.

Results

Preliminary Analysis

Changes in total mean scores and standard deviations over the course of the intervention (T0, T1, T2, T3) in wellbeing, optimism, and life satisfaction of participants allocated to the past, future, or control BPS-condition, are displayed in Table 2.

Table 2

Changes in Total-Mean-Scores (M, SD) among BPS-Conditions and Assessment Measures at Baseline (T0), After one Week (T1), After Two Weeks (T2), and at the Four Week Follow-Up (T3)

Measure	Condition	Total-Mean-Scores (SD)							
		T0		T1		T2		T3	
		<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>	<i>N</i>	<i>M (SD)</i>
Well-Being									
	Past	100	35.00 (8.48)	100	52.14 (9.37)	100	54.33 (9.32)	100	55.66 (8.75)
	Future	95	34.61 (7.86)	95	52.78 (10.40)	95	56.31 (9.26)	95	56.69 (8.35)
	Control	95	33.58 (9.11)	95	52.40 (10.67)	95	56.12 (8.55)	95	55.62 (7.62)
Life Satisfaction									
	Past	100	52.11 (12.18)	100	53.57 (12.28)	100	55.43 (11.40)	100	55.07 (11.51)
	Future	95	50.86 (13.42)	95	54.69 (12.18)	95	58.28 (11.24)	95	58.68 (11.27)
	Control	95	54.50 (14.85)	95	55.60 (13.83)	95	57.16 (12.46)	95	56.88 (11.38)
Optimism									
	Past	100	17.34 (2.07)	100	17.60 (1.65)	100	18.40 (1.53)	100	18.12 (1.36)
	Future	95	17.03 (1.88)	95	17.51 (1.65)	95	18.25 (1.70)	95	17.84 (1.36)
	Control	95	17.77 (2.08)	95	18.21 (1.87)	95	18.39 (1.58)	95	19.45 (1.46)

Note. Total number of participants *N* in each condition

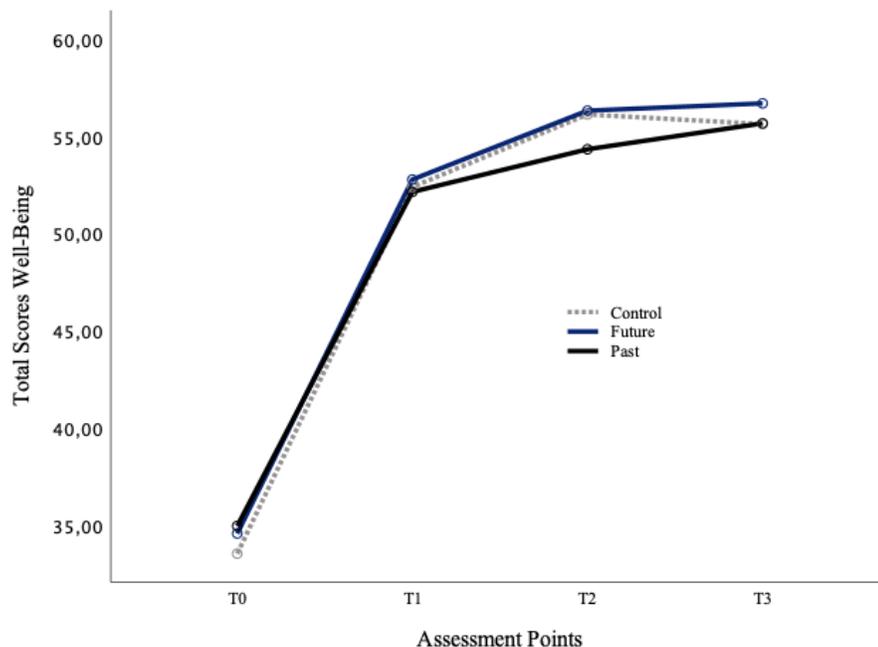
Main Analyses

Repeated Measures

Well-being. There was a main effect of time on well-being $F(3, 861) = 757.69, p < .001, \eta^2_p = .73$. The Bonferroni-adjusted post-hoc analysis revealed statistically significant differences ($p < .05$) in well-being between the assessment points: T0 and T1, T0 and T2, T0 and T3, T1 and T2, T1 and T3, showing that participants' well-being increased within the assessment time periods (see Table 2). The difference in well-being between the assessment point T2 and T3 was not statistically significant ($SMD = -.40, p = 1.00$), showing that participants well-being levels did not significantly increase between the intermediate and the follow-up assessment measure. Between-factor effects revealed no statically different main effects for conditions $F(2, 287) = 0.35, p = .70, \eta^2_p = .002$. Further, the interaction between time and condition was not significant $F(6, 861) = 1.17, p = .32, \eta^2_p = .03$. Changes in well-being measures between conditions are displayed in Figure 3.

Figure 3

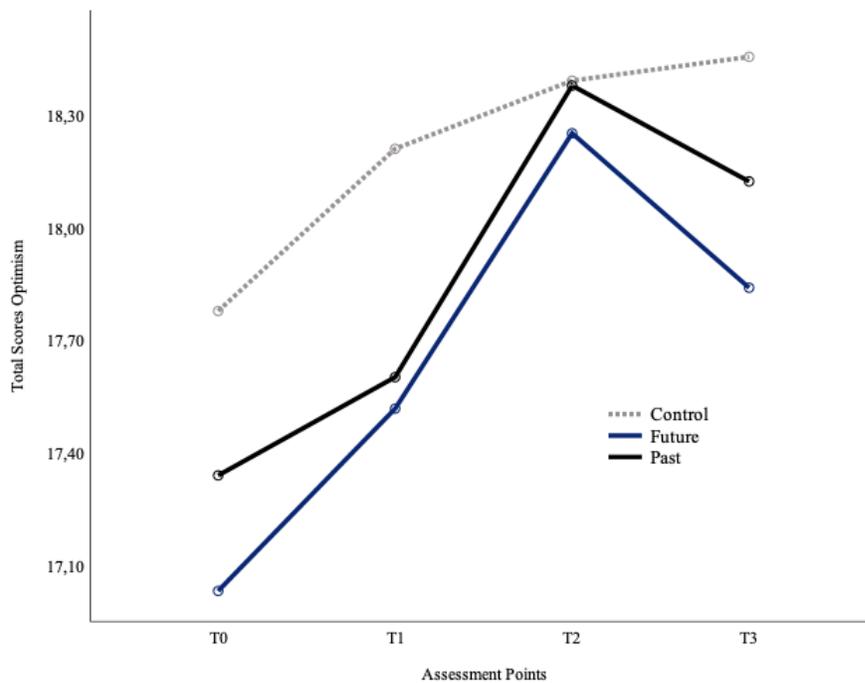
Changes over Time in Total Well-Being Scores among Conditions at Baseline (T0), After one Week (T1), After two Weeks (T2) and at the Four Week Follow-Up (T3)



Optimism. There was a main effect of time on optimism $F(3, 861) = 43.93, p < .001, \eta^2_p = .19$. Bonferroni-adjusted post-hoc analysis revealed statistically significant differences ($p < .05$) in optimism levels between the assessment points: T0 and T1, T0 and T2, T0 and T3, T1 and T2, T1 and T3, showing that participants optimism significantly increased within the assessment time periods (see Table 2). The difference in optimism between the assessment point T2 and T3 was not found to be statistically significant ($SMD = .20, p = .19$). Between-factor effects revealed no statically different main effects for conditions $F(2, 287) = 4.61, p = .06, \eta^2_p = .03$. Further, the interaction between time and condition was not significant $F(6, 861) = 1.39, p = .21, \eta^2_p = .01$. Changes in optimism measures between conditions are displayed in Figure 4.

Figure 4

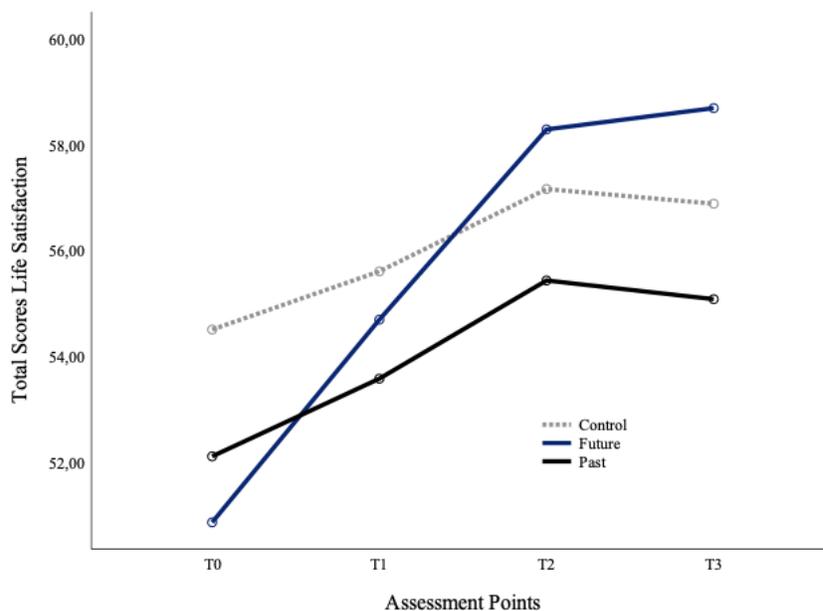
Changes over Time in Total Mean Optimism Scores among Conditions at Baseline (T0), After one Week (T1), After two Weeks (T2) and at the Four Week Follow-Up (T3)



Life Satisfaction. There was a main effect of time on life satisfaction $F(3, 861) = 25.29$ $p < .001$, $\eta^2_p = .17$. Bonferroni-adjusted post-hoc analysis revealed statistically significant differences ($p < .05$) in life satisfaction between the assessment points: T0 and T1, T0 and T2, T0 and T3, T1 and T2, T1 and T3, indicating that life satisfaction significantly increased within the assessment time periods (see Table 2). Differences in life satisfaction between the assessment points T2 and T3 ($SMD = 0.76$, $p = 1.00$) were not found to be statistically significant. Between-factor effects revealed no statically different main effects for conditions $F(2, 287) = .94$ $p = .38$, $\eta^2_p = .01$. Further, the interaction between time and condition was not significant $F(6, 861) = 3.29$ $p = .30$, $\eta^2_p = .02$. Changes in life satisfaction measures between conditions are displayed in Figure 5.

Figure 5

Changes over Time in Total Mean Life Satisfaction Scores among Conditions at Baseline (T0), After one Week (T1), After two Weeks (T2) and at the Four Week Follow-Up (T3)

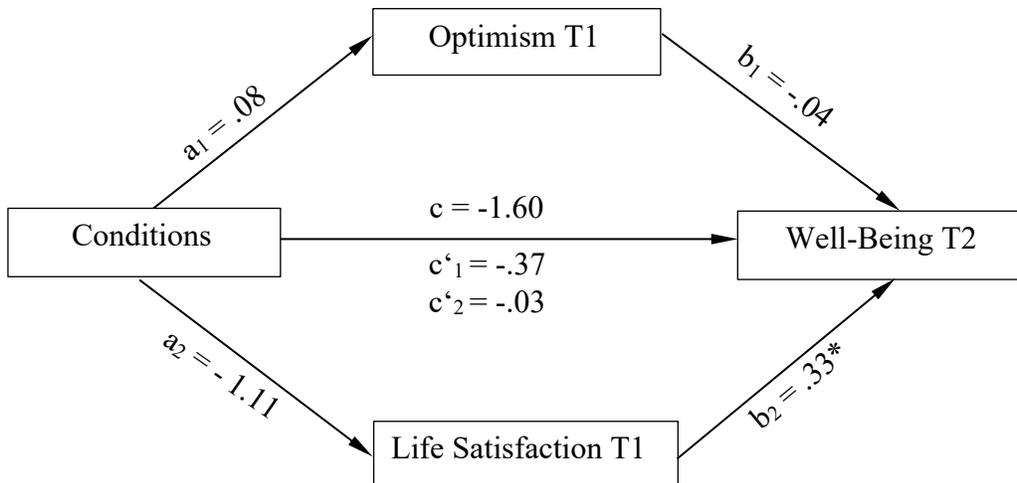


Mediation Analysis

Results of the PROCESS mediation analysis showed that the relationship between BPS-conditions (future and past) and well-being at T2 was not mediated by life satisfaction at T1 ($c'_1: IE = -.37, CI [-1.58, .82]$) and/or optimism at T1 ($c'_2: IE = -.03, CI [-.23, .26]$). There was no significant direct effect of BPS-condition on well-being at T2 ($c: DE = -1.60, p = .18$). Pathway effects of the model showed no significant effect for BPS-condition with life satisfaction at T1 ($a_2: \beta = -1.11, p = .52$) and optimism at T1 ($a_1: \beta = .08, p = .72$). A statically significant effect was found for life satisfaction at T1 ($b_2: \beta = .33, p = .00$) on well-being at T2. The effect of optimism at T1 ($b_1: \beta = -.04, p = .90$) on well-being at T2 was not statistically significant. In Figure 6, indirect and direct pathway effects of the mediation model are displayed.

Figure 6

Simple mediation model presenting the direct effect (c) and indirect effects (c'_1, c'_2) of BPS-condition on well-being at T2 and the effect of BPS-condition on optimism at T1 (a_1) and life satisfaction at T1 (a_2) on well-being at T2 ($b_1; b_2$)

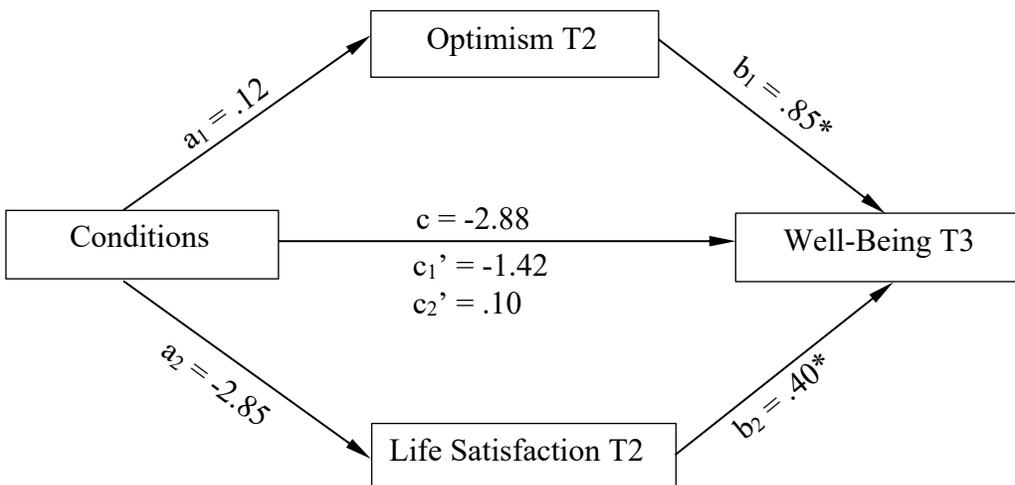


Note. Conditions coded in BPS-past = 1 and BPS-future = 0. * indicates $p < .05$.

The relationship between BPS-condition and well-being at T3 was not mediated by life satisfaction at T2 (c_1' : $IE = -1.42$, $CI [-2.61, .12]$) and/or optimism at T2 (c_2' : $IE = .10$, $CI [-.28, .65]$). There was no direct effect of BPS-condition on well-being at T3 (c : $DE = .01$, $p = .99$). Pathway effects of the model showed no significant effect of BPS-condition on the mediators, optimism at T2 (a_1 : $\beta = .12$, $p = .62$) and life satisfaction at T2 (a_2 : $\beta = -2.85$, $p = .63$). Further, statically significant effects for life satisfaction at T2 (b_2 : $\beta = .40$, $p = .00$) and optimism at T2 (b_1 : $\beta = .85$, $p = .01$) on well-being at T3 were found. In Figure 7, indirect and direct pathway effects of the mediation model are displayed.

Figure 7

Simple mediation model presenting the direct effect (c) and indirect effects (c_1' , c_2') of BPS-condition on well-being at T3 and the effect of BPS-condition on optimism at T2 (a_1) and life satisfaction at T2 (a_2) on well-being at T3 (b_1 ; b_2)



Note. Conditions coded in BPS-past = 1 and BPS-future = 0. * indicates $p < .05$.

Discussion

The purpose of this study was to examine the effects of a past and future BPS intervention over a control condition. Central to this work was to explore differences in mediation effects by assuming an association between a past BPS-condition and well-being as mediated by life satisfaction and an association between a future BPS-condition and well-being as mediated by optimism. Replicating previous studies, the delivered BPS intervention produced significant increases in well-being, life satisfaction, and optimism over time, compared to baseline measures. The increases in intervention outcomes persisted over time and endured until the post-intervention follow-up. However, no significant differences emerged between the experimental and the control condition. Besides, neither life satisfaction nor optimism mediated the association between BPS-conditions and well-being. Results showed a significant effect of life satisfaction, measured after one and two weeks within the intervention on well-being. Optimism measured at the intermediate assessment predicted higher wellbeing at the intervention follow-up. These effects were not significantly different between the future and past BPS-condition. Altogether, these findings contrast and comply with literature and are worth expounding.

Effectiveness of BPS-Conditions on Well-Being, Life Satisfaction, and Optimism

The expected increase of intervention outcomes in the course of the current BPS intervention aligns with previous studies confirming the positive effect of best-possible-selves on well-being (King, 2001), optimism (Peters et al., 2016), and life satisfaction (Summerfield, 2016). However, because outcome measures improved similarly among the past, future, and control BPS-condition, results prohibit to conclude that the BPS component alone is responsible for the positive effects on well-being, optimism, and life satisfaction. The increase of intervention outcomes in the BPS-control condition mirrors the results obtained by Mongrain et al. (2012) and Carillo et al. (2020), who reported no significant differences between BPS-future, present, past, and control condition. To specify reasons for the nonsignificant differences between conditions, it is essential to consider the expectations held by control groups in psychological interventions. According to Boot et al. (2013), active control groups, as used in this study, should hold the same expectation about the purpose of the intervention as the experimental conditions to counteract placebo effects. Only when this is the case, it is possible to attribute the differential intervention improvements to the potency of the treatment (Boot et al., 2013). In accordance with these guidelines, this study equally briefed the participants of all intervention conditions about the

study's purpose. As almost no prior research has respected the need of matching expectations between control and experimental groups (Boot et al., 2013), the results of the current study possibly give a more valid picture about the efficacy of a BPS intervention. By this means, it could be questioned whether past studies have overestimated the effects of BPS exercises. Eventually, it should be noted that the active recalling of activities by the control condition can explain the increases in intervention outcomes, as this task resembles the act of savoring (Carillo et al., 2020), an exercise with positive effects on well-being (Smith & Hanni, 2017).

The significant, similar increases in intervention outcomes for the past- and future-BPS conditions imply that temporal orientation does not affect the efficacy of the BPS intervention. This conclusion could be explained by the shared qualities and characteristics of both conditions: Participants allocated to both experimental conditions were encouraged to broaden their attention-scope towards their positive selves in the corresponding time frame. As the broadening of attention towards the positive, is a process of increasing outcomes such as optimism, life satisfaction, and well-being (Fredrickson 2004), this could explain why both conditions had the same effect. At last, the BPS mobile application used in this study could explain the nonsignificant effects between the future and past conditions. Although this study speaks for its innovative approach of developing the first mobile BPS-applications, there is a lack of evidence whether this method outweighs conventional BPS methods. Even though research has emphasised the potential of smartphone-delivered PPIs in promoting well-being (Howells, 2016), no studies have explored the effectiveness of BPS mobile applications before. Additionally, researchers have raised their concerns about limitations impacting mobile applications: Unexpected utilization issues coming along with technological devices or lacking human guidance are known to undermine the intervention engagement (Titzler et al., 2018) and may have been equally discouraging for participants in the BPS-conditions.

As the positive effects of the current BPS intervention persisted until after the intervention, future research should further investigate how building positive best-possible-selves promotes and protects mental health in the long term. Besides, future research should deviate from a control group exercise that may evoke the same effects as savouring (Carillo et al., 2020). Although there is no researched variance in the use of BPS control condition exercises, a suggestion for future RCT studies could be to implement a neutral control task such as reading about the BPS intervention. Resulting from the finding that a past and future-oriented BPS

intervention similarly increases psychological outcomes, the implication follows that BPS interventions could be tailored to the participant's preferred temporal frame. Thus, participants' different experiences of difficult events in the past (e.g., traumas, losses, difficult changes) or in the future (e.g., future anxiety, difficult changes in the future) are considered. Respecting the idiosyncratic histories of the target population in BPS interventions could help to sustain the positive effects of BPS intervention over time. Taking participants' time-specific preferences into account could thus, be highly beneficial for participants (Carillo et al., 2020) and increase the efficacy of the BPS intervention (Lyubomirsky & Layous, 2013). Future research should thus, further explore the consideration of participant's preference of time in conditions for BPS interventions. No prior research has looked into the functionality of a BPS-mobile application in encouraging optimism and life satisfaction to achieve post increases in well-being levels of participants. As reviewed by research, optimists are known to have higher well-being than pessimists in domains such as life satisfaction and benefit from an increased goal commitment and academic success (Segerstrom, 2017). In this context, a BPS mobile application can be a practical tool, simple integrable into daily life, which supports people in becoming more optimistic and satisfied, leading to a healthy and successful way of living. For reasons of implication, mobile applications with promising effects on well-being can be beneficial in promoting positive change in a large non-clinical population (Coelhoso et al., 2019). Subsequently, it is important to further explore how the efficacy of BPS mobile applications can be improved as this approach is new to the field of BPS.

Life Satisfaction and Optimism as Mediators

The nonsignificant differences between BPS-conditions account for an explanation why the expected mediation effects of optimism and life satisfaction, as caused by BPS-past and BPS-future conditions were not found. Guiding participants in building a past and future best possible self, increased both their life satisfaction and optimism, which rejects the expectations that these constructs can be related to only either a past or future timeframe (Seligman, 2004). The lacking mediation effects may speak for shared characteristics between a past and future BPS. The similarities between imagining the best self in the future and remembering the best version of the self in the past, have been emphasised by research on narrative psychology and BPS-like methods before (Sools et al., 2015; Addids et al., 2007). According to Addis et al. (2007), the retrieval of past events and the imagining of future events rely on overlapping neural systems and

cognitive structures. Therefore, the same positive emotions may be elicited when imagining the best possible future and past self, impeding the expected time-oriented mediation effects. In support, similar past-oriented BPS methods, such as life-review and autobiographical memory which encourage the recollection of positive memories in one's past, have been found to not only increase life satisfaction (Westerhof & Bohlmeijer, 2012) but also optimism (Hamzehzadeh et al., 2018). In turn, imagining the future and creating a future narrative has been viewed to function as a form of live review (Sools et al., 2015), likewise promoting optimism and life satisfaction which could describe why no mediation effect occurred. Confirming this notion, research on traditional future-oriented BPS interventions has examined its positive effects on both, life satisfaction and optimism (Peters et al., 2010). Accordingly, the best possible future and past self are integrally tied to one another (Sools et al., 2015), both stimulating the positive emotions optimism, and life satisfaction and thus, preventing a mediation effect to occur.

Despite the missing mediation effects, pathways of the expected model showed that life satisfaction predicted well-being. This finding aligns with previous studies demonstrating that life satisfaction can be increased by the deployment of BPS interventions (Proctor & Linley, 2014; Summerfield, 2016) and is strongly associated with well-being (Lombardo et al., 2018). In contrast to what was expected, this study could not conclude that life satisfaction is a construct explicitly related to the past (Kardas et al., 2019; Przepiorka & Sobol-Kwapinksa, 2020). Life satisfaction increased among participants imagining a best possible future and past self, which extends past research which has predominantly emphasised that positive views of the past relate to higher life satisfaction and happiness (Westerhof & Bohlmeijer, 2012; Przepiorka and Sobol-Kwapinksa, 2020). In this regard, the effectiveness of a BPS intervention in increasing life satisfaction does not necessarily rely on the inclusion of a past temporal variant in BPS exercises.

Further, in this study, participants' level of optimism after two weeks within the intervention, predicted well-being at the intervention follow-up. These results comply with both cross-sectional and longitudinal studies, relating optimism with well-being: Accordingly, optimism was related to low depression, low negative emotions, and life satisfaction (Ho et al., 2010). Other studies found that higher optimism can be related to higher subjective well-being in times of adversity (Carver et al., 2017). Contrasting prior expectations, this study opposes the notion that optimism is understood as a positive emotion explicitly related to a future timeframe (Seligman, 2004, p.23). In the current study, participants' level of optimism increased over time,

however, independently of the condition they were allocated to. This conclusion is consistent with results acquired by Carillo et al. (2020), revealing no association between conditions and increases in optimism over time. The observation that optimism is not only related to a future BPS could be explained by research acknowledging optimism to have a state and stable trait component (Kluemper et al., 2009). Some people may thus be naturally more optimistic than others about both, their future and past BPS as it lies in their disposition to evaluate life events positively. Besides, this study showed that the optimism levels of participants only predicted their well-being when measured at the intermediate assessment and not after one week of within the intervention as found with life satisfaction. In this sense, longer engagement in BPS interventions may be needed to develop optimism gains high enough to significantly predict later well-being.

In considerations of the discussed findings, future research and implications can be addressed. Research on working mechanisms, such as mediators, explaining the efficacy of BPS interventions is still in its infancy (Carillo, 2018; Heekerens & Heinitz, 2019). Although the current study could not endorse the mediation of life satisfaction and optimism, future research should continue exploring how BPS interventions achieve their effects. With this in view, future research should further explore how temporal orientations in BPS research can be beneficial in achieving time-related positive effects. Further, it should be validated whether other constructs explain the effects of a BPS-component on well-being to evaluate the potential of a BPS imagery exercise as a feasible application in daily life.

Strengths and Limitations

This research provides unique contributions in that it was the first randomized controlled study to explore underlying working mechanisms, of a mobile-delivered BPS intervention. This study, therefore, followed a request made by past research to consider variables that function as mediators in BPS interventions (Heekerens & Heinitz, 2019). While past research has made efforts to demonstrate the efficacy of BPS interventions on positive psychological outcomes (King, 200; Peters et al., 2010; Kardas, 2019), the strength of this research was to give insights into how BPS intervention function and, therefore, fill a research gap. Further, the majority of conventional BPS interventions have been implemented through a written online medium, providing participants with video instructions and thus, leaving room for the improvement of technological advancement in terms of mobile applications (Loveday et al., 2019). As a response, this study relies on the assets of positive technologies, being the encouragement of personal

growth, the development of virtues and strengths of people (Carillo et al., 2020). While past research has already examined that online-delivered BPS interventions are as beneficial as in-person interventions (Layous et al., 2013), this study stands out with its innovative quality through the development of a BPS mobile application. Known assets of mobile-delivered PPIs are the ubiquity of smartphones, making in-the-moment interventions accessible and cost-effective (Daugherty et al., 2018). Another strength of this study over previous BPS studies, is the use of an active control group, lowering the probability of placebo effects and increasing the achievement of causal results (Boot et al., 2013). Last, the implementation of a past BPS-condition in this study can be acknowledged as scientific progress for research on temporality in experimental BPS studies. By using two experimental groups with different time variants, it could be demonstrated that those conditions do not show significant differences in their effect on intervention outcomes.

There are some limitations to this work. At the foremost, the dropout number of eligible participants not continuing with the study after completing the baseline questionnaire was considerably high, representing a threat to validity. Further, the sample of this study was mainly composed of older, highly educated female adults which impact the generalizability of the results to the whole population. The preponderance of female participants with an older age could have influenced the intervention outcomes as past research has found that BPS interventions are especially effective for and most used by participants at a younger age (Meevissen et al., 2011; Krebs & Duncan, 2015). As addressed by Meevissen et al. (2011), women could be more receptive to an imagery exercise, therefore, promoting increases in BPS intervention outcomes. Thus, future research is needed to explore possible barriers experienced by the male population which hinder them to participate in BPS interventions. Besides, older participants of smartphone-delivered interventions are more likely to experience a range of different barriers (Pywell et al., 2020), shedding light on possible usability issues impacting the intervention outcomes and dropouts. Future research should therefore study the relationship between BPS interventions and well-being as mediated by optimism and life satisfaction in a broader demographic cohort.

Conclusion

To conclude, as results of the present RCT study show no significant main effects between the BPS-condition over an active control group, the use of the BPS paradigm as an exercise to increase well-being, optimism and life satisfaction cannot entirely be supported.

However, it should be recognized that this study used a BPS mobile application as a new but less studied intervention delivery method, therefore contrasting traditional BPS implementation methodologies.

Importantly, this study extends previous literature by providing insights into the underlying working mechanisms of a smartphone-delivered BPS intervention: Findings imply that temporal orientation in BPS does not influence the efficacy of the intervention. More specifically, this study demonstrates that optimism and life satisfaction do not serve as mediators explaining the relationship between a past and future BPS with well-being. The nonsignificant difference between experimental groups suggests that no temporal differences can be attributed to life satisfaction and optimism as mediators. Nonetheless, life satisfaction and optimism predict the later well-being of participants in this study, emphasising the importance of both constructs to attain higher well-being. In particular, the conclusion follows that building best possible selves in the past and future rely on complex, overlapping systems (Addis et al., 2007) and therefore, equally encourage well-being, optimism, and life satisfaction. This notion underlines that both, a BPS past and BPS future are relevant for experiencing positive emotions and mental health: Recollecting positive images of the self in the past enhances well-being, optimism, and life satisfaction by way of giving positive meaning to life, reframing a possible overgeneralized negative pictures of a past-self (Westerhof & Bohlmeijer, 2012). Likewise, imaging a positive future self can promote the same emotions by bringing awareness to one's future goals, restructure priorities (Sheldon & Lyubomirsky, 2007), and encourage living according to personal values (Sools et al., 2015).

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