Master's thesis

Positive potentiation effects of positive emotions in a daily setting: The role of positive mental health

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12th July 2016

UNIVERSITY OF TWENTE.

Abstract

Background: The broaden-and-build theory posits that experience of positive emotions triggers expansive mindsets which eventually lead to building of psychological, physical and social resources and a high level positive mental health (PMH). Research suggest that over time, these broadening and building characteristics can increase reciprocally, leading to an upward spiral of positive emotions. However, analogous to the rather salient nature of emotions, upward spirals might as well generate in short time periods of a daily setting. Therefore, this study aims to investigate the relationship between the repeated experience of positive emotions, positive mental health and performance in divergent thinking tasks.

Method: 106 Dutch and German respondents were randomly assigned to either the experimental or control condition. The 30-minute long online study consisted of a pre-measurement of the mDES and MHC-SF and a post-measurement of the mDES. After pre-measurement participants completed four tasks of the Guilford Alternative Uses Test on divergent thinking. Between tasks, specific emotional states were induced in participants. Herefore, participants were shown either positive or neutral pictures from the International Affective Picture System (IAPS), depending on allocation to the experimental or control group, respectively.

Results: In both conditions, high-arousal positive emotions have increased- and low-arousal positive emotions decreased between measurements. No significant relationship was found for experience of positive emotions and performance on the divergent thinking tasks. Individuals with high PMH reported significantly more positive emotions than participants with low PMH. However, no interaction between PMH and increase in positive emotion or PMH and performance on the divergent thinking task was found.

Discussion: Results did not suggest that experience of positive emotions significantly increased divergent thinking ability or chances to generation of an upward spiral over a brief course of time. Except for differences in the experience of positive emotions, positive mental health was unrelated to divergent thinking or increase in positive emotions. The unexpected changes in positive emotions highlight the necessity for future research to differentiate between individual positive emotions and their function in task performance.

Samenvatting

Achtergrond: Volgens de broaden-and-build theorie stimuleren positieve emoties de verruiming van iemands gedachterepertoire. Op den lange duur zou deze verbrede mentale toestand leidden tot opbouw van psychologische, lichamelijke en sociale hulpbronnen en een hoog niveau van positieve geestelijke gezondheid (PMH). Onderzoek toont aan dat deze twee processen wederzijds versterken waardoor een opwaartse spiraal van positieve emoties kan ontstaan. Echter, door de voorbijgaande natuur van emoties stelt zich de vraag of opwaartse spiralen mogelijk ook kunnen ontstaan op de korte termijn (*i.e.* een dagelijks setting). Het doel van deze studie is daarom om de relatie tussen herhaaldelijke ervaringen van positieve emoties, positieve geestelijke gezondheid en prestatie in divergent denken-taken in kaart te brengen.

Methode: 106 Nederlandse en Duitse respondenten werden at random toegewezen aan de experimentele of de controle groep. De studie duurde in totaal 30-minuten en bevatte een voormeting van de mDES en de MHC-SF en een nameting van de mDES. Na de voormeting vulden de participanten vier divergent denken-taken (*i.e.* de Guilford Alternative Uses Test) in. Tussen de taken werden specifieke emotionele toestanden geïnduceerd. Hiervoor werden aan de deelnemers uit de experimentele en neutrale conditie respectievelijk positieve of neutrale plaatjes uit het International Affective Picture System (IAPS) getoond.

Resultaten: In beide condities zijn hoog-arousal positieve emoties verhoogd- en laag-arousal positieve emoties verlaagd tussen meetmomenten. Er werd geen significante samenhang gevonden tussen de ervaring van positieve emoties en prestatie op de divergent denken-taken. Deelnemers met hoge PMH rapporteerden significant meer positieve emoties dan deelnemers met lage PMH. Voor PMH en toename in positieve emoties of PMH en prestatie op de divergent denken-taken werden geen significante samenhangen gevonden.

Discussie: De resultaten maken niet aannemelijk dat de ervaring van positieve emoties de vaardigheid tot divergent denken verhoogd of de kans om in korte tijd een opwaartse spiraal te ontwikkelen. Behalve de verschillen in ervaren positieve emoties was positieve geestelijke gezondheid ongerelateerd aan divergent denken of toename in positieve emoties. De onverwachte veranderingen in positieve emoties in de loop van de studie maken duidelijk dat vervolgonderzoek rekening zou moeten houden met specifieke positieve emoties en hun rol in prestatie op bepaalde taken.

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Introduction

Positive emotions feel good. While this is a generally accepted fact, (clinical) psychology research has long overseen the possible chances, or the "good" in feeling good. In fact, for over half a decade after World War II, psychological research relied on the so called *pathogenic approach*. The pathogenic approach, or medical-disease model, is characterized by its dichotomous idea of health and illness. Thus, it seeks to explore ways of how to treat mental illness and free people of mental adversities. From the viewpoint of the pathogenic approach, (mental) health is equal to the absence of (mental) disease. This idea stands in contrast to the World Health Organization's (WHO; 1946) position, which defines health as "(…) a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity." (p. 1). In this definition, the WHO subsumes aforementioned pathogenic approach and the *salutogenic approach*, which followed from the humanistic perspective in the 1960s (Keyes, 2007). Accordingly, the salutogenic approach centers around the origin and obtainment of mental health and considers concepts as human strengths, resources and potentials (Mayer & Hausner, 2014). Integrating these apparently opposing approaches in an estimate to reflect an all-encompassing spectrum of human health, the WHO's approach is called the *complete state model* (Keyes, 2007). It took until end of the last century before the American Psychological Association (APA) officially acknowledged the complete state model with the formation of a new school of thought called "Positive Psychology" (Seligman & Csikszentmihalyi, 2000). Positive psychology can be characterized as an approach to mental health which, contrary to conventional psychology, focuses on building what is right instead of fixing what is wrong. It centers on achieving a satisfactory life and cultivating personal strengths and encompasses research on such concepts as well-being, optimism, mindfulness, resilience or virtues (Seligman & Csikszentmihalyi, 2000). Also, as one of the key characteristics of well-being, the experience and promotion of positive emotions plays a central role in positive psychology, while negative emotions have always attracted more attention within the pathogenic approach. Given their linkage to relatively ancient brain regions, a significant amount of research on emotions has been denoted to their adaptive function and evolution.

Generally, evolutionary psychologists agree upon the idea that emotions are, by definition, associated with certain action tendencies. The emotion of disgust, for example, is associated with the psychological and behavioral tendency to avoid and retain distance (Frijda, Kuipers, & ter Schure, 1989). Also, it is was generally posited, that specific emotions go hand

in hand with specific physiological responses as for example changes in pupil dilation, muscle tension or heart rate and blood pressure (Frijda, 1986). From an evolutionary perspective, then, emotions evolved because they prompted specific action patterns that increased the odds to survive under life-threatening circumstances (Tooby & Cosmides, 1990). While this idea stands it's ground for negative emotions like fear, the evolutionary advantage of positive emotions is less clear, as positive emotions typically do not seem to elicit specific action tendencies but, at best, orientations towards action or inaction (Fredrickson & Levenson, 1998; Frijda, 1986). Thus, the function of positive emotions can hardly be determined from the viewpoint of general theories on emotions.

One of the benefits of positive emotions is that they facilitate social interactions and make people feel more connected to others (Isen, 1987; Waugh & Fredrickson, 2006). Also, people who experience positive emotions tend to be more creative and efficient in problem solving tasks and are more open to information (Isen, 2001; Isen, Daubman, & Nowicki, 1987). Findings like these sparked the development of a coherent theoretical model, which, contrary to earlier theories of emotion, could account for the fact that positive emotions make part of human experience while, as amplified above, their evolutionary function is unclear. This model is called the broaden-and-build theory of positive emotions (Fredrickson, 1998; Fredrickson, 2001). Firstly, Fredrickson postulates, positive emotions broaden the scope of people's thought-action-repertoire, that is, they widen the scope of thoughts and actions that come to mind. This widened attentional focus, in turn, facilitates building of physical, psychological and social resources such as physical health, behavioral flexibility, knowledge, capabilities and social support systems. While the broadening characteristic of positive emotions is rather momentary, the building characteristic, however, develops over time and, most importantly, accumulates durable resources that can be drawn on in the future (Fredrickson, 1998; Fredrickson, 2001). Consequently, getting back to the evolutionary role of positive emotions, it seems likely that these broadening and building characteristics could have heightened the odds of survival in our ancestors, and thereby increased the chance to reproduce (Fredrickson, 1998).

Strikingly, opposed to positive emotions, effects of negative emotions are approached differently outside the evolutionary perspective. Contrary to our ancestors, most people today do not live in a world anymore where risk of death is imminent on a daily level. Hence, in many cases the former advantages of negative emotions, like cardiovascular mobilization, lost ground to their disadvantageous consequences (Fredrickson, 2003). This observation has been emphasized in research, showing that experiencing negative emotions, especially over a prolonged amount of time, can have a diversity of negative effects on physical and mental health

(Morrison & Bennett, 2013). For example, negative emotions were shown to be detrimental on recovery after surgery (Seebach et al., 2012) and to heighten risk for development of depression (Brown & Rosellini, 2011). Also, prolonged negative emotions form a profound risk factor for cardiovascular diseases (Buerki & Adler, 2005). Again, this is where the integral function of positive emotions comes into play: By broadening people's cognitive and behavioral scope and triggering expansive mindsets, positive emotions can speed up recovery from the heightened cardiovascular activity that negative emotions bring forth. This is known as the "undoing hypothesis" (Fredrickson, 2001). However, positive emotions not only counteract negative emotions and help building personal resources, they also form the basis for well-being both in the present as in the long-term future (Harker & Keltner, 2001). Optimally, this can lead to *flourishing*, which is defined as a state of complete emotional, psychological and social well-being *(*Keyes, 2002). Flourishing forms the upper end of the mental health continuum, whereas *languishing* constitutes its lower end. While flourishing people (also called *flourishers)* are filled with positive emotion, are psychologically adapt and feel socially related, *languishers* have low levels of well-being and tend to feel hollow and stagnating in life (Keyes, 2002). However, this is not to say that languishers suffer from psychopathology and flourishers do not. As demonstrated in Keyes (2002), levels of psychopathology are modestly correlated with levels of positive mental health (PMH), that is, the absence of mental illness does not equal the presence of PMH and well-being. This perspective is called the two continua model (Keyes, 2002; 2005).

Research on the two continua model has shown that languishers tend to have even worse levels of psychosocial functioning than individuals who suffer from depression and are moderately or high flourishing (Keyes, 2004). This observation partly parallels findings from the undoing hypothesis: a moderate or high level of flourishing can undo, or at least compensate the negative psychosocial effects of mental disease. A possible explanation for this observation is that positive emotions, via the steps depicted in the broaden-and-build-model, generate conditions that increase the odds of experiencing more positive emotions (Fredrickson & Joiner, 2002). That is, positive emotions have the tendency to self-perpetuate by broadening thinking and making finding of positive meaning in future experiences more likely (Tugade & Fredrickson, 2004). This process can be visualized as an upward spiral (Fig. 1).This upward spiral, in turn, could counter the self-perpetuating negative thoughts and feelings that are characteristic for depression, leading to less psychosocial problems.

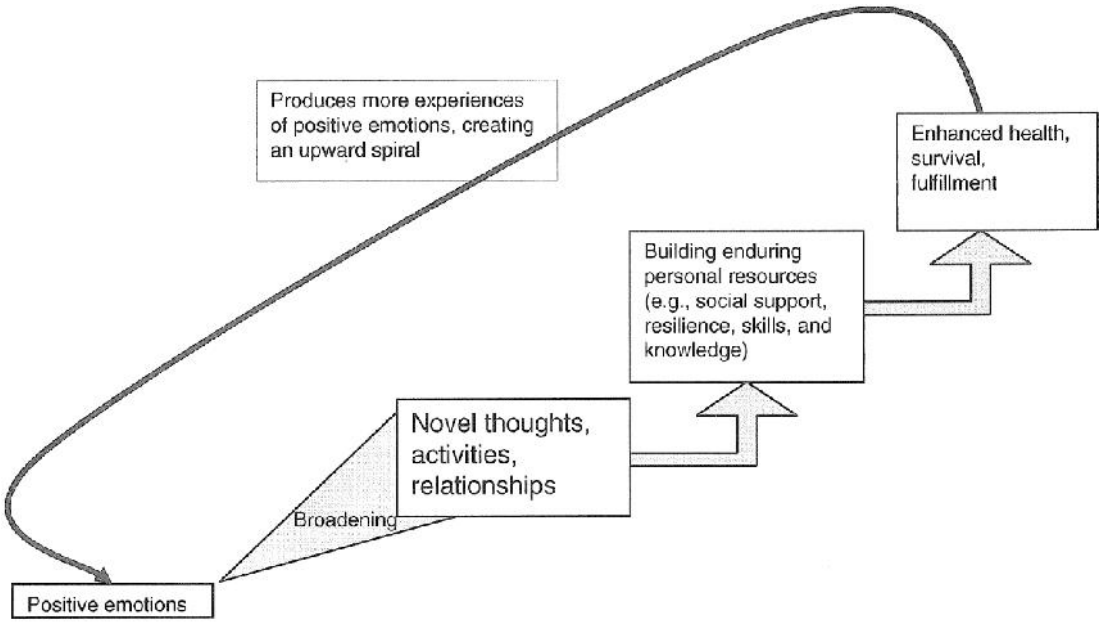

Figure 1. Generation of an upward spiral of positive emotion. *Adapted from Fredrickson and Cohn (2008, Fig. 48.1)*

So far, the establishment of upward spirals has only been shown over the course of several weeks (Fredrickson & Joiner, 2002; Kok et al., 2013). For example, in the study of Fredrickson and Joiner (2002), the authors compared the predictive value of positive and negative emotions on future broadened thinking. Results showed that contrary to negative emotions, positive emotions predicted changes in broadened thinking. In fact, positive emotions and broadened thinking had serially increased one another over the 5-week span. Fredrickson concludes: "*The psychological broadening sparked by one positive emotion increases the odds that an individual will find positive meaning in subsequent events and experience additional positive emotions. This upward spiral can, over time, build psychological resources and optimize people's lives.*" (p. 174). However, since emotions are generally short-lived and momentary phenomena (Reeve, 2005) one might wonder whether such an extended time is a prerequisite for the establishment of an upward spiral. While this undoubtedly might be the case for "optimization of people's life", which is a complex, multi-faceted process, it could be argued that less complex processes (say, performance on a task on divergent thinking) might be facilitated by positive emotions more instantaneously. However, it is yet to be studied in how far upward spirals can occur over shorter periods of time, say, on the micro level of a day. Specifically, one might argue that the broadened thought-action repertoire that positive emotions induce might be sufficient to establish an upward spiral. For example, individuals experiencing positive emotions are more likely to behave in a friendly and prosocial way

towards others (Wang & Saudino, 2015). Prosocial behavior, in turn, has been shown to increase positive affect (Dulin & Hill, 2003; Oarga, Stavrova, & Fetchenhauer, 2015). As in this example, it seems plausible that individuals might benefit from their own positive emotions on a short-termed basis and even self-generate upward spirals of positive emotions in everyday life. Interestingly, this process might be facilitated in flourishers. For example, Catalino and Fredrickson (2011) found that flourishers tend to experience stronger boosts in positive emotions in reaction to pleasant events. This means that individuals with a high mental health to begin with might be especially receptive for the positive effects of a broadened cognition and thus be more likely to experience upward spirals of positive emotions.

This study is designated to test these assumptions and extend our knowledge on how upward spirals can come to be in daily life. Concretely, participants will be split into an experimental and a control condition. Individuals in the experimental condition will make a series of tasks on divergent thinking and after each, be induced with positive emotions. Individuals in the control condition will do the same tasks but will be induced with neutral emotions. In general, the question of how to evoke certain, distinct emotions in participants reliably, is a central point in emotion research. Only if all participants in an experiment can be brought into the same emotional state is it possible to make assumptions about the behavioral consequences of those same emotions. To prevent bias, emotions are oftentimes induced in research participants. That is, research participants are prompted to feel in a certain way indirectly, for example by letting them watch emotion-laden film sequences or images. Since internet use has increased tremendously in the last 15 years, research has adapted to this process (Wright, 2005). Accordingly, emotion induction methods have been implemented in online research as well. In a systematic review, Ferrer, Grenen, and Taber (2015) have shown that emotion induction techniques in online studies are generally effective, and even comparable in effect to emotion induction techniques in the laboratory. The authors did point out, however, that positive emotions are harder to induce than negative emotions. Also, they reported that studies targeting positive emotions generally had shown smaller effect sizes than studies that had targeted negative emotions. Anyhow, greatest effect sizes were achieved using emotionally laden pictures for induction of positive emotions.

Therefore, emotion induction by means of emotionally laden pictures seems suited best for this study. The following research question is formulated:

In how far does repeated prompting of positive emotions lead to a step-by-step increase in performance in divergent thinking and in which way is this relationship moderated by different levels of positive mental health?

The following hypotheses have been formulated:

H1: Looking at a sequence of images with a positive valence evokes positive emotions in participants.

H2a: Compared to participants in a neutral mood, participants in a positive mood show more divergent thinking.

H2b: Answers on the Alternative Uses Test of individuals in the experimental condition will become increasingly original compared to the control condition during the course of the study.

H3: Compared to participants with low levels of positive mental health, participants with high levels of positive mental health experience stronger increases in positive emotions from pre- to post-induction measurement.

H4: Compared to participants with low levels of positive mental health, participants with high levels of positive mental health show more divergent thinking.

Method

Participants and recruitment

Participants were recruited via different communication channels by applying the convenience sampling method. 55 participants of the total sample of n = 119 were recruited via the University of Twente's research participant pool and gained course credits in exchange for their participation. Other participants were recruited with flyers and by directly contacting and inviting potential participants verbally or via the internet. Also, the experimenters chose to recruit Dutch and German residents in order to attain a bigger sample. Therefore, the questionnaire was set up in an, otherwise identical, Dutch and German version.

Finally, data of 106 participants (71.7% female) was filled in completely and could be taken into account for further analysis in the study. The age of the participants ranged from 18-61 years (M = 23.40, SD = 6.46). Of these 106 individuals, 39 (36.8%) were Dutch and 67 (63.2%) German natives. Participants were predominantly students (88.7%), followed by employees (9.1%) and apprentices (1.9%). Prior to participation in the study, every respondent confirmed his or her voluntary participation in the study (*i.e.* informed consent). There were no significant differences in age, gender, or nationality for those who completed the study and the 13 respondents (15.47%) who quit the study prematurely.

Materials

modified Differential Emotions Scale

The modified Differential Emotions Scale (mDES; Fredrickson, 2013) is a revised, 16-item-long form of the Differential Emotions Scale (DES; Izard, 1977), and intended to present emotions. Compared to the DES, the mDES encompasses a far wider range of positive emotions and therefore, was especially suited for use in this study. Also, compared to other widely used measures of emotions, it encompasses high- and low-arousal positive emotional states (Fredrickson, 2013). In total, the version of the mDES used in this study covers eight positive (*i. e.* interest, awe, inspiration, joy, balance, surprise, fondness, contentment) and eight negative (*i.e.* fear, anxiety, anger, shame, sadness, guilt, disgust, contempt) emotions, of which each is covered with one item. Of the eight positive emotions, four go along with high arousal (*i.e.* interest, inspiration, joy & surprise) and four go along with low arousal (*i.e.* awe, satisfaction, fondness, serenity). Items 4 (feeling moved) and 11 (surprise) were later withdrawn from analyses because of their unclear relationship to positive or negative emotions. The standard

instruction to the mDES is: “Indicate for each group of feelings, the amount you experience them *in this moment*” followed by a group of related feelings, like “joyful, glad, happy”. Answers are given on a 7-point Likert scale, ranging from 1 = “Not at all” to 7 = “Extremely”. The corresponding translations in Dutch and German are 1 = “Helemaal niet” / “Gar nicht” and 7 = ”Heel intens” / “Sehr stark”, respectively. In the present study, the items representing positive emotions achieved high internal consistency (α = .80).

Mental Health Continuum – Short Form

The Mental Health Continuum – Short Form (MHC-SF; Keyes, 2009) is a 14-item-long scale that is intended to measure positive mental health or *flourishing.* It encompasses the three subscales emotional well-being (items 1-3 items), social well-being (items 4-8) and psychological well-being (items 9-15). Answers are given on a 6-point Likert scale from 0 = “Nooit” / “Niemals” to 5 = “Elke dag” / “Jeden Tag” for the Dutch and German version, respectively. For scoring, a simple sum score of all answers is calculated. Based on Keyes (2009), flourishing is determined if a person scores 4 or higher for at least one of the three emotional well-being items and, at the same time, scores 4 or higher for at least six of items 4-14. The opposite, languishing, is determined if a person scores 1 or lower for at least one of the three emotional well-being items and simultaneously scores 1 or lower for at least six of items 4-14. People who are neither diagnosed flourishers nor languishers are coded as moderately mentally healthy. The MHC-SF is a widely validated measure and has shown a highly satisfying internal consistency of >.80 (Keyes, 2009). For this study, the Dutch version showed a very high internal consistency, with a Cronbachs α of .91. The German version of the scale, however, had a poor Cronbachs α of .54. However, no single item could be identified that played a major role in the low internal consistency of the scale.

International Affective Picture System

For emotion induction, pictures drawn from the International Affective Picture System (IAPS; Lang, Bradley, & Cuthbert, 2008) were used. The IAPS was set up as a standardized database of emotion-evoking images, containing 958 images of different semantic categories. Each picture is accompanied by a detailed list of its average rating in terms of pleasure (unpleasant – pleasant), arousal (calming - exciting) and dominance (in control – dominated).

Figure 2.1. Six exemplary positive emotion-inducing images

Otherwise identical, the two conditions in this study differed solely in the images that were shown during emotion induction. The images in figures 2.1 and 2.2 are exemplary of the images used for both conditions in this study. It should be noted, however, that these images are not from the original IAPS, since users of the IAPS are halted to not make the images publicly accessible.

Figure 2.2. Six exemplary non-emotion-inducing images

Guilford's Alternative Uses Test

Guilford's Alternative Uses Test (AUT) was designed as an instrument for measuring a person's divergent thinking ability (Guilford, 1967). While divergent thinking may not reflect the full construct of creativity, research has shown that the AUT is a reliable indicator of creative potential (Runco & Acar, 2012). Thus, the AUT is a suitable instrument for measuring broadened cognition. The test derives its name from the fact that it asks for all possible uses a person can come up with for a common household item. In Guilford's original version, respondents were asked to write down six different uses. In order to find more elaborate answers, respondents for this study were allowed to come up with as many as 20 uses for a glass bottle, a brick, a newspaper and a tablespoon, respectively. Analogous to another study on the AUT, participants were given 3 minutes per item (Dippo, 2013). For this study, the central criterion for divergent thinking performance was the answer's *originality*. Originality is indicated by the unusualness of a given answer. For assessing originality, each single response is compared to all responses from all respondents to a given item. Answers that were given in no more than 5% of cases are considered unusual answers and those not given in more than 1% of cases are considered unique. Analogous to Guilford's recommendation (1967), scores for originality were derived by allocating 1 or 2 points for unusual and unique answers, respectively. Afterwards, a sum for these answers was calculated. In order to avoid disproportionately higher scores for respondents who gave many answers, each individual sum score was divided with the total amount of answers a respondent person had given for that specific item.

Setting and procedure

Firstly, the appropriate pictures for use in this study were chosen based on the average ratings on pleasure and arousal. Thus, in the experimental condition, participants were shown a set of pictures with a positive valence and high and low levels of arousal, because this corresponded best to the emotions depicted in the mDES. Participants in the neutral condition, on the other hand, were shown images with a medium level of pleasure and a medium level of arousal (both around 5.0), making them essentially neutral to look at. In order to find the appropriate pictures, rating scores of the IAPS images were ordered from highest to lowest pleasuring with help of Microsoft Excel 2013. Images that were expected to differ in appraisal between genders (*e.g.* erotica) were excluded from selection. For each of the three inductions of either a positive or neutral emotional state, 24 different pictures were chosen.

The data was gathered via an electronic questionnaire that was embedded in the research platform "Qualtrics" (www.qualtrics.com). By choosing for a web-based measurement, participants could conveniently complete the survey at home and did not need to come to a lab. Participants were given a link to the questionnaire where they were welcomed with an introductory text and a brief description of the study's objective. Also, respondents were informed about the approximate duration and the course of action of the study. Finally, every respondent was asked to give his or her informed consent to participate in the study.

After a brief inquiry of demographic data participants were randomly assigned to either the experimental or control condition. As can be seen in *Figure 2.3*, respondents were then asked to fill in the mDES, the Resilience Scale (Wagnild & Young, 1993), which was used for a related study, and the MHC-SF. Afterwards, the four divergent thinking tasks were presented. These tasks consisted of the AUT for a glass bottle, a brick, a newspaper and a tablespoon, respectively. After each AUT, positive or neutral emotions were induced by prompting respondents to look at a series of 24 selected images.

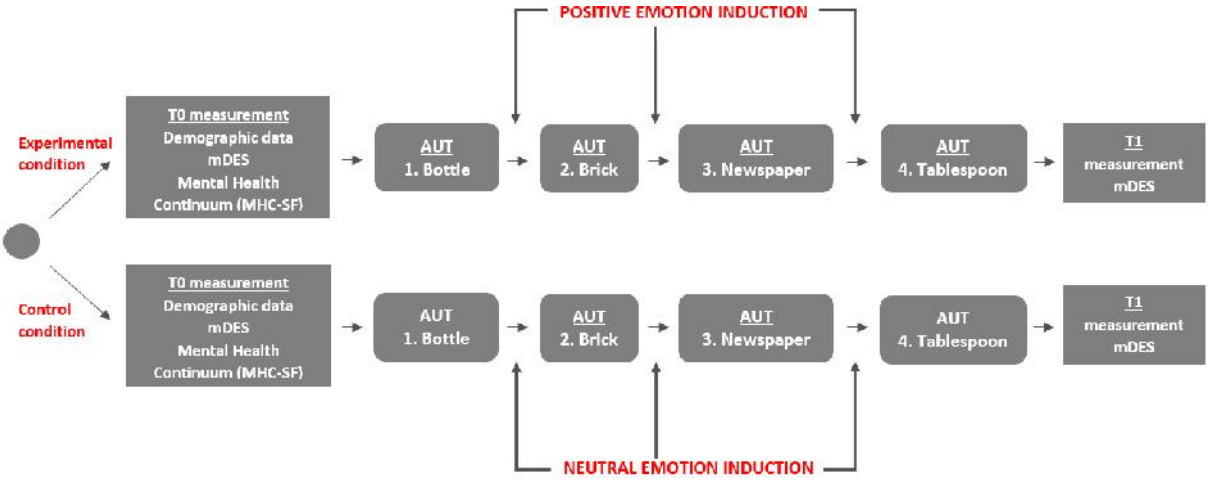

Figure 2.3: Study design.

In neuroimaging research, picture presentation of 6s has shown sufficient for emotion induction, while the authors acknowledge, that most autonomic and somatic changes can be observed in the first 1000ms (Cuthbert, Schupp, Bradley, Birbaumer, & Lang, 2000). In the following 5s, the cells' potentials turn back to their original level. For this study, presentation of images for 5s was chosen. This way, respondents were given time to voluntarily grasp the content of the images while at the same time, length of each emotion induction was kept low. This way, it was hoped to reach optimal emotion induction while keeping adherence to the study high.

Statistical analysis

Data was analyzed using IBM SPSS Statistics 23. For the manipulation check, pre-induction scores of both conditions on the mDES were first compared with an ANOVA. In order to assess the distribution of the differences in scores between pre- and posttest, T0 and T1 scores on the mDES were tested using the Shapiro-Wilk test for normality. For both groups, differences in scores did not differ from a normal distribution significantly with $p>0.50$. Therefore, the paired-sample t-test was used for comparison of pre- and post-induction scores on the mDES for both the experimental condition and the control condition. In order to assess for which type of positive emotions the more profound changes have taken place, difference scores of pre- and post-measurement were compared using a paired-sample t-test.

Secondly, it was tested whether experience of positive emotions goes along with higher divergent thinking and if so, in how far divergent thinking can be increased with experience of more positive emotions. Herefore, the four originality scores (*i.e.* one per task) and a total mean score (*i.e.* sum of originality score 1-4, divided by 4) in both conditions were compared for between-subject effects using a multivariate ANOVA.

Thirdly, flourishers and non-flourishers were compared based on their emotional reactivity to the emotion induction. In the first step, distribution of flourishing, languishing and moderate individuals over both conditions was first tested with a chi-square test. Given the lack of flourishing individuals in the sample, further analysis was executed for individuals with high MHC-SF total scores and low MHC-SF total scores from the whole sample. A score was considered “high” or “low”, when it was located more than one standard deviation above or below the sample-mean, respectively. In fact, using the total score as an indicator of positive mental health is common practice for Dutch populations (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011) . Afterwards, main effects and the interaction effects of one’s level of positive mental health and within-person changes in positive emotions were assessed using repeated measure ANOVA.

Fourth, the relationship between positive mental health and divergent thinking was assessed. Herefore, Pearson correlation coefficients were calculated for originality scores from the AUT and total scores on the MHC-SF.

Results

As mentioned before, several hypotheses were tested during this study. The first hypothesis was:

H1: Looking at a sequence of images with a positive valence evokes positive emotions in participants.

Firstly, a ANOVA showed that baseline scores on the mDES did not differ significantly between groups with $F(1,104) = 0.312$, $p = .578$. As can be seen in table 1, comparison of pre- and post-experiment scores did not point to significant differences in positive emotions for the control condition with $t(52) = 0.43$, $p = .67$. Based on H1, this observation was expected. However, in the experimental condition, positive emptions did not appear to have changed either from before to after emotion induction with $t(52) = 1{,}962$, $p = .06$. Thus, the data suggests that the amount of positive emotions did not change from pre- to post-manipulation in either group. Still a trend towards statistical significance was visible for the experimental condition. Further examination of the data revealed that the three high-arousal positive emotions interest, amusement and joy and the three low-arousal positive emotions satisfaction, fondness and serenity had somewhat contrary effects.

Table 1
Mean Scores, Standard Deviations and Significance of Differences on the modified Differential Emotion Scale per Moment of Measurement

	Pre-induction (T0)		Post-induction (T1)		Mean difference T0-T1		*p*
	M[1]	*SD*	*M*[1]	*SD*	*M*	*SD*	
Experimental							
Total	3.30	1.27	3.48	1.21	0.18	0.68	.056
High-arousal positive emotion [a]	3.16	1.25	3.82	1.05	0.66	1.02	< .0005*
Low-arousal positive emotion [b]	3.44	1.43	3.14	1.71	-0.30	0.91	.022*
Control							
Total	3.43	1.16	3.47	1.22	-0.04	0.59	.669
High-arousal positive emotion [a]	3.32	1.13	3.64	1.06	0.32	0.81	.006*
Low-arousal positive emotion [b]	3.55	1.33	3.30	1.57	-0.25	0.86	.038*

[1] Range: 1 *"Not at all"* – 7 *„Extremely"*
[a] interest, joy, amusement
[b] satisfaction, fondness, serenity
* statistically significant at $p < .05$

While high-arousal positive emotions were significantly higher after the induction with $t(52) = 4.684$, $p < 0.001$, low-arousal positive emotions reduced significantly with $t(52) = -2.359$, $p = .022$. Still, comparison of difference scores showed that the increase in high-arousal positive emotions was stronger than the decrease in low-arousal positive emotion with $t(52) = 1,934$, $p = .028$. In the control condition, however, the same pattern was observed. Thus, high-arousal positive emotions increased significantly, with $t(52) = 2.869$, $p = .006$, and low-arousal positive emotions decreased, with $t(52) = -2.131$, $p = .038$. Altogether, these results suggest that significant changes in the level of positive emotions have taken place in the course of the experiment.

As can be seen in table 2, post-experimental total scores on the mDES and scores for high-arousal positive emotion and low-arousal positive emotion did not differ between conditions.

Table 2
Mean Difference Scores and Significance of Differences for Post-Experimental Measurement of the modified Differential Emotion Scale per Condition

	Mean difference experimental – control		*p*
	M	*SD*	
mDES (T1)			
Total	0.01	0.24	.947
High-arousal positive emotion [a]	0.18	0.20	.359
Low-arousal positive emotion [b]	-0.16	0.32	.622

[a] interest, joy, amusement
[b] satisfaction, fondness, serenity

Hypothesis H2a was:

H2a: Compared to participants in a neutral mood, participants in a positive mood show more divergent thinking.

Table 3 shows mean originality scores for each task and condition. In order to find an answer to hypothesis 2 originality scores (*i.e.* one per task) and a total mean score were compared between conditions using an ANOVA. As can be seen, respondents in the experimental group could think of significantly more original uses for a brick ($M = 0.41$) than the control condition ($M = 0.30$) with $F(1,104) = 5.327$, $p = .023$. For the other three tasks originality of answers was the same for both conditions.

Table 3
Means, Standard Deviations and Significance of Differences of Originality Scores per Condition

	Experimental group[a]		Control group[b]		Mean difference between groups		*p*
	M[1]	*SD*	*M*[1]	*SD*	*M*	*SD*	
Tasks							
Bottle	0.53	0.24	0.59	0.28	-0.06	0.05	.110
Brick	0.41	0.30	0.30	0.18	0.11	0.05	.023*
Newspaper	0.51	0.25	0.48	0.23	0.03	0.05	.604
Tablespoon	0.45	0.27	0.52	0.28	-0.07	0.05	.213
Total	0.48	0.20	0.47	0.17	< 0.01	0.04	.920

Note. Tasks are listed in same order as presented during the study.
[1] Range: 0 (no original answer/-s given) – 2 (solely unique answer/-s given)
[a] n = 53
[b] n = 52
* statistically significant at $p < .05$

Figure 3 shows mean originality scores of both groups for each of the four tasks from the Alternative Uses Test. Since scores only differ significantly for the brick-task, the hypothesized pattern is not confirmed.

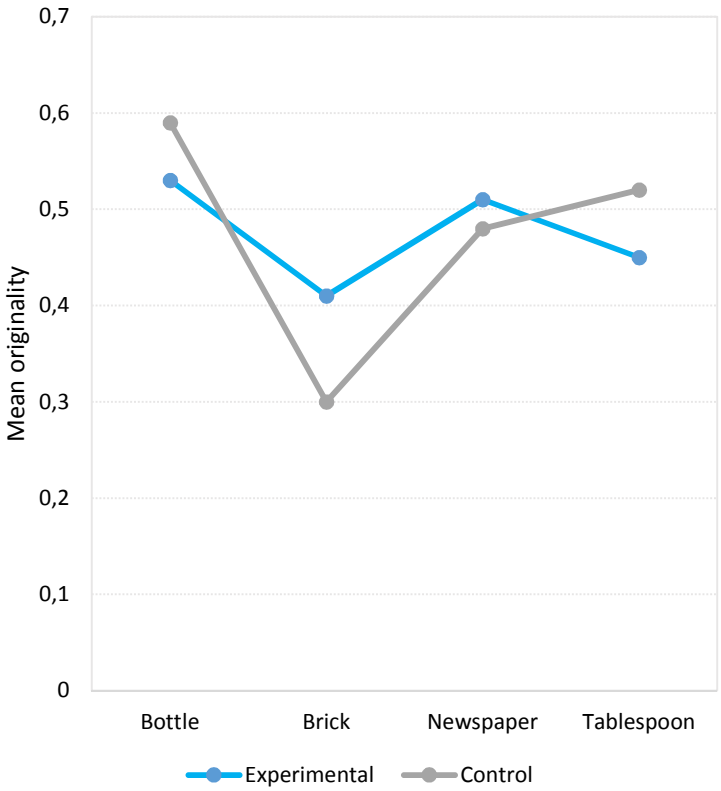

Figure 3. Originality scores per task in order of presentation

Hypothesis H2b was:

H2b: Answers on the Alternative Uses Test of individuals in the experimental condition will become increasingly original compared to the control condition during the course of the study.

Hypothesis H2b was based on the assumption that positive emotions and a broadened cognition can have a reciprocal relationship. Translated to this study, this phenomenon could be visualized as a line diagram in which the scores for the experimental group gradually divert from the scores of the control group, with the latter having lower scores.

Since scores only differ significantly for the brick-task, the hypothesized pattern is not confirmed.

The third hypothesis was:

H3: Compared to participants with low levels of positive mental health, participants with high levels of positive mental health experience stronger increases in positive emotions from pre- to post-induction measurement.

In order to check whether individuals in the two conditions differed in terms of their level of positive mental health beforehand, descriptive statistics were calculated for both groups apart. The results showed that individuals that were selected to the control condition (M = 31.72) had significantly higher scores than those in the experimental condition (M = 26.70) with $t(104) = 3.093$, p = .003. A check for possible outliers that might have caused this difference did not identify statistically relevant extremes.

Table 4 shows the number of flourishing, languishing and intermediate individuals per condition. A chi-square test showed that distribution of the three levels of positive mental health did not differ between conditions with X^2 (2, N=106) = 3.53, p = .17. Since the total sample had only 1 individual that was considered flourishing and 11 languishers, a comparison of flourishers and languishers was not feasible.

Table 4
Frequency and Percentages of Different Levels of Positive Mental Health per Condition

	Experimental group		Control group		Total	
	N	%	*N*	%	*N*	%
MHC-SF						
Flourishing	-	-	1	1.9	1	0.9
Moderate	42	79.2	47	88.7	89	84.0
Languishing	11	20.8	5	9.4	16	15.1

Therefore, further analysis was executed for individuals with high MHC-SF total scores and low MHC-SF total scores from the whole sample. A score was considered "high" when it was located more than one standard deviation above the sample-mean and "low", when located more than one standard deviation below. While individuals with high or low scores on the MHC-SF are not necessarily considered flourishers or languishers, respectively, the MHC-SF total score still is an excellent indicator of one's level of positive mental health (Lamers, Westerhof, Bohlmeijer, Ten Klooster, & Keyes, 2011). Table 5 shows the statistical differences of mean scores on the mDES for individuals with high or low scores on the MHC-SF. As can be seen, participants with high levels of PMH consistently reported significantly higher scores for high-arousal positive emotions and low-arousal positive emotion at both moments of measurement. This observation is also reflected in the significantly higher scores for overall positive emotions with $F(1,39) = 4.786$, $p = .015$ at T0 and $F(1,39) = 2.801$, $p = .006$ at T1.

Table 5
Mean Scores, Standard Deviations and Significance of Differences on the modified Differential Emotions Scale for Individuals with High or Low Positive Mental Health

	High PMH[1]		Low PMH[2]		Mean difference between groups		*p*
	M	*SD*	*M*	*SD*	*M*	*SD*	
mDES							
Pre-induction (T0)							
Total	4.10	1.42	3.10	0.97	1.00	0.39	.015*
High-arousal positive emotion [a]	3.99	1.37	3.19	1.01	0.80	0.39	.045*
Low-arousal positive emotion [b]	4.22	1.62	3.02	1.13	1.20	0.45	.011*
Post-induction (T1)							
Total	4.33	1.40	3.17	1.10	1.16	0.40	.006*
High-arousal positive emotion [a]	4.36	1.26	3.54	0.96	0.82	0.36	.026*
Low-arousal positive emotion [b]	4.30	1.75	2.80	1.61	1.50	0.53	.007*

Note. PMH was scored "high" when MHC-SF total < 37,90 and "low" when MHC-SF total < 20.48
[1] n = 23 [2] n = 18
[a] interest, joy, amusement
[b] satisfaction, fondness, serenity
* statistically significant at $p < .05$

Table 6 shows statistical significances of interaction between high- and low total scores on the MHC-SF and changes in scores on the mDES from pre- to post-test. As can be seen, the data shows no significant interaction-effects between respondent's level of PMH and their change in positive emotion in the course of the study.

Table 6
Statistical Significance of Interaction between Level of Positive Mental Health and Change in Positive Emotions from T0 to T1

	F	*df*	*p*
MHC-SF			
Total	.575	1	.453
High-arousal positive emotion [a]	.007	1	.934
Low-arousal positive emotion [b]	1.167	1	.287

Note. Results obtained using repeated measure ANOVA; "Level of PMH" was scored "high" when MHC-SF total < 37,90 and "low" when MHC-SF total < 20.48; high PMH: n = 23; low PMH: n = 18
[a] interest, joy, amusement
[b] satisfaction, fondness, serenity

The fourth hypothesis was:

H4: Compared to participants with low levels of positive mental health, participants with high levels of positive mental health show more divergent thinking.

Table 7 shows Pearson correlation coefficients for originality scores from the Guilford Alternative Uses Test and total scores on the MHC-SF for the whole sample.

Table 7
Pearson's Correlations for MHC-SF and Tasks of the Guilford Alternative Uses Test

	Glass bottle		Brick		Newspaper		Tablespoon		Total	
	r	*p*	*r*	*p*	*r*	*p*	*r*	*p*	*r*	*p*
MHC-SF total	-.051	.607	-.040	.686	-.049	.621	.090	.360	-.013	.895

It was chosen to include scores from the whole sample for this calculation because earlier tests did not point to significant differences between the conditions with respect to their level of originality (with exception for the brick-task). As can be seen, the level of positive mental health does not appear to correspond to the amount of originality in respondents' answers on the AUT. Consequently, the relationship between both constructs was not further examined.

Discussion

Earlier research has shown that positive emotions broaden people's thought-action-repertoire and build personal resources that, in the long run, increase the chance of experiencing more positive emotions. This study was the first to put these self-perpetuating effects of positive emotions to a test for a daily setting. Specifically, it was examined in how far divergent thinking of individuals with different levels of positive mental health increases when repeatedly experiencing positive emotions over a brief course of time. The following research question was formulated:

In how far does repeated prompting of positive emotions lead to a step-by-step increase in performance on Guilford's alternative uses test and in which way is this relationship moderated by different levels of positive mental health?

Based on findings of this study, it cannot be concluded that upwards spirals of positive emotions can be established on a short-term basis. Also, results did not replicate findings of earlier research which attributed a crucial role to one's level of positive mental health in the ability to profit from experience of positive emotions.

Hypothesis 1 was intended to test whether the manipulation (*i.e.* the induction of positive emotions by means of the IAPS) was effective. Strikingly, respondents in the control condition, who were shown neutral images displayed the same pattern of increase in positive emotions as the experimental condition. In both conditions, more high-arousal positive emotions (*i.e.* interest, joy and amusement) were experienced at the end of the experiment, while experience of low-arousal positive emotions (*i.e.* satisfaction, fondness and serenity) had diminished. Importantly, this could have been overseen easily because changes of both types of positive emotions had cancelled each other out to the point that at first, it appeared that no significant changes had taken place in either group. But even when distinguishing the two groups of positive emotions, respondents in both conditions did not differ with respect to any type of positive emotions after the three instances of manipulation. Therefore, the changes in positive emotions cannot be attributed to the manipulation itself. One possible explanation for the inefficient emotion induction may be that respondents did not look at the images attentively. Contrary to their common use in neurocognitive laboratory research, distracting factors during IAPS stimuli presentation could not be-minimized in this study. Bradley and Lang (2007) also emphasize, that IAPS pictures are effective in prompting affective reactions, but that these psychological and physiological responses are of a relatively transient nature. It can therefore

be questioned in how far images from the IAPS were suited to evoke emotional reactions that persisted over the course of several minutes. However, while these factors might have contributed to the absence of post-experimental differences in positive emotions between conditions, they cannot account for the systematic changes in emotions that have likewise taken place within both conditions. Thus, an alternative explanation for the increase in positive emotions is that the very nature of the tasks might have caused the observed changes in positive emotions. As could be seen in post-experimental scores on the mDES, in both conditions, low-arousal positive emotions had diminished significantly. In fact, research has shown that regulatory *decrease* of emotions may occur when the behavioral tendencies connected to those emotions are no longer useful (Gross, 1999). Assuming that the divergent thinking-tasks were experienced as pleasantly but challenging, as the data suggests, the activating characteristics of high-arousal positive emotions seem beneficial for task completion. Contrary, low-arousal positive emotions have calming effects (Fredrickson, 2000). For performance on a divergent thinking task under time pressure, these would be rather counterproductive. Again, simple aggregation of all positive emotions, as is common practice in Fredrickson's research on the broaden-and-build theory (Fredrickson, 2013), would have concealed these dynamics in positive emotions. In fact, given how the amount of experienced positive emotions is the primary focus, it appears that within the model, emotions are mainly considered from a hedonistic perspective. At the same time, the theory disregards the evolutionary function of emotions as prompts to highly-flexible and coordinated adaptation processes in a world of ever-changing challenges and opportunities. Thus, while temptation to think of positive emotions as something of which "the more, the better", researchers should be attentive to their changing functionality for different tasks and situations (Jeon, Walker, & Yim, 2014; McNulty & Fincham, 2012).

Based on two hypotheses it was tested whether experience of positive emotions goes along with more divergent thinking and if so, whether psychological broadening can be enhanced by repeatedly experiencing more positive emotions. However, since levels of positive emotions did not differ between conditions at posttest, results for these hypotheses cannot be controlled for, making conclusions unwarranted. On the other hand, if divergent thinking did change as a function of emotional experience, one would not expect the level of divergent thinking to differ between groups that report equal levels of positive emotion. In fact, no significant differences were found between groups except for performance on the brick-task. Interestingly, the brick-task was the task to follow the first emotion induction procedure and resulted in individuals in the experimental group having significantly higher originality scores.

This observation parallels research which showed how positive emotions can have a facilitating effect on creative ingenuity (Isen et al., 1987). Still, it remains unclear if and in how far levels of positive emotions had actually differed between groups at this point of the study. Also, it might be questioned in how far a high-demand creative process like divergent thinking can really be facilitated in the way that the broaden-and-build model suggests. Research has shown that divergent thinking relies on both the strategic retrieval of existing knowledge as well as the recombination of different aspects of knowledge into novel ideas (Beaty & Silvia, 2012; Paulus & Brown, 2007). Thus, divergent thinking involves high-order top cognitive processes that are related to effective executive functioning and intelligence (Beaty & Silvia, 2012). While Fredrickson highlights that positive emotions can evoke cognitive, attentional and behavioral broadening, most of evidence for cognitive broadening comes from earlier work by Isen (*e.g.* Isen, 1987). In her own studies on the broadening, Fredrickson preferred using global-local visual processing paradigms. (Fredrickson & Branigan, 2005; Johnson, Waugh, & Fredrickson, 2010). Other researchers found support for broadening effects of positive emotions with help of eye-gaze experiments (Wadlinger & Isaacowitz, 2006). These paradigms have in common that they assess broadening as changes in basic attentional allocation and sensory processing (Beaucousin et al., 2013). Thus, compared to divergent thinking, performance on global-local tasks is far less dependent on personal characteristics (like former knowledge and intelligence) and high-order cognitive functions. Given the lack of more recent evidence for the facilitating effects of positive emotions on divergent thinking and Fredrickson's strong reliance on attention-focused paradigms, it appears debatable in how far broadening is able to influence higher-order cognitive functions. Thus, in order to regain a clearer picture of the scope of broaden-and-build processes, future researchers should further extent their research to cognitive broadening paradigms. In these paradigms, knowledge about attentional broadening might be extended to, for instance, executive functioning or reasoning.

For the next hypothesis it was tested in how far flourishers in the experimental condition reported stronger increases in positive emotions after emotion induction. This hypothesis was based on aforementioned work of Catalino and Fredrickson (2011), which suggested that flourishers tend to respond more positively to pleasant events. In this study's sample, participants in the control condition reported higher levels of positive mental health to begin with. However, since one's own belonging to either the control- or the experimental condition was impossible to determine at the time participants filled in the MHC-SF (*i.e.* before the first emotion induction) the difference can be considered a random artefact (de Boer, Waterlander, Kuijper, Steenhuis, & Twisk, 2015). Also, mean item scores of this study's sample showed

great discrepancy to scores for individuals aged 18-29 from the Dutch validation study of the MHC-SF (Lamers et al., 2011). This is likely due to its great homogeneity. This study's sample mainly consisted of undergraduate psychology students from the University of Twente. Apparently, this group shows lower levels of well-being than persons of the same age from the general public. Further, results suggested that individuals with high levels of positive mental health experienced more positive emotions than individuals with low PMH at any given point of measurement. This finding corresponds to previous research on the topic by pointing to a key characteristic of individuals with high positive mental health, namely experiencing many positive emotions (Keyes, 2002). Despite the obvious differences in positive affect between individuals with different levels of positive mental health, results did not suggest that the two groups increase in positive emotions in different ways between measurements. This stands contrary to findings of the earlier cited work of Catalino and Fredrickson (2011). A possible explanation for this discrepancy lies in the very different methodological approaches of both studies. Firstly, while the present study was set up as a short-termed experiment with deliberate intention to manipulate elicit specific emotions, Catalino and Fredrickson (2011) used a 10-week retrospective study design without deliberate presentation of emotional stimuli. Consequently, participants in the authors' study had been exposed to positive-emotion evoking stimuli more often and over longer time. Most importantly, however, in Catalino and Fredrickson's study (2011), flourisher's emotional reactivity to engagement in positive-emotion eliciting everyday activities like helping, playing and interacting was assessed. In this study, emotional reactivity to emotion-eliciting images was measured. It is likely that the cognitive processing and appraisal of engagement in personally-relevant pleasant activities profoundly differs in quality to that of non-relevant affective pictures and this way, is able to trigger the profound psychological changes that the pictures failed to do. In fact, the developers of the IAPS acknowledge that autonomic and psychological reactions to viewing pleasant pictures are quite small when compared to engagement in pleasurable activities (Bradley & Lang, 2007).

Hypothesis 4 was intended to test whether the originality of answers on the divergent thinking task was related to a person's level of positive mental health. This hypothesis was based on two assumptions. Firstly, people with high positive mental health experience many positive emotions and secondly, positive emotions expand a person's mindset and thereby increase divergent thinking. While the first assumption was supported with findings in this study, no evidence was found for the second assumption. Testing hypothesis 4, originality scores of all four tasks showed low and non-significant correlation coefficients with scores on

the positive mental health-measure. Thus, results did not suggest the presence of a relationship between person's level of positive mental health and their divergent thinking ability. There are several possible explanations for this finding. Firstly, as stated before, divergent thinking performance cannot be deduced from a person's broadened mental state. Secondly positive mental health and divergent thinking differ in stability over time. On the one hand, divergent thinking ability can be trained but is relative stable characteristic (Beaty & Silvia, 2012; Benedek et al., 2014). Positive mental health, on the other hand tends to fluctuate over time. For example, in the study of Catalino and Fredrickson (2011), 44% of flourishing individuals still increased, 5% maintained and 51% decreased in the course of the 10-week long study. Therefore, it is questionable in how far individuals who showed high levels of positive mental health in this study possess stable characteristics that facilitate performance in divergent thinking.

Being the first study to test the establishment of an upward spiral of positive emotion over the course of several minutes, this study clearly shows its strength in its innovative character. While the broaden and build model was used as a starting point, this study was set up to leave familiar paths and instead look for alternatives to the well-known and widely accepted idea of short-termed broadening- and long-termed building effects. However, several limitations and advices can be given as well. Firstly, the convenience sample that was used for the study might not have been optimal. Respondents were recruited via the University of Twente's research participant pool. As results showed, scores on the MHC-SF and the mDES were significantly lower than scores obtained with more representative samples of the same age group. As a second limitation, the study's strong dependence on a single outcome measure for positive emotions could be mentioned. As meta-analytical research on different emotional measures suggests, assessment of momentary distinct emotions is difficult and oftentimes lacks previous validation (Weidman, Steckler, & Tracy, 2014). For example, while in one study "amusement" might be assessed as if it was a discrete emotion, the next study might use the word "amused" as characterization of the emotion "joy". Weidman et al. conclude that the majority of words and phrases used to measure specific emotions are used interchangeably across different studies and lack specificity. Next to the ambiguous distinction of emotions, emotional self-report measures as the mDES depend on a level of emotional consciousness not every respondent might possess. Therefore, it is unclear in how far scores on the mDES in this study are a valid reflection of the respondent's affective states at pre- and post-measurement. Hence, future research might aggregate scores of explicit, implicit and physiological methods of emotion assessment (Fredrickson, 2013). Notwithstanding, however, it should be noted that

within narrow boundaries in time and resources, the mDES can be a suited measure showing a high internal consistency. Third, the divergent thinking tasks were presented in the same order for all participants. To avoid confounding and carryover effects, future research studying positive potentiation effects should use counterbalancing (Brooks, 2012). As a fourth limitation, choice for the IAPS as emotion induction procedure did not seem suited for an online study-design. Therefore, following research might experiment with other validated methods for emotion induction. For example, contrary to emotion induction with pictures or film clips, in internal emotion generation procedures participants are stimulated to induce emotional states in themselves from their own imagination or memory (as in the recall of significant personal events). Not only were these methods shown to be equally effective as external induction procedures, findings also suggest that internal eliciting procedures might me especially suited for experiments targeting positive emotions (Salas, Radovic, & Turnbull, 2012). Additionally, promoting emotion regulation by looking for positivity on the inside is in accord with many positive psychology interventions like three good things or loving kindness meditation (Bohlmeijer, Bolier, Westerhof, & Walburg, 2013; Bohlmeijer & Hulsbergen, 2013). Therefore, internal emotion eliciting procedures might be a promising field of study for showing individuals how to generate their own upward spirals of positive emotions.

Concluding, results of this study could not replicate earlier findings which attested positive emotions a facilitating role in higher order cognitive functions. As the unexpected changes in positive emotions in the course of this study have shown, an approach that considers effects of *individual* positive emotions should be preferred over use of aggregate scores in that it allows researchers to gain insight in how specific positive emotions work across situations. This way, a more sophisticated idea of the influences of positive emotions in daily functioning could be achieved and, in the long run, positive mental health be promoted.

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Appendix

Appendix A: modified Differential Emotions Scale (Dutch)

Appendix B: modified Differential Emotions Scale (German)

Appendix C: Mental Health Continuum – Short Form (Dutch)

Appendix D: Mental Health Continuum – Short Form (German)

Appendix A: modified Differential Emotions Scale (Dutch)

Deze vragenlijst bestaat uit 16 groepen van woorden die gevoelens beschrijven. Duid bij elke groep van woorden aan in welke mate u zich **nu (dus op dit moment)** zo voelt: 1 = helemaal niet, 4= matig, 7 = heel intens, of een van de cijfers tussenin.

		Helemaal niet			**Matig**			**Heel intens**
(1)	Geïnteresseerd, geconcentreerd, alert	1	2	3	4	5	6	7
(2)	Bevreesd, angstig, bang	1	2	3	4	5	6	7
(3)	Bezorgd, gespannen, zenuwachtig	1	2	3	4	5	6	7
(4)	Bewogen, ontroerd	1	2	3	4	5	6	7
(5)	Boos, geïrriteerd, kwaad	1	2	3	4	5	6	7
(6)	Beschaamd, gegeneerd	1	2	3	4	5	6	7
(7)	Joviaal, opgewekt, opgetogen	1	2	3	4	5	6	7
(8)	Blij, geamuseerd, gelukkig	1	2	3	4	5	6	7
(9)	Verdrietig, neerslachtig, somber	1	2	3	4	5	6	7
(10)	Tevreden, content, voldaan	1	2	3	4	5	6	7
(11)	Verrast, verwonderd, verbluft	1	2	3	4	5	6	7
(12)	Liefdevol, hartelijk, vriendelijk	1	2	3	4	5	6	7
(13)	Schuldig, berouwvol	1	2	3	4	5	6	7
(14)	Vol afkeer of tegenzin, walgend	1	2	3	4	5	6	7
(15)	Laatdunkend, geringschattend, minachtend	1	2	3	4	5	6	7
(16)	Kalm, sereen, ontspannen	1	2	3	4	5	6	7

Appendix B: Modified Differential Emotions Scale (German)

Dieser Fragebogen besteht aus 16 Gruppen von gefühlsbeschreibenden Worten. Gib bei jeder Wortgruppe an inwiefern du dich nun **(also in diesem Moment)** so fühlst: 1 = gar nicht, 4 = mittel, 7 = sehr stark, oder eine der Zahlen dazwischen

		Gar nicht			**mittel**			**Sehr stark**
(1)	aufmerksam, konzentriert, wach	1	2	3	4	5	6	7
(2)	erschreckt, Angst, Furcht	1	2	3	4	5	6	7
(3)	besorgt, angespannt, nervös	1	2	3	4	5	6	7
(4)	bewegt, ergriffen, gebannt	1	2	3	4	5	6	7
(5)	wütend, Ärger, Zorn	1	2	3	4	5	6	7
(6)	gehemmt, verschämt, verlegen	1	2	3	4	5	6	7
(7)	amüsiert, erheitert, vergnügt	1	2	3	4	5	6	7
(8)	fröhlich, glücklich, Freude	1	2	3	4	5	6	7
(9)	niedergeschlagen, entmutigt, Trauer	1	2	3	4	5	6	7
(10)	ausgeglichen, wohl, zufrieden	1	2	3	4	5	6	7
(11)	Überraschung, erstaunt, verblüfft	1	2	3	4	5	6	7
(12)	liebevoll hingezogen, verliebt, Zuneigung	1	2	3	4	5	6	7
(13)	reumütg, schuldig, tadelnswert	1	2	3	4	5	6	7
(14)	angewidert, Ekel, abgestoßen	1	2	3	4	5	6	7
(15)	Verachtung, Geringschätzung, Spott	1	2	3	4	5	6	7
(16)	ruhig, gelassen, entspannt	1	2	3	4	5	6	7

Appendix C: Mental Health Continuum – Short Form (Dutch)

De volgende vragen beschrijven gevoelens die mensen kunnen hebben. Lees iedere uitspraak zorgvuldig door en omcirkel het cijfer dat het best weergeeft *hoe vaak u dat gevoel had gedurende de afgelopen maand*.

Gedurende de afgelopen maand, hoe vaak had u het gevoel…

	Nooit	**Eén of twee keer**	**Onge-veer 1 keer per week**	**2 of 3 keer per week**	**Bijna elke dag**	**Elke dag**
…dat u gelukkig was?	0	1	2	3	4	5
…dat u geïnteresseerd was in het leven?	0	1	2	3	4	5
...dat u tevreden was?	0	1	2	3	4	5
...dat u iets belangrijks hebt bijgedragen aan de samenleving?	0	1	2	3	4	5
...dat u deel uitmaakte van een gemeenschap (zoals een sociale groep, uw buurt, uw stad)?	0	1	2	3	4	5
...dat onze samenleving beter wordt voor mensen?	0	1	2	3	4	5
...dat mensen in principe goed zijn?	0	1	2	3	4	5
...dat u begrijpt hoe onze maatschappij werkt?	0	1	2	3	4	5
…dat u de meeste aspecten van uw persoonlijkheid graag mocht?	0	1	2	3	4	5
…dat u goed kon omgaan met uw alledaagse verantwoordelijkheden?	0	1	2	3	4	5
...dat u warme en vertrouwde relaties met anderen had?	0	1	2	3	4	5
...dat u werd uitgedaagd om te groeien of een beter mens te worden?	0	1	2	3	4	5
…dat u zelfverzekerd uw eigen ideeën en meningen gedacht en geuit hebt?	0	1	2	3	4	5
…dat uw leven een richting of zin heeft?	0	1	2	3	4	5

Appendix D: Mental Health Continuum – Short Form (German)

Die folgenden Fragen beschreiben Gefühle die Menschen haben können. Lesen Sie jede Frage aufmerksam durch und kreuzen Sie die Zahl an die am besten angibt, *wie oft sie dieses Gefühl hatten während des letzten Monats.*

Während des letzten Monats, wie oft fühlten Sie…

	Niemals	**1-2 Mal**	**Ungefähr einmal die Woche**	**2-3 Mal die Woche**	**Fast jeden Tag**	**Immer / jeden Tag**
…sich glücklich?	0	1	2	3	4	5
…sich am Leben interessiert?	0	1	2	3	4	5
...sich zufrieden?	0	1	2	3	4	5
...dass Sie etwas Wichtiges zur Gesellschaft beizutragen haben?	0	1	2	3	4	5
...dass Sie zu einer Gemeinschaft gehören (wie z.B. eine Gruppe oder Ihre Nachbarschaft)	0	1	2	3	4	5
...dass unsere Gesellschaft ein besserer Ort für Menschen wie Sie wird?	0	1	2	3	4	5
...dass die Menschen grundsätzlich gut sind?	0	1	2	3	4	5
...dass es für Sie Sinn macht, wie unsere Gesellschaft funktioniert?	0	1	2	3	4	5
…dass Sie die meisten Seiten Ihrer Persönlichkeit mögen?	0	1	2	3	4	5
…dass Sie die Verpflichtungen des täglichen Lebens gut meistern?	0	1	2	3	4	5
...dass Sie herzliche und vertrauensvolle Beziehungen zu anderen haben?	0	1	2	3	4	5
...dass Sie Erfahrungen machten, die Sie herausforderten zu wachsen und ein besserer Mensch zu werden?	0	1	2	3	4	5
…sich selbstsicher im Denken und Äussern von eigenen Ideen?	0	1	2	3	4	5
…dass ihr Leben eine Richtung hat oder Sinn macht?	0	1	2	3	4	5