Bachelor's Thesis

Can You Change How You View Life? – A Randomized Controlled Trial on The Changeability of Life Mindsets

Morticia Boroch

University of Twente

First supervisor: Dr. Marijke Schotanus-Dijkstra

Second supervisor: Prof. Dr. Ernst Bohlmeijer

Submission Date: 26.06.2019

Department of Behavioral Sciences, Positive Psychology and Technology

Abstract

Background: To date, there is little evidence on whether a life mindset can be changed. The current study was therefore set out to examine whether a life mindset can be changed to be more optimistic ('life is long and easy') and whether a changed mindset also indicates a change in the well-being of a person. Further, it was examined whether the age of a person influences the likelihood that they change their life mindset.

Methods: A randomized controlled trial was conducted with a total of 102 participants (M_{age} = 33.72, 52.9% female) which were randomly assigned to either the life mindset intervention (n= 51) or the control group (n= 51). The group receiving the life mindset intervention was provided with a text on the benefits of the 'life is long and easy' mindset, while the control group received a text on personality. Participants further completed online self-reporting questionnaires at baseline and directly after the intervention.

Results: Analyses revealed that reading the intervention text did not lead to a higher rate of beneficial mindset changes than reading the control text [$\chi^2(3) = 4.39$, p=0.223]. Further, a mediation analysis revealed that a change in mental well-being was not mediated by a change in the life mindset (*indirect effect*= -0.01, BC 95% CI = -0.03 to 0.01). No moderation effect of age on change of mindset was found. However, a significant difference in mindsets between age groups was found with younger people endorsing the short-hard life philosophy, while older people endorsed the short-easy life mindset [baseline: $\chi^2(3) = 14.75$, p=0.002; posttest: $\chi^2(3) = 15.72$, p=0.001].

Limitations: The manipulation text was not tested before with qualitative research and further, no long-term effects of the intervention were examined.

Conclusion: As, to my knowledge, the current study is one of the first to examine the changeability of life mindsets and their influence on mental well-being, as well as age-related differences, further research is needed to explain the results of the current study and to explain possibly underlying constructs.

Introduction

Do you think you can change how you view life? Previous studies determined the effect of how people view life or aspects of life to be influential in how they behave and how well they feel (e.g. Crum, Salovey, & Achor, 2013). Such life views might be, for example, the notion of life to be long and easy as opposed to being short and hard (Norton, Anik, Aknin, & Dunn, 2011) or stress to be enhancing opposed to being debilitating (Crum & Lyddy, 2014). Some studies even suggest that peoples' thoughts and beliefs can influence their physical health in both positive and negative ways. A study by Phillips, Ruth, and Wagner (1993) discovered that Chinese people who felt determined to establish a certain illness based on their astrological sign, in fact, died earlier than participants in a control group who did not hold onto those beliefs. Based on a review of several areas of research, Ray (2004) further added to those findings by stating that our thoughts determine the way in which our brain functions. Therefore, by changing our thought patterns, we, in turn, change how our brains function. Ultimately, those changes in the brain again evoke changes in the body. In addition, most studies suggest that pessimistic philosophies are more prominent in the overall population than optimistic views of life (Crum & Lyddy, 2014; Norton et al., 2011). As those studies provide some evidence that a person's thoughts can have an influence on the rest of their lives, in terms of their behaviors, but also in terms of their personal well-being, the question arises whether these prevailing pessimistic philosophies about life, which are also called life mindset, can be changed into a more optimistic life mindset, in order to increase well-being in the population.

Life Mindsets

A mindset is defined as a mental frame that is created through conscious as well as unconscious experiences. It functions as a lens that is applied when encountering new situations and determines how one reacts to them (Crum & Lyddy, 2014; Dweck, 2008). The definition of a life mindset is derived from Hobbes' *Leviathan* published in 1651/1960. Hobbes (1652/1960) suggested that life is "nasty, brutish, and short". A life mindset, therefore, concerns

whether a person holds the philosophy that life is short or long and whether a person believes life to be easy or hard (Norton et al., 2011). Those life mindsets were used by Norton et al. (2011) to show that it is possible to infer a great deal about a person's present and future expectations by asking two simple questions, namely where they stand on the aforementioned life philosophies. From those two questions, four different life mindsets result: life is short and easy, short and hard, long and easy, or long and hard. The most prominent mindset in the studies of Norton et al. (2011) was that life is short and hard. However, this prominent pessimistic mindset was also found to be the least beneficial one for a person's well-being (Norton et al., 2011).

Well-Being and Life Mindsets

The life mindset is suggested not only to have a direct influence on the well-being of a person, but also on how people manage their friendships (e.g. Kurtz, 2008), their general judgements in life (Greenberg, Solomon, & Pyszczynski, 1997), their self-worth (Bandura, 1977; King, Hicks, Krull, & Del Gaiso, 2006), and their civic engagement and optimism about the future (Norton et al., 2011). From this, it can be concluded that the mindset one holds does not only influence the day-to-day interactions of a person, but also their general well-being.

For example, Crum et al. (2013) suggested that the mindset one holds on stress ('stress is enhancing' or 'stress is debilitating') is very influential on the stress response of a person. In their study, the stress mindset was assessed, as well as the participants' health, work performance, and well-being in terms of quality of life. The participants were 388 employees of a firm that was undergoing a downsizing procedure at that time. Therefore, they were in a stressful environment, which made it possible to assess the stress response of the participants in connection with their stress mindset. Results demonstrated that people holding a stress-is-enhancing mindset reported higher satisfaction with life, higher work performance, and better mental health (Crum et al., 2013). In a second study, the authors confirmed these findings by measuring physiological responses of participants (n = 63) who were undergoing stressful

situations during a class in University (Crum et al., 2013). Again, the results demonstrated that the physiological stress responses were most beneficial for those believing that stress is enhancing.

To date, there has been little research on life mindsets and their connection with well-being. Norton et al. (2011) examined the relation between life mindsets in combination with life-satisfaction in a sample of 342 adults. In a second study, the researchers again examined the same relation in 121 adults, this time using the participants' happiness in general as a measure for well-being. The results from these two studies showed that participants who endorsed the long-easy life mindset were happiest and significantly more satisfied with life, as well as that they were establishing a higher likelihood to perform voluntary work, in comparison to the participants holding the short-hard life mindset. From this, the authors concluded that people holding the long-easy life mindset have the highest well-being compared to those holding another life mindset (Norton et al., 2011).

As these prior studies focused on aspects of emotional well-being (i.e. life-satisfaction and happiness), less is known how a life mindset influences social and psychological well-being. While emotional well-being by definition (Keyes, 2002) focuses more on the existence or lack of positive feelings about life, psychological and social well-being are concerned with optimal functioning and achieving one's own potential (Keyes, 2002). Psychological well-being, in particular, includes the individual aspects of functioning well in one's private life, while social well-being rather reflects the public aspects of functioning well in society and engaging oneself socially (Keyes, 2002). As those three dimensions of well-being together make up the overall mental well-being of a person, it is important to consider whether the life mindset of a person influences only their emotional well-being or all three dimensions of mental well-being together. As it is suggested that an optimistic life mindset ('life is long and easy') indicates higher well-being (Norton et al., 2011), the question arises whether a mindset change

in an optimistic direction, in turn, will lead to an increase in well-being. However, to be able to determine this, it must first be determined whether a life mindset, in fact, can be changed.

Changeability of Life Mindsets

Research on the changeability of mindsets, in general, found that an extensive intervention is not necessarily needed to change a mindset. For example, the study of Aronson, Fried, & Good (2002) demonstrated that an intelligence mindset can be changed by showing the participants a film clip that advertises a certain mindset by portraying intelligence as fixed or malleable. In addition, Crum et al. (2013) found that the 'stress is enhancing' or 'stress is debilitating' mindsets changed after watching a short, factual film clip advertising either one of the two mindsets. Also, the study of Chiu, Hong, & Dweck (1997) showed the same patterns of mindset changeability using a 'scientific' article arguing favorably about either the 'fixed' or 'malleable' view of intelligence. As the definition of life mindsets was only proposed very recently by Norton et al. (2011) there is no research on its changeability to date. However, based on the reported findings on the changeability of other mindsets, it is expected that a life mindset can also be changed by the means of an intervention.

Further, while the studies using video-media to change the mindsets of their participants (e.g. Aronson et al., 2002; Crum et al., 2013) provided videos to their participants on several different occasions for a mindset change to occur, the participants receiving an intervention using an informative text were only given this text on one occasion (e.g. Chiu et al., 1997). Therefore, it can be expected that changes in the life mindset can be evoked in a shorter period of time by using an informative text compared to using video media.

A factor that might influence the ability to change a mindset, particularly the life mindset, is the age of a person. This has not yet been assessed directly, but there exists some research on the change of 'openness to change' throughout the life span of a person (e.g. Tulviste, Kall, & Rämmer, 2016; Khoshtaria, 2018). Openness to change has been found to be important in attitude changing interventions aimed at, for example, changing the risk

assessment of older people in traffic-related situations (Tuokko, McGee, Gabriel, & Rhodes, 2007). A study by Tulviste, Kall, and Rämmer (2016) investigated whether people of different age groups prioritize different values in their lives. They divided the participants into a group younger than 30 years old and a group older than 30 years. The younger participants in their study valued 'openness to change' to a greater extent than the older participants. For the older participants were being secure, holding on to traditions, and persisting on their values of higher value than for younger participants. Krosnick and Alwin (1989), as well as Khoshtaria (2018) also found that older people tended to appreciate holding their values stable over time (for instance security) more often than younger people, for whom it was more important to seek out new experiences and explore different values. Krosnick and Alwin (1989) found that periods of susceptibility of attitude changes are late adolescence and early adulthood. After those periods, the researchers found the changeability of attitudes and believes to minimalize and remain at that level throughout the rest of a person's life span (Krosnick & Alwin, 1989).

Present Research

Until now, there has been limited research on life mindsets, in general, but more particularly there is a knowledge gap in whether the life mindset can be changed. It is important to investigate this, as it has been shown that holding a 'life is long and easy' mindset is beneficial for a person's well-being. Therefore, the aim of this research is to test whether a life mindset can be changed by providing the participants with information on the beneficial effects of this particular mindset. It is first hypothesized that persons receiving an informative text on the benefits of the 'life is long and easy' mindset are more likely to change their life mindset in an optimistic direction than persons not receiving that informative text. Secondly, it is expected that if the mindset of a person changes from a more pessimistic to an optimistic mindset, this, in turn, will evoke a positive change in their well-being. Thirdly, it is hypothesized that there are age differences in the changeability of the life mindset, with a higher rate of beneficial

changes in mindsets in younger people compared to older people. This is because it is expected that older people will show a lower degree of openness to change than younger people.

Methods

Design

The current research was a parallel double-blind Randomized Controlled Trial (RCT). Participants were randomly assigned to an intervention group, who received an informative text on life mindsets or one on stress mindsets, or a control group, who received a comparable text about the Personality Big Five (allocation ratio 1:1:1). The study was conducted in German and online questionnaires were sent out at baseline and on the day of the intervention (one week after baseline) in April 2019. The independent variable of this study was the information provided to the participants on mindsets and their functions on well-being, while the dependent variable was the view of life to be easy or hard and long or short. The study was approved by the Ethics Committee of the University of Twente (no. 190218) and the participants gave their online informed consent before participating in the study.

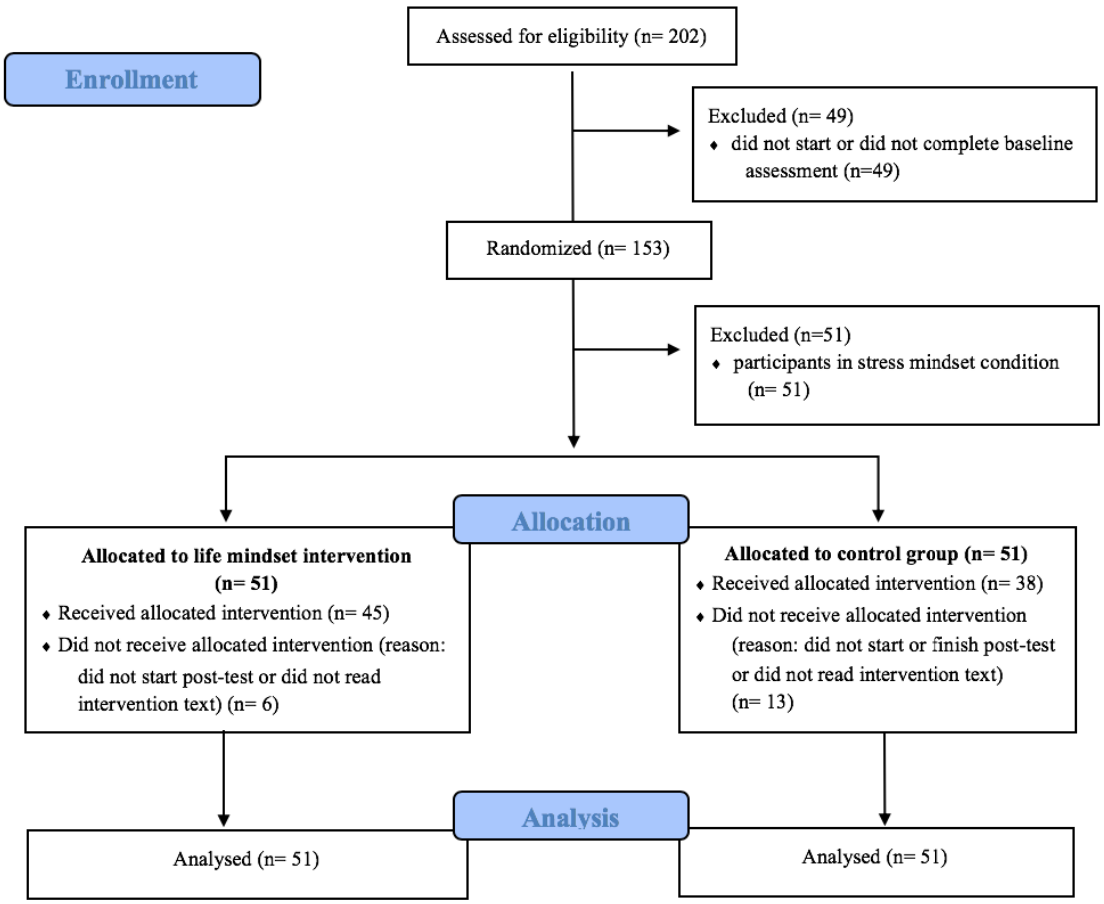
Participants and Procedure

The participants were sampled based on convenience from the social networks of the researchers. Eligible participants were 18 years or older, able to speak German, and willing to take part in two consecutive online surveys over a time span of one week. As the current study was conducted using an online questionnaire, the researcher had no influence on the environment in which the participants completed those.

After personally recruiting the participants, they received an E-Mail including a link to an external Qualtrics website to give their online informed consent and to complete the baseline survey. Of the 202 recruited participants, 153 finished the baseline survey. Only those were randomly assigned to three intervention groups of which only the life mindset intervention group and the control group were used in the current study (the third group consisted of 51

participants in a stress mindset intervention group). The randomization procedure was done by a researcher who was not actively involved in recruitment and analyses of the data using random numbers from randomizer.org. A week after baseline, participants received an informative text for their respective group (see Conditions) and a posttest survey on Qualtrics.

After the last survey, the participants were debriefed about the different intervention groups of the study and the true purpose of the current study. Participants always had three days to complete the surveys and in order to minimize drop-out, participants were again notified one



Conditions

There were two different conditions to which the participants were randomly assigned (Figure 1). The texts that the participants were provided within each condition were written by the researchers themselves and proofread by all participating researchers, to assure that the

conditions were as equal as possible in lengths and information density. The participants in all conditions were instructed to read the text carefully and after that, were asked to indicate the content of the text, in order to control whether the participants read the texts. It was further emphasized that there were no right or wrong answers to the questions that followed.

Life Mindset condition. The text provided to this experimental group can be found in Appendix A. The group received a text about the fact that if one views life as being long and easy, this, in turn, has benefits for one's overall well-being and general health. Those benefits were contrasted to the negative effects of the pessimistic life mindset (life is short and hard). The text was based on the findings of Norton et al. (2011).

Control condition. The text provided to the control group can be found in Appendix B. The text concerned a psychological construct, the Big Five Personality Traits, in order for the participants not to sense that they were in the control condition. The topic was further chosen because it was likely to be also informative for laypersons but not likely to cause changes in their mindsets. The text explained that in contrast to the Big Five animals in Africa, psychologists use the term Big Five when referring to the personality traits of 'openness to experience', 'conscientiousness', 'extraversion', 'agreeableness', and 'neuroticism'.

Materials

Life-mindset. To measure the life mindset of the participants, the following two binary choice questions were used: (1) 'Is life short, or long?' (2) 'Is life easy, or hard?' The questions were taken from the research of Norton et al. (2011) and result in four different life mindsets: life is short and easy (1), life is short and hard (2), life is long and easy (3), or life is long and hard (4) (Norton et al., 2011). A life mindset change score was created by assigning people to one of three change groups. The optimistic change group (2) included all participants who indicated an optimistic life mindset (long-easy) at posttest or at both time points. The pessimistic change group (1) included all participants who indicated a pessimistic life mindset (short-hard) at posttest or at both time points. And the other change group (0) included all

participants that either changed to the short-easy or to the long-hard mindset at posttest or endorsed one of the two at both time points.

Well-being. The Mental Health Continuum-Short Form (MHC-SF) was used to measure mental well-being (Keyes, 2009). The scale measures three facets of mental well-being: emotional, social, and psychological well-being. It consists of 14 items (e.g. 'During the past month, how often did you feel… satisfied with life') to which the participant has to indicate on a five-point Likert-scale whether they occurred from 'never' (0) to 'every day' (5) during the past four weeks. The item mean scores are computed for each participant, with a higher score indicating higher well-being. A well-being change score was calculated subtracting the well-being score at baseline (t0) from the well-being score at posttest (t1), whereby a higher score indicates a larger increase in well-being. The MHC-SF demonstrated excellent internal consistency (Cronbach's alpha = .89; Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011) and a test-retest reliability ranging between .57 and .71 (Keyes, 2009). Cronbach's alpha in the present study was .88 at baseline and .93 at posttest.

Openness to experience. The openness subscale from the Big Five Inventory 2 (BFI-2; Danner et al., 2016) was used to measure the openness of the participants during the baseline survey. This scale comprises the three facets: esthetic values, intellectual curiosity, and creative ingenuity. The whole openness subscale consists of 12 items, to which the participants can either indicate agreement or disagreement on a five-point Likert-scale ranging from 'strongly agree' (5) to 'strongly disagree' (1). An example item is: 'I am someone who is curious about many different things' (Danner et al., 2016). To calculate a person's openness score, six of the items had to be reverse coded. Then the item mean scores were calculated with a higher item mean score indicating higher openness. The subscale has a high Cronbach's alpha (.85) and a high test-retest reliability (.82). Cronbach's alpha in the present study was .85 at baseline.

Statistical Analyses

All analyses were conducted with IBM SPSS Statistics (version 24.0) and two-tailed tests at a significance level of 0.05. Missing data at posttest was imputed for the life-mindset questionnaire and mental well-being (18.8%, Little's MCAR test: χ^2 (15) = 3329.70, $p < .001$) using the expectation maximization algorithm (EM). The method was chosen because Blankers, Koeter, & Schippers (2010) found this method to be highly valid and reliable in comparison with other imputation methods and further because an iterative process is used on the observed data (Dempster, Laird, & Rubin, 1977). Only the results of the intention to treat analysis are reported because it revealed similar results to the per protocol analysis.

Descriptive statistics of the participants' characteristics and outcome measures at baseline were analyzed using independent samples t-tests for continuous outcomes and Pearson χ^2-tests for categorical outcomes to determine the differences at baseline between the two conditions and between drop-outs and completers. Drop-outs were defined as incomplete data at posttest, including all participants who did not partake or finish the intervention and/or the posttest questionnaire, as well as participants who did not read the intervention texts. The following formula, according to Cohen (1988), was used to calculate Cohen's *d* effect sizes for within- and between-group differences: $d = \frac{(M_2 - M_1)}{Pooled\ SD}$.

To examine whether the life mindset of the participants changed more often in the optimistic direction in the experimental than in the control condition, a Pearson χ^2-test was conducted for each time point, to assess whether there were significant differences between the two conditions. Further Pearson χ^2-tests with each condition separately were conducted to assess whether there was a significant within-group difference from baseline to posttest in life mindsets.

To assess the mental well-being differences in the sample, the level of mental well-being of participants holding an optimistic life mindset (long-easy; coded 3) was compared to the level of mental well-being of those holding a pessimistic life mindset (short-hard; coded 2) at

posttest using an independent samples t-test. Further, the increase in mental well-being in the two manipulation groups was assessed by splitting the sample accordingly and performing a paired samples t-test using the mean mental well-being score from posttest and baseline.

Mediation and moderation analyses were conducted according to the procedure proposed by Preacher and Hayes (2008) using the PROCESS tool (Hayes, 2012). To examine whether mental well-being increased more in those participants who also had a change from a more pessimistic to an optimistic life mindset, a simple mediation analysis was conducted where X is condition (coded 1 for the intervention group and 3 for the control group), Y is the t1-t0 change in mental well-being, and M is the t0 to t1 change in life mindsets (coded 2 for the optimistic change group, 1 for the pessimistic change group, and 0 for the other change group). The PROCESS tool was used to calculate unstandardized regression coefficients for each path of the mediation model. The effect of X on M is represented by path *a*, the effect of M on Y while controlling for the effect of X is represented by path *b*, and lastly, the total effect of X on Y is represented by path *c*. Path *c'* represents the direct effect of X on Y while the effect of M is partialled out. The product of a and b (*ab*) is calculated to determine the indirect effect of X on Y through M. The bias-corrected (BC) 95% CI of the indirect effect was based on 10,000 bootstrapped resamples (Hayes, 2013). An effect was concluded to be significant when the BC 95% CI did not include zero.

Age groups were created according to research done by Khoshtaria (2018) on age group differences. The first group of young people (0) included all participants between the ages of 18 to 30 and the second group of older people (1) included all participants starting from the age of 31 onwards. First, it was checked whether the level of openness to experience was indeed lower in older adults. Therefore, an independent samples t-test was conducted using the mean scores on openness to experience. With a Pearson χ^2 analysis, it was checked whether the age groups differed in regard to their mindset and also in regard to their mindset changeability, using the mindset change groups. Then, a moderation analysis was conducted to test whether

age has a moderating effect on the relation between condition (independent variable) and the change in mindset score (dependent variable).

Results

Table 1 summarizes the baseline characteristics of the final sample. The participants' ages ranged from 19 to 84 years (M_{age}=33.72). The study included 46.1% male participants (n= 47) and 52.9% female participants (n= 54). The majority of participants had an intermediary education (58.8%) and participants were predominantly occupied in a paid employment (56.9%). There were no significant differences between conditions on demographics and baseline measures (Table 1), except for education [χ^2 (2) = 10.84, p= .004], with participants in the control condition being predominantly intermediately educated (74.5%). Compared to the norm table (Danner et al., 2016), participants scored in a normal range on openness to experience.

Table 1

Baseline characteristics of participants in the intervention group, control group, and the total sample.

	Intervention group (*n*= 51)	Control group (*n*= 51)	Total (*n*= 102)	*p*
Age, *M* (*SD*)	34.35 (14.96)	33.08 (15.58)	33.72 (15.21)	.674
Gender, *n* (%)				.578
Male	24 (47.1)	23 (45.1)	47 (46.1)	
Female	26 (51.0)	28 (54.9)	54 (52.9)	
No indication	1 (2.0)	-	1 (1.0)	
Education, *n* (%)				.004
low	17 (33.3)	6 (11.8)	23 (22.5)	
intermediate	22 (43.1)	38 (74.5)	60 (58.8)	
high	12 (23.5)	7 (13.7)	19 (18.6)	
Employment status, *n* (%)				.572
Paid employment	31 (60.8)	27 (52.9)	58 (56.9)	
Retired, student, or on parental leave	17 (33.3)	22 (43.1)	39 (38.2)	
Student & part-/fulltime employed	3 (5.9)	2 (3.9)	5 (4.9)	
Openness, *M* (*SD*)	3.66 (0.66)	3.69 (0.63)	3.68 (0.64)	.828

Drop-Out

A total of 83 (81%) participants received their allocated intervention and completed posttest. The number of drop-outs differed marginally significant between groups [$\chi^2(1) = 3.17$, $p = .075$], indicating that participants in the control condition were slightly more inclined to drop out than participants in the intervention condition. However, there were no significant differences between drop-outs and completers on demographics and baseline characteristics (openness to experience, life mindset, and mental well-being).

Manipulation effects on life mindset

It was expected that the life mindset of the participants who receive an informative text on the benefits of the 'life is long and easy' mindset will be more likely to change than that of participants reading a control text on personality. A Pearson χ^2 analysis revealed that the difference in endorsement of life mindsets within each group between baseline and posttest was significant [manipulation condition, $\chi^2(9) = 48.51$, $p<0.001$; control condition, $\chi^2(9) = 86.13$, $p<0.001$], indicating that there was a change in mindsets in both groups. However, the difference between groups was not significant [$\chi^2(3) = 4.39$, $p=0.223$; see Table 2]. This indicates that reading the intervention text on the benefits of the 'life is long and easy' mindset did not lead to a higher rate of beneficial changes in mindsets compared to reading the control text on personality.

Table 2

Outcome measures of the intervention group, control group, and total sample at baseline and posttest.

	Intervention group (*n*= 51)	Control group (*n*= 51)	Total (*n*= 102)	*p*
Life mindset at baseline, n (%)				.995
Short easy	11 (21.6)	11 (21.6)	22 (21.6)	
Short hard	22 (43.1)	21 (41.2)	43 (42.2)	
Long easy	9 (17.6)	9 (17.6)	18 (17.6)	
Long hard	9 (17.6)	10 (19.6)	19 (18.6)	
Life mindset at posttest, n (%)				.223
Short easy	11 (21.6)	15 (29.4)	26 (25.5)	
Short hard	11 (21.6)	17 (33.3)	28 (27.5)	
Long easy	18 (35.3)	10 (19.6)	28 (27.5)	
Long hard	11 (21.6)	9 (17.6)	20 (19.6)	
Mental well-being at baseline, *M* (*SD*)	3.26 (0.78)	3.08 (0.82)	3.17 (0.80)	.277
Mental well-being at posttest, *M* (*SD*)	3.25 (0.89)	3.23 (0.89)	3.24 (0.89)	.885

Well-being

Participants endorsing a pessimistic (short-hard) life mindset at posttest reported a significantly lower mental well-being (M= 2.84, SD= 0.92) than participants endorsing an optimistic (long-easy) life mindset (M= 3.56, SD= 0.81), $t(54)$= 3.11, p= .003. The effect size according to Cohen (1988) was d= 0.82, indicating a strong between-group effect. Further, there was no significant increase to posttest in the level of mental well-being following the intervention in the life mindset group (t= -0.11, p=0.910), while there was a significant increase in the level of mental well-being in the control group (t= 2.38, p= 0.021, d= 0.44). However, as can be seen in Table 2, there were no significant differences between the manipulation group and the control group on mental well-being indicating that the intervention did not have an effect on the mental well-being of the participants ($t(100)$= 0.15, p= 0.885).

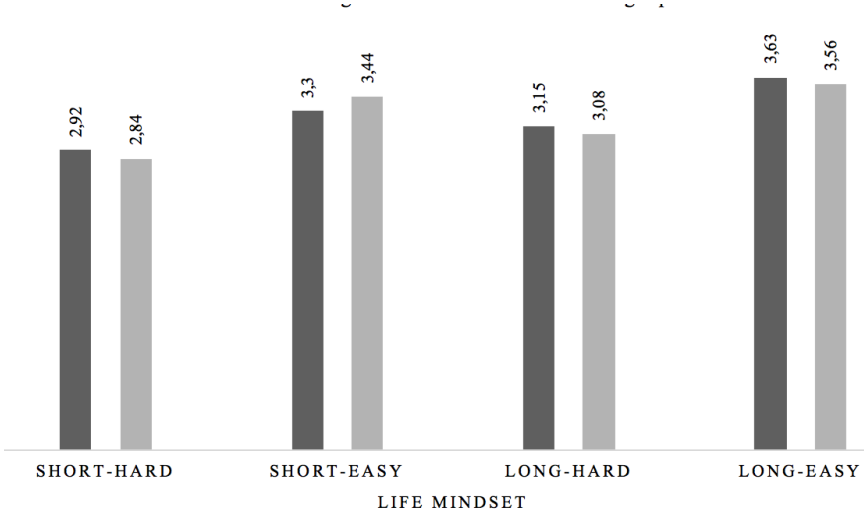


Figure 2. Level of mental well-being at baseline and posttest for the participants holding the different life mindsets.

Manipulation effects on mental well-being. The unique contribution of a change in mindset from a more pessimistic one to a more optimistic one on the change in mental well-being was analyzed using a simple mediation model. The a-path was not significant (p= 0.239), while the coefficients of the b-path, as well as the total (c-path) and direct (c'-path) effect, were marginally significant (p= 0.069, p = 0.074, p= 0.053, respectively). The total model explained

6.1% of the variance in change in mental well-being. However, the BC 95% CI of the indirect effect of mindset change contained a zero in the assumed model (*ab*= -0.01, BC 95% CI = -0.03 to 0.01). This indicates that a higher level of mental well-being after reading a text on the benefits of the long-easy life philosophy was not mediated through a change in the participants' mindsets from a more pessimistic life mindset to the long-easy one in comparison to the control group.

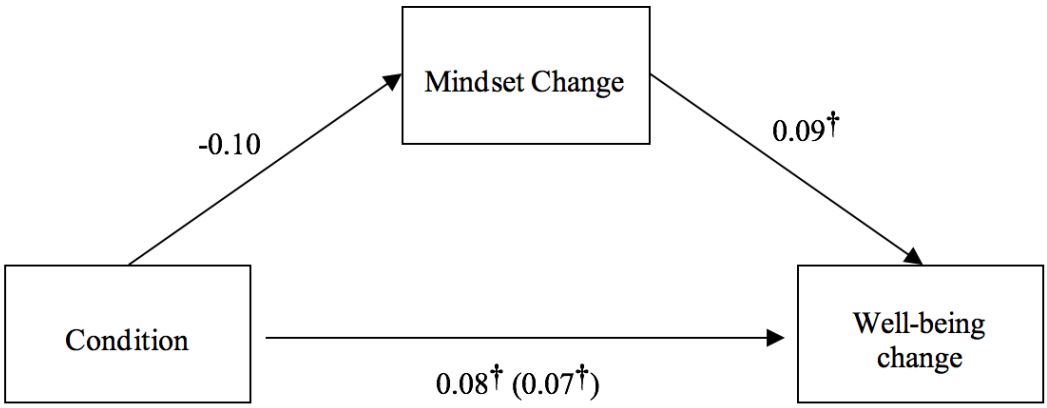


Figure 3. Simple mediation model of condition as predictor of mental well-being change (t1 – t0), mediated by mindset change (indicated by the mindset change group). Total effect (c-path) is given in parentheses.

Notes: †p <0.10.

Age Group Effects and Moderation

Approximately 63% of the participants were under 30 years or 30 years old and 37% of the participants were over 30 years old. The types of life mindsets at baseline, as well as at posttest, differed significantly between the two age groups, because the younger participants embraced a short-hard life philosophy, while the older participants embraced a short-easy life philosophy (baseline, $\chi^2(3) = 14.75$, p=0.002; posttest, $\chi^2(3) = 15.72$, p=0.001). However, there was no significant difference between the mindset change scores when the age groups were compared, $\chi^2(2) = 2.88$, p= 0.237. This suggests that people in both age groups did not change

their mindset after reading the text on the long-easy life mindset benefits compared to the control text. Further, no significant differences of openness to experience between the different age groups was found, t(100)= -1.42, *p*= 0.160.

It was also tested whether the effects of the intervention on well-being were moderated by age and no significant interaction effects for the moderator age were revealed, *b*= 0.00, 95% CI (-0.01, 0.01), *t*= 0.1016, *p*= .919. These findings indicate that even though the different age groups differed in regard to their life philosophies, age is not a moderating variable in whether a person changes their life mindset more easily or not.

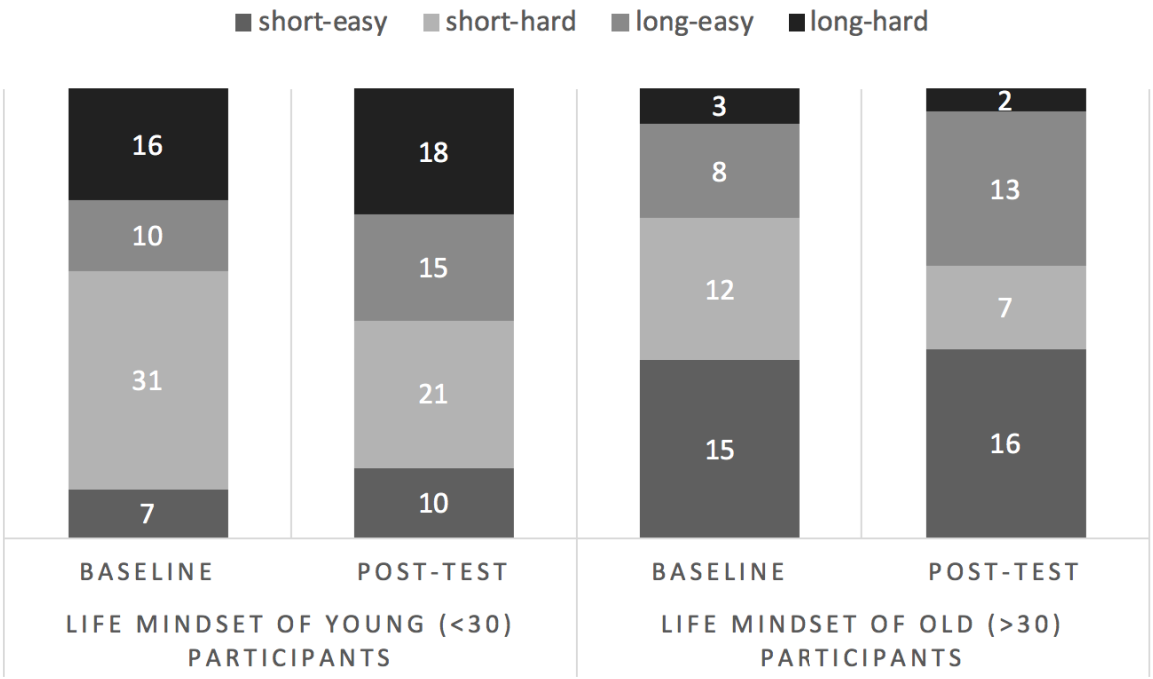


Figure 4. Distribution of the different life mindsets in the two age groups at baseline and at posttest.

Discussion

The main aim of the current study was to assess whether a life mindset can be changed by giving information about life mindsets and their impact, with a focus on the benefits of the long-easy life mindset, in the experimental condition, while participants in the control condition received a rather neutral text on the Big Five Personality traits, which was not expected to cause

any changes in the life mindset. However, no significant effects of the intervention on either the life mindset or well-being were found at posttest.

Findings with regard to the life mindset revealed that participants in both groups were initially more inclined to endorse the life is short and hard mindset at baseline, which confirms Hobbes' (1651/1960) view that people generally tend to view life as 'nasty, brutish, and short', as well as the findings from Norton et al. (2011). Further, regarding the changeability of the life mindset, it was expected that a higher rate of beneficial mindset changes will occur after reading the text on the life mindset compared to reading the control text on personality. Though changes were in the predicted direction, with more changes from a more pessimistic life mindset to an optimistic one in the intervention condition, there were no significant differences between the two groups at posttest, indicating that the intervention did not have the hypothesized effect. One possible explanation for these findings is that using an intervention text might not have been influential enough to change the life mindset. Other studies on the changeability of, for example, the stress mindset by Crum et al. (2013) or the intelligence mindset by Aronson et al. (2002), used video media portraying the benefits of the 'stress is enhancing' or the 'intelligence is malleable' mindset, respectively, to evoke significant changes in their participants' mindsets. Therefore, a video about the benefits of the 'life is long and easy' mindset might lead to significant changes in the life mindset.

In addition to providing video media, the study by Aronson et al. (2002) further found significant changes in their participants' intelligence mindsets after three sessions that were each 10 days apart of writing letters to a younger pen pal encouraging a malleable or fixed view of intelligence. Van Tongeren and Burnette (2018) also found it beneficial for the participants to summarize scientific evidence and quotes from scholars on the fixed or malleable happiness mindset to evoke a change in the happiness mindset. Thus, it might be that to change someone's life philosophy a more extensive intervention including a deeper engagement in the topic over a longer time span is necessary. This might be because, in comparison to other mindsets, the

life mindset touches upon many areas of a person's life such as their civic engagement, including voting behaviors, charitable donations, and volunteering, as well as their optimism about the future, and their general happiness (Norton et al., 2011). This indicates that the life mindset might not be as easily changeable as other mindsets and future research should assess the different domains that might constitute and are influenced by the life mindset.

As suggested by a prior study on the influence of the life mindset on the well-being of a person (Norton et al., 2011), the current study also found that holding an optimistic life mindset indicated a significantly higher level of well-being than holding a pessimistic one. Against the prediction that a beneficial change in mental well-being will be evoked after more beneficial changes in the life mindset occurred after having read the manipulation text on the beneficial nature of the 'life is long and easy' mindset, no effect of the manipulation condition mediated by a changed mindset on a change in mental well-being was found. One possible explanation for these findings is that the definition of well-being assumed in the current study differed from the definition used in the previous study by Norton et al. (2011). They defined well-being in terms of life satisfaction and happiness with life which only corresponds to the emotional part of mental well-being while the current study accounted for all aspects of mental well-being, therefore, comprising emotional, psychological, and social well-being. This might indicate that the life mindset of a person has a wider influence on the emotional well-being of a person than it has on the psychological and social well-being. However, more research is needed to examine the exact relationship between the dimensions of mental well-being and the life mindset of a person.

The findings in regard to the age differences in the changeability of life mindsets influenced by age-related differences in openness to experience revealed that whether a person changes their life mindset more often is not moderated by their age in the current study, nor is a person's age related to their level of openness to experience. This contradicts the expected age-related differences of susceptibility to change between the age groups. A possible

explanation for this might be that the participants in the different age groups did not exhibit the proposed differences in openness to change, which might indicate that they are still susceptible to change even as they get older. However, further research is needed to determine this. Another possible explanation for this might be that, to my knowledge, no other comparable study assessed age differences in the changeability of the life mindset or mindsets in general but previous research focused rather on age differences in the changeability of attitudes (e.g. Tuokko et al., 2007). However, attitudes are always specific favoritisms or disfavoritisms for a certain situation or entity and are able to change from situation to situation (Bhugra, Evans-Lacko, & Cutter, 2015; Guyer & Fabrigar, 2015), while mindsets are more general and function as a frame of mind, possibly comprising several different attitudes (Zion & Crum, 2018). This indicates that while the changeability of attitudes is affected by age-related differences in openness to experience the changeability of a life mindset might not be, as it is rooted more deeply in more than one domain of a person's life (Norton et al., 2011).

An interesting finding of the current study was that even though age was not found to be a moderator influencing whether a person changes their mindset or not, the life mindsets of the participants differed significantly between the age groups at baseline. Older people more often believed that life is easy rather than hard and short rather than long. On the other hand, younger people more often believed that 'life is hard' while they also perceived life as short. Research of Kennedy, Mather, and Carstensen (2004) might explain those findings. They examined the age-related differences in positivity in 300 participants aged from 47 to 102 years. The results of their study, as well as of several replications of it (e.g. Charles, Mather, & Carstensen, 2003; Mikels, Larkin, Reuter- Lorenz, & Carstensen, 2005), showed that older adults exhibit a preference in attention to, as well as in memorizing of, positive over negative information, which the researcher termed 'positivity effect'. This positivity effect might explain the favoritism of viewing life as easy in older adults, compared to younger participants.

Strengths and limitations

The present study has several strengths. First, it is one of the first studies that adopts the definition of life mindsets proposed by Norton et al. (2011) and further, to the best of my knowledge, the first one that uses an intervention to assess whether this particular mindset can be changed. Second, an intention to treat analysis was conducted to impute all missing data at posttest. Third, a diverse sample was used in the current study, which poses a strength to the generalizability as previous studies on mindset changeability mostly engaged student samples (e.g. Crum et al., 2013). Other strong points of this study are that the randomization was done by a researcher who was not actively involved in recruitment and analyses therefore, selection and analysis bias were reduced. Further, the tendency of the respondents to respond with socially desirable answers was minimized through the use of an online questionnaire and lastly, the questionnaires that were used were all validated versions which established high reliability.

However, despite these strengths, there are also some possible limitations that need to be considered. First, the manipulation text was not tested a priori in a pilot study to examine whether the text was clear enough to the reader and how a reader might interpret the information provided to him. Therefore, qualitative research, possibly in the form of interviews with the participants, would be needed to improve the intervention on text lengths and instructions.

Next to this, the current study did not assess the long-term effects of the intervention, as the posttest was conducted directly after the intervention and no follow-up survey was administered. It might, therefore, be that the changes in mindsets and well-being were merely spontaneous reactions to the intervention and that long-term changes in either the life mindset or in the level of mental well-being were left undetected. Therefore, the time span between the intervention and the follow-up should be increased in a replication of this study in order to assess whether changes occur in the long-term. This is also because the MHC-SF measures a person’s mental well-being in a time frame of one month and was, therefore, likely not able to

reliably detect changes in a period of one week. Thus, changes in well-being might be merely due to random fluctuation.

Another possible limitation is that the researcher had no influence on the environment in which the participants filled in the questionnaires and therefore, there might be confounding variables other than the intervention that could have led to changes in scores from baseline to posttest. However, as the participants were recruited from different social systems of the researchers and the sample was not homogenous on any of the baseline characteristics, it is not likely that the results from this study were influenced by any confounding variables that were out of control for the researchers.

Lastly, even though participants were asked to indicate what the text they read was about, the researchers cannot for certain rule out that some participants only skimmed through the text and did not really internalize the information provided to them.

Future research and practical implications

In order to address the limitations of the current study, future research should focus on introducing stable changes in the life mindset by the means of an intervention and determining the time and reinforcers that are necessary to do so. Therefore, it should be investigated whether different intervention methods (e.g. video media, informative texts, writing an essay or hearing a lecture about a topic) aimed at changing the life mindset, achieve different results and whether repeated exposure to selective information heightens the effect in changing the life mindset, as has been proven with other mindsets (e.g. Crum et al., 2013). Next to this, the time frame for a follow-up survey should be increased in order to be able to assess the long-term effects of the intervention.

Furthermore, future research should try to investigate the definition and underlying domains of a life mindset to determine whether a life mindset should best be measured in a different way, for example, using a continuous measure or splitting it into different domains, as opposed to asking two simple questions. Further, as there still is limited research on the age-

related differences in life mindsets, these, as well as the possible underlying constructs that might be influencing the age-related differences, should be further investigated in a replication of this study using a sample with a higher representation of older people.

Lastly, as there are only a few studies that examined the changeability of mindsets and this is the first that studied the changeability of the life mindset, replication is needed to study the life mindset and its changeability more extensively. This is needed in order to create an informed basis for practical implications. In the end, the knowledge on this will likely provide useful for the general public, as well as clinical practice, in designing specific interventions targeting a change to an optimistic life mindset to ultimately increase well-being.

Conclusion

In sum, this study showed that the life philosophy a person has can be assessed very easily and predicts a great deal about their mental well-being, with higher mental well-being in people holding an optimistic life mindset compared to the ones holding a pessimistic mindset. However, the study did not yield evidence that the life mindset can be changed by the use of a written informative text on the benefits of an optimistic life mindset (‘life is long and easy’), as well as a change to an optimistic mindset was not shown to be a mediator in the intervention effect on well-being. Further, there were significant differences in mindsets between age groups, with older people (above 30) believing that life is short and easy, while younger people believe that life is hard and being indecisive whether it is long or short. This suggests that there might be a change in how a person perceives life throughout their life span. This, however, needs to be researched more deeply in a replication of this study.

Concluding, it can be stated that there still is limited research on the life mindset in general and, to my knowledge, no previous study that examined the changeability of it and the resulting influences on well-being by the means of an intervention. Therefore, this, as well as possible reasons for the current findings, should be investigated further in the future.

References

Aronson, J., Fried, C. B., & Good, C. (2002). Reducing the effects of stereotype threat on African American college students by shaping theories of intelligence. *Journal of Experimental Social Psychology, 38,* 113–125. doi:10.1006/jesp.2001.1491

Bandura, A. (1977). Self-efficacy: Toward a unifying theory of behavioral change. *Psychological Review, 84*, 191-215.

Bhugra, D., Evans-Lacko, S., & Cutter, W. (2015). Mentally Ill, Public Attitudes towards. In J.D. Wright (2nd Ed.), *International Encyclopedia of the Social & Behavioral Sciences* (pp. 228-234). Orlando, Florida: Elsevier.

Blankers, M., Koeter, M.W., & Schippers, G.M. (2010). Missing data approaches in eHealth research: simulation study and a tutorial for nonmathematically inclined researchers. *Journal of Medical Internet Research, 12*(5), 54.

Charles, S. T., Mather, M., & Carstensen, L. L. (2003). Aging and emotional memory: the forgettable nature of negative images for older adults. *J. Exp. Psychol. Gen.* 132, 310–324.

Chiu, C. Y., Hong, Y.Y., & Dweck, C. S. (1997). Lay dispositionism and implicit theories of personality. *Journal of Personality and Social Psychology, 73,* 19–30. doi:10.1037/0022-3514.73.1.19

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd Ed.). Hillsdale, NJ: Erlbaum.

Crum, A.J., & Lyddy, C. (2014). De-stressing stress: The power of mindsets and the art of stressing mindfully. In C. Ngnoumen, A. Ie, E. & E. Langer (Ed.) *The Handbook of Mindfulness,* 948-963. Hoboken, New Jersey: Wiley-Blackwell.

Crum, A. J., Salovey, P., & Achor, S. (2013). Rethinking stress: The role of mindsets in determining the stress response. *Journal of Personality and Social Psychology, 104*(4), 716-733.

Danner, D., Rammstedt, B., Bluemke, M., Treiber, L., Berres, S., Soto, C., & John, O. (2016). Die deutsche Version des Big Five Inventory 2 (BFI-2). *Zusammenstellung sozialwissenschaftlicher Items und Skalen.* doi:10.6102/zis247

Dempster, A.P., Laird, N.M., & Rubin, D.B. (1977). Maximum likelihood from incomplete data via the EM algorithm. *Journal of the Royal Statistical Society, Series B (Methodological), 39*(1), 1-38.

Dweck, C. S. (2008). Can personality be changed? The role of beliefs in personality and change. *Current Directions in Psychological Science, 17,* 391–394. doi:10.1111/j.1467-8721.2008.00612.x

Greenberg, J., Solomon, S., & Pyszczynski, T. (1997). Terror management theory of self esteem and cultural worldviews: Empirical assessments and conceptual refinements. *Advances in Experimental Social Psychology, 29*, 61-139.

Guyer, J. J., & Fabrigar, L. R. (2015). Attitudes and behavior. In J.D. Wright (2nd Ed.), *International Encyclopedia of the Social & Behavioral Sciences,* (pp. 183-189). Orlando, Florida: Elsevier.

Hayes, A.F. (2012). *PROCESS: A Versatile Computational Tool for Observed Variable Mediation, Moderation, and Conditional Process Modeling.*

Hayes, A. F. (2013). *Introduction to mediation, moderation, and conditional process analysis. A regression-based approach*. New York, NY: Guilford Press.

Hobbes, T. (1651/1960). Leviathan. Oxford: Basil Blackwell.

Kennedy, Q., Mather, M., & Carstensen, L. L. (2004). The role of motivation in the age-related positivity effect in autobiographical memory. *Psychological Science, 15*, 208–214.

Keyes, C.L.M. (2002). The mental health continuum: From languishing to flourishing in life. Journal of Health and Social Behavior, 43, 207-222.

Keyes, C.L.M. (2009). Atlanta: *Brief description of the mental health continuum short form*

(MHC- SF). Retrieved from http://www.aacu.org/sites/default/files/MHC-SFEnglish.pdf

Khoshtaria, T. (2018). What are the values of young people and how are these different from the values of older generations in Georgia? *Journal of Beliefs & Values*. doi:10.1080/13617672.2017.1359480.

King, L. A., Hicks, J. A., Krull, J., & Del Gaiso, A. K. (2006). Positive affect and the experience of meaning in life. *Journal of Personality and Social Psychology, 90*, 179-196. doi: 10.1037/0022-3514.90.1.179

Krosnick, J. A., & Alwin, D. F. (1989). Aging and susceptibility to attitude change. *Journal of personality and social psychology*, *57*(3), 416.

Kurtz, J. L. (2008). Looking to the future to appreciate the present: The benefits of perceived temporal scarcity. *Psychological Science, 19*, 1238-1241.

Lamers, S.M.A., Westerhof, G.J., Bohlmeijer, E.T., ten Klooster, P.M., & Keyes, C.L.M. (2011). Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC- SF). *Journal of Clinical Psychology, 67*(1), 99-110.

Mikels, J. A., Larkin, G. R., Reuter- Lorenz, P. A., & Carstensen, L. L. (2005). Divergent trajectories in the aging mind: changes in working memory for affective versus visual information with age. *Psychol. Aging* 20, 542–553.

Norton, M. I., Anik, L., Aknin, L. B., & Dunn, E. W. (2011). Is life nasty, brutish, and short? Philosophies of life and well-being. *Social Psychological and Personality Science*, *2*(6), 570-575.

Phillips, D. P., Ruth, T. E., & Wagner, L. M. (1993). Psychology and survival. *Lancet, 342,* 1142–1145.

Preacher, K.J., & Hayes, A.F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavioral Research Methods, 40*, 879–891.

Ray, O. (2004). How the Mind Hurts and Heals the Body. *American Psychologist*, *59*(1), 29.

Tulviste, T., Kall, K., & Rämmer, A. (2017). Value priorities of younger and older adults in seven European countries. *Social Indicators Research*, *133*(3), 931-942.

Tuokko, H. A., McGee, P., Gabriel, G., & Rhodes, R. E. (2007). Perception, attitudes and beliefs, and openness to change: Implications for older driver education. *Accident Analysis & Prevention*, *39*(4), 812-817.

Van Tongeren, D.R., & Burnette, J.L. (2018). Do you believe happiness can change? An investigation of the relationship between happiness mindsets, well-being, and satisfaction. *The Journal of Positive Psychology, 13*(2), 101-109. doi: 10.1080/17439760.2016.1257050

Zion, S.R., & Crum, A.J. (2018). Chapter Eight - Mindsets Matter: A New Framework for Harnessing the Placebo Effect in Modern Medicine. *International Review of Neurobiology, 138*, 137-160.

Appendix A

Life Mindset Intervention Text

Did you know that your perspective of life influences your health and behavior? How do you perceive life? Do you think that life is short or long? And do you think that life is easy or difficult?

Recent scientific studies have shown that most people believe that life is short and difficult. However, those people who believe that life is long and easy have better health outcomes. In general, they do not only possess a higher level of well-being, they also feel more happy, donate more money to charity, do more often volunteer work and are more satisfied with their relationships compared to the individuals who are holding another view of life (namely, that life is long and difficult, short and difficult or short and easy). Also, individuals who believe that life is long and easy think that they will experience less worse and more good things to happen in the future compared to individuals who possess the short and difficult view of life. Taken together, if you believe that life is long and easy, you are more likely to feel better and do better, for example by improving the well-being of others.

Appendix B

Control Group Text on Personality

Did you know that 'The Big Five' are not only animals but also indicate your personality? While the big five animals in Africa refer to the five animals most difficult to hunt on foot - the lion, leopard, rhinoceros, elephant and cape buffalo - psychologists use the term to describe the five core traits of your personality:

1. Openness to experience: curious, broad range of interests, try new things.
2. Conscientiousness: thoughtfulness and planning, organized, attention to detail.
3. Extraversion: sociable, talkative, assertive, outgoing and energized.
4. Agreeableness: trust, kindness, cooperative, care about other people.
5. Neuroticism: emotional unstable, mood swings, gets upset easily.

Recent scientific studies have shown that both biological and environmental influences play a role in shaping our personalities. Studies also suggest that these big five personality traits tend to be relatively stable over the course of adulthood. It is important to note that each of the five personality factors represents a range between two extremes. For example, extreme extraversion versus extreme introversion, and neuroticism (emotional instability) versus emotional stability. In the real world, most people lie somewhere in between the two polar ends of each dimension.

Taken together, your personality can be categorized into five main personality traits which are relatively stable.

Appendix C

Debriefing Document

Dear participant,

In the past 2 weeks, you took part in the study investigating how people perceive new information. We sincerely thank you for your invested time to participate! We are very happy with the way in which everyone was involved and has done their best to complete all surveys. With the data from this study, we can find answers to important scientific questions and we hope to gain more insight in how people perceive and react to new information. We will now inform you about the real set-up of the study and its aim.

Set-up of the study. In total, XX people participated in the study. They were divided into 3 different groups of equal size and every group received a different text to read before the second survey. If you are interested, you can read those texts on the following pages (or skip these by clicking on the arrow to go to the next page). One text was about how people perceive stress, one text was about how people perceive life and one text was about personality. The latter text was used as a control condition, we expected no change in your perceptions or beliefs after reading this text. However, we did expect that the so called 'stress mindset' or 'life-mindset' would change in a beneficial way, by reading the other two texts.

Aim of the study. The aim of this study was to analyze whether the different mindsets (about stress or about life) could be changed with appropriate information. We also test whether such information influences your mental well-being in a beneficial way. The used texts conform to current scientific knowledge and we were curious whether people perceive, believe or act differently after reading some latest insights from science.

In order to not bias or distort the results, we kept back the true aim of the study. We expect some first results in a few months, although a scientific paper about the results will probably take more than a year until publication. If you want to read more about the scientific

insights we used as input for the texts about the stress or life mindset, we give you some reading tips below.

Again, we thank you very much for your invested time and participation!

Reading tips. https://www.tandfonline.com/doi/abs/10.1080/10615806.2016.1275585 (about stress) https://journals.sagepub.com/doi/abs/10.1177/1948550611401425 (about life)