

It is all just psychological: Mindset matters.
Stress Mindset, its Implications for Mental Well-Being and
Personality as a Moderator
Carina Schreiber
S1794809
University of Twente

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

Abstract

Background: There is growing evidence that our stress mindset can be changed and thereby might beneficially influence our health and productivity. This study examined whether stress mindset can be changed, whether this change comes with a corresponding increase in mental well-being and whether the three personality traits extraversion, neuroticism and openness moderate those changes in stress mindset.

Methods: A German sample ($n = 78$), with a mean age of 36 years and a majority of female participants (61.5%), was randomly assigned to a stress mindset ($n = 52$) or control condition ($n = 50$). Participants had to complete online surveys at baseline, post-test and follow-up.

Results: The mixed two-way repeated measures ANOVA did not reveal a significant time x condition interaction effect neither on stress mindset nor on mental well-being. The moderation analyses using PROCESS (Hayes, 2019) did not reveal any significant interaction effects at post-test or at follow-up for extraversion, neuroticism, or openness

Limitations: The study was limited by the form, duration and frequency of its manipulation as well as a high dropout rate.

Conclusion: Since the phenomenon of stress mindset presents a possible solution to the perceived growing stress levels and the corresponding health risks in today's society it still remains important. Thus, future research should test which manipulations effectively change people's stress mindset and then check for corresponding health implications.

Introduction

We count the year 2019. The world we live in today appears as fast changing due to constant new innovations, digitalization and globalization (Aitken & Crawford, 2007). Living in this society confronts us, among other things, with an intensified workload, an obsession with competition, a constant strive for perfection and the pressure to always be online and connected. The nature of our modern world leads more and more to an increase in and perseverance of stress posing a threat to our mental health (Brunet, n.d; Chong, 2017).

The World Health Organization (2014) defines mental health as “a state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community“. The two continua model divides mental health into a negative and a positive dimension: mental illness and mental well-being, the latter incorporating emotional, social and psychological well-being (Keyes, 2005).

Since there is a growing emphasis on adding life to years, i.e. experiencing mental health and quality of life as long as possible, mental health, and especially mental well-being, has gained evermore importance (Drewnowski & Evans, 2001). Thus, the increasing stress levels posing a threat to our mental well-being, made stress one of the major interests in research (Gu, Strauss, Bond & Cavanagh, 2015; Shapiro, Brown & Biegel, 2007; Lehavot & Simoni, 2011; Nabi, Prestin & So, 2013; Neece, 2013).

Stress and Stress Mindset

Stress has been defined as “the experience of anticipating or encountering adversity in one’s goal related efforts” (Carver & Conner-Smith, 2010). When anticipating or encountering stress our body engages in a stress response which can be understood as the body’s general reaction to the demands it is confronted with (Kunz-Ebrecht, Mohamed-Ali, Feldman, Kirschbaum & Steptoe, 2003; Selye, 1975). Looking at it from an evolutionary perspective, this stress response was supposed to improve mental and physiological functioning to ensure survival in life threatening situations (Sapolsky, 1996). However, in today’s world the stressors we are faced with are usually not life threatening anymore. Nevertheless, whether confronted with a dangerous animal or a presentation in front of a class our body still engages in the same stress response: activating the sympathetic nervous system and the hypothalamic-pituitary-adrenal axis

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

and decreasing the activation of the parasympathetic nervous system (Kunz-Ebrecht, Mohamed-Ali, Feldman, Kirschbaum & Steptoe, 2003; Selye, 1975). If the stressor is only of short duration our body is able to cope with these alterations. However, if the stressor persists for a longer time the ongoing stress response poses a threat to our health (Ellis & Del Giudice, 2014).

Stress has been associated with several negative physiological as well as psychological consequences. According to the American Psychological Association (2018) constant high stress rates affect the musculoskeletal system (headache, migraine and lower back pain), the respiratory system (reduced lung function, shortness of breath and rapid breathing), the cardiovascular system (increased risk of heart attack, hypertension and stroke), the endocrine system (chronic fatigue, immune disorders and metabolic disorders like diabetes type 2), and the nervous and reproductive system. Furthermore, high stress levels were found to decrease immune function, fostering the development and persistence of disease (Huang, Stewart, Franco, Evans, Lee, Cruz, Webb, & Acevedo, 2011; Cohen, Tyrrell & Smith, 1991). Schneiderman, Ironson, & Siegel (2005) found stress to be linked to the six leading causes of death, namely heart disease, accidents, cancer, liver disease, lung ailments, and suicide. Psychological consequences of high stress rates include depression, burnout, anxiety and irritability as well as cognitive impairment (American Psychological Association, 2013; Hammen, 2005; Mayo Clinic, 2016; McEwen & Seeman, 1999; Schwabe & Wolf, 2010; Wang, 2005). Thus, stress seems to pose a threat to our physiological as well as psychological health.

A recent study by Crum, Salovey, and Achor (2003), however, adopted a new perspective on stress. In their study they introduced the concept of stress mindset as a distinct variable - next to the amount of stress, coping mechanisms and stress appraisal - appearing to have a significant impact on the stress response. According to Dweck (2008) a mindset is “a mental frame or lens that selectively organizes and encodes information, thereby orienting an individual toward a unique way of understanding an experience and guiding one toward corresponding actions and responses”. Mindsets are proposed to have an impact on one’s judgement (Taylor & Gollwitzer, 1995), evaluations (Gollwitzer, 1999), behavior (Lieberman, Samuels & Ross, 2004), and health (Crum & Langer, 2007). Crum and her colleagues established the “stress-is-enhancing” and the “stress-is-debilitating” mindsets which they explained as “the evaluation of the nature of stress itself as enhancing or debilitating” (Crum, Salovey & Achor, 2003). It was shown that stress mindset had a significant impact on how stress is psychologically experienced as well as

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

behaviorally approached. Furthermore, it was demonstrated that the stress mindset had long-term effects and was a significant predictor of increased psychological health and life satisfaction. The researchers also found that a “stress-is-debilitating” mindset could be changed in the direction of a “stress-is-enhancing” mindset by a small intervention, namely by presenting a scientific article or video with evidence in favor of a “stress-is-enhancing” mindset.

Taken this research into account, the consideration arises whether such a change in people’s mindset could also bring about a corresponding increase in mental well-being. Prior studies by Park and Helgeson (2006) as well as Tedeschi and Calhoun (2004) investigated a phenomenon referred to as stress-related growth. This phenomenon describes how stressful experiences can initiate positive changes in individuals: stress can lead to a heightened awareness, new perspectives, an enhanced development of mental toughness, a sense of mastery, deeper relationships, strengthened priorities, an increased sense of meaningfulness and greater appreciation for life (e.g. Park & Helgeson, 2006; Tedeschi & Calhoun, 2004). With regard to stress mindset in particular, Crum, Salvo and Achor (2003) found a “stress-is-enhancing” mindset to be associated with better health. Furthermore, changes from a “stress-is-debilitating” mindset in the direction of a “stress-is-enhancing” mindset were accompanied by corresponding changes in psychological symptoms. They measured participants’ symptoms with the Mood and Anxiety Symptom Questionnaire (MASQ) (Watson, Weber, Assenheimer, Clark, Strauss, & McCormick, 1995) and discovered that participants changing their mindset in the direction of a “stress-is-enhancing” mindset reported fewer psychological symptoms of anxiety and depression than participants who were holding a stress-is-debilitating mindset. Furthermore, overall life satisfaction was positively correlated with a “stress-is-enhancing” mindset.

However, research on stress mindset and its possible positive effects is still limited and although a few studies look at its implications for mental health, none of them concentrated on the specific construct of mental well-being and thereby the positive side of mental health. Considering, however, the growing emphasis on the agenda adding life to years (Drewnowski & Evans, 2001), it would be advantageous to know how to minimize the potential detrimental impact of stress on mental well-being or even how to use stress to increase it.

Consequently, it would be helpful to know what factors may have an impact on a person’s readiness to change their mindset in the direction of a “stress-is-enhancing” mindset or limit it to a “stress-is-debilitating” mindset. Prior research investigated the influence of

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

individual differences on stress response and found personality to be a significant predicting variable (e.g. Matthews, Emo, Funke, Zeidner, Roberts, Costa & Schulze, 2006; Oswald, Zandi, Nestadt, Potash, Kalaydjian, & Wand, 2006; Schneider, 2004; Schneider, Rench, Lyons & Riffle, 2012; Xin, Wu, Yao, Guan, Aleman & Luo, 2017).

Personality

Personality is defined as “the set of psychological traits and mechanisms within the individual that are organized and relatively enduring and that influence his or her interactions with, and adaptation to, the intrapsychic, physical, and social environment” (Larsen & Buss, 2013). There are many models trying to explain and capture personality (e.g. Allport’s trait theory, Cattell’s 16 Factor Model, Eysenck’s Giant Three, Myers–Briggs Type Indicator (MBTI)) (Matz, Chan, & Kosinski, 2016). The present study, however, will make use of the Five Factor Model (FFM). This model describes five dimensions of personality: openness, conscientiousness, extraversion, agreeableness, and neuroticism (McCrae & Costa, 1999). Prior studies found specifically neuroticism, extraversion and openness to be significant factors in the stress response. While extraversion and openness have a positive effect on our perception of stress i.e. decreasing the stress response, neuroticism increases it (Gallagher, 1990; Schneider, 2004; Schneider, Rench, Lyons & Riffle, 2012; Shewchuk, Elliott, MacNair-Semands & Harkins, 1999, Xin, Wu, Yao, Guan, Aleman & Luo, 2017).

Extraversion refers to taking an energetic approach toward the physical and social world, feeling positive and being outgoing and sociable. Neuroticism is characterized by negative emotions and emotional instability. Openness to experience is defined as being intellectually curious, creative, imaginative, independent as well as being open to and enjoying new experiences (Cherry, 2019).

In a systematic review Kilby, Sherman, and Wuthrich (2018) examined interindividual differences in stressor appraisal. Six studies investigated the relationship between the Big Five personality traits and stressor appraisal. A negative relationship was found between neuroticism and stressor appraisal: individuals who scored higher on neuroticism were more likely to perceive a stressful event rather negatively, as less challenging and more threatening (Gallagher, 1990; Schneider, 2004; Schneider, Rench, Lyons & Riffle, 2012; Shewchuk, Elliott, MacNair-Semands & Harkins, 1999). Furthermore, Xin and his colleagues (2017) found neuroticism to be

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

a predictor of increased decline in positive affect in stress situations. Extraversion was positively associated with challenge but not threat appraisal, indicating that people scoring higher on extraversion perceive stressors rather positively, as challenging and not threatening (Gallagher 1990). Supporting these findings, individuals scoring higher on extraversion showed higher positive affect and less increase of negative affect (Schneider, Rench, Lyons & Riffle, 2012; Xin, Wu, Yao, Guan, Aleman & Luo, 2017). According to Schneider and his colleagues (2012), openness was associated with increased positive affect, lower negative affect as well as lower threat appraisal. These studies suggest neuroticism to have harmful effects and extraversion and openness to have beneficial effects on the stress response.

However, none of these studies focused on the construct of stress mindset specifically. Either they investigated stress appraisal, physiological indicators of stress, or stress response in general. Furthermore, research about personality and stress mainly focuses on the negative influence of neuroticism. Knowledge about a possible positive impact of personality is still very limited. There are only a few studies investigating the relationship of stress and the beneficial impact of extraversion and openness.

Present study

The present study aimed to foster the understanding of how we could use the increasing stress level in today's society to foster mental-wellbeing instead of harming it and whether personality may have an enhancing as well as limiting impact on this change in stress mindset by asking three research questions: First, can a stress mindset be changed? Second, is a change in stress mindset in the direction of a "stress-is-enhancing mindset" associated with higher mental well-being? And third, does an individual's personality play a role in the adoption of stress mind? It was hypothesized that 1) through manipulation a stress mindset can be changed in the direction of a more "stress-is-enhancing" mindset, 2) through this manipulation mental well-being scores will increase correspondingly, 3) extraversion, neuroticism and openness each moderate the relationship between condition and stress mindset: High scores of extraversion and openness were proposed to facilitate an increase in the stress mindset score, i.e. a change in the direction of a "stress-is-enhancing" mindset whereas high scores of neuroticism were proposed to impede an increase in the stress mindset score.

Methods

The present study was approved by the University of Twente Ethics Committee and registered in The Netherlands Trial Register (190218). Before their participation in this study all participants gave their online informed consent.

Design

In this random controlled trial (RCT) conducted in the Netherlands, an online survey was used. The study was conducted online in April 2019. After the baseline assessment eligible participants were randomly assigned either to an experimental stress mindset condition or a control condition with an allocation ratio of 1:1. The online surveys were obtained at three different time points: at baseline, at post-test (one week later) and at follow-up assessment (two weeks later).

Participants and procedure

In March and April 2019, participants were recruited by convenience sampling. Each of the eight researchers asked approximately 25 individuals to participate in online questionnaires via Qualtrics. Participants had to be at least 18 years old, German-speaking and had to own a valid email address as well as a sufficient internet connection. Participants who agreed to participate received an email with the link to the informed consent (Appendix A) and the baseline assessment. Of the 106 eligible participants 102 completed the baseline assessment about their demographics (such as age, gender and employment status) as well as their stress mindset, mental well-being and personality. Following baseline, the sample was randomized by an independent researcher using random numbers from randomizer.org. Participants were assigned to either a stress mindset condition or a control condition. After randomization, at post-test, they received either a manipulative or an informative text (Appendix B and C) and one week later a follow-up questionnaire with a debriefing document (Appendix D). Both questionnaires again asked about participants' stress mindset and mental wellbeing. A full flow chart of participants can be found in Figure 1. To increase participation, participants received a reminder via email when they failed to fill out the questionnaires.

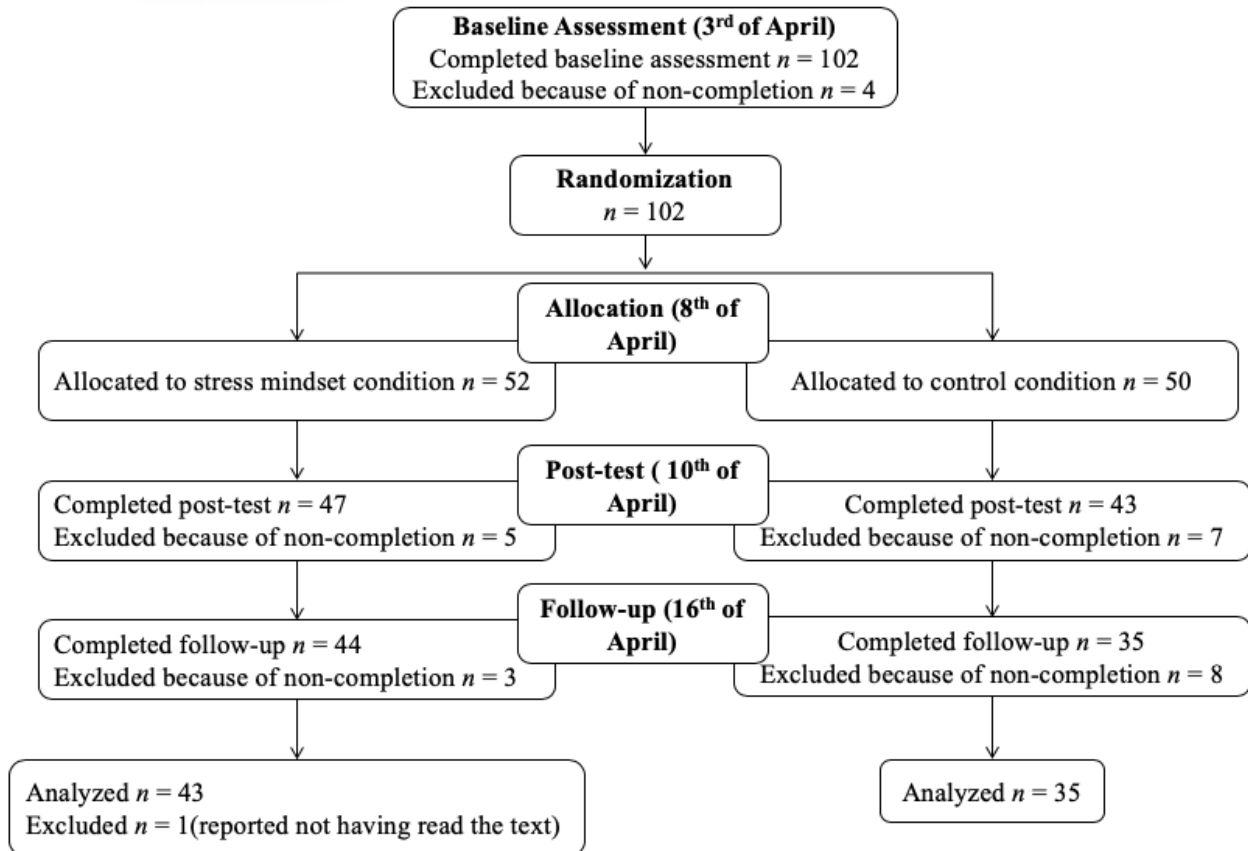


Figure 1. Flow chart of participants 10th

Conditions

Stress Mindset Condition

The stress mindset condition received a one third page long manipulative text in favor of a “stress-is-enhancing” mindset (Appendix B). By referring to scientific studies examining the beneficial effects of stress on energy levels, workplace performance, life satisfaction and psychological symptoms the text aimed to persuade people to believe in the positive nature of stress and to perceive it rather as enhancing than debilitating.

Control Condition

The control condition received a one third page long neutral, informative text about the Big Five (Appendix C). Participants were informed that the Big Five are not only game animals in Africa but also the core traits used to describe people’s personality. By giving the participants information about the Big Five dimensions and how personality is shaped the text aimed to pose a neutral, non-manipulative equivalent to the stress mindset condition’s manipulative text.

Measures

Stress Mindset

The participant's stress mindset was assessed in all three surveys with the Stress Mindset Measure (SMM) developed by Crum, Salovey, and Achor (2013). The questionnaire measures the extent to which an individual holds the mindset that the effects of stress are debilitating or enhancing with eight items. The SMM evaluates the participants' general stress mindset (e.g. *"The effects of stress are negative and should be avoided."*) and signs and symptoms related to the debilitating and enhancing consequences of stress in the field of health and vitality, learning and growth, performance and productivity (e.g. *"Experiencing stress improves health and vitality"*). The participants answered the items by rating the extent to which they agree or disagree with the given statements on a five-point Likert scale ranging from 'strongly disagree' (1) to 'strongly agree' (5). In the present study an overall score was calculated ranging from 8 to 40. Based on this score participants' stress mindset was assessed on a dimensional scale where lower scores indicated a "stress-is-debilitating mindset" and higher scores a "stress-is-enhancing mindset". The SMM proved to have good psychometric properties in a focus group of faculty graduate students at Yale University, $n = 335$ ($\alpha = .86$) (Crum, Salovey & Achor, 2013). In the present study total scores ranged from 8 to 38 ($\alpha = .95$).

Mental Well-being

The participant's mental well-being was measured in all three surveys using the continuous scale of the 14-item Mental Health Continuum-Short Form (MHC-SF) developed by Keyes and his colleagues (2008). The MHC-SF consists of three subscales. The first subscale measures emotional well-being (e.g. *"During the past month, how often did you feel happy?"*) and contains three items about happiness, positive affect and life-satisfaction. The second subscale indicates psychological well-being (e.g. *"During the past month, how often did you feel that you liked most parts of your personality?"*) and consists of six items about self-acceptance, environmental mastery, positive relations, personal growth, autonomy, and purpose in life. The last subscale, social well-being (e.g. *"During the past month, how often did you feel that you belonged to a community (like a social group, your school, or your neighborhood)?"*), includes five items about social contribution, social integration, social actualization, social acceptance and social coherence. For all 14 items, there are six answer categories ranging from 'never' (1) to 'every day' (6). In the present study an overall score was calculated ranging from 14 to 84.

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

Based on this score participants' mental well-being was assessed on a dimensional scale with low scores indicated a lower mental well-being and high scores a higher mental well-being. The instrument is frequently used due to its excellent psychometric properties ($\alpha > .80$) that were shown in various samples of adolescents and adults in the Netherlands, the U.S., and in South Africa (Keyes, 2005; Keyes et al., 2008; Lamers, Westerhof, Bohlmeijer, ten Klooster & Keyes, 2011; Westerhof & Keyes, 2009). In the present study total scores ranged from 27 to 83 ($\alpha = .97$).

Personality

The participants' personality was measured using the Big Five Inventory 2 (BFI-2) developed by Danner, Rammstedt, Bluemke, Treiber, Berres, Soto, and John (2016). This questionnaire measures the Big Five Personality traits (openness, conscientiousness, extraversion, agreeableness, and neuroticism). In this study only the scales extraversion (e.g. "*I am someone who is outgoing, sociable.*"), neuroticism (e.g. "*I am someone who has few artistic interests.*") and openness (e.g. "*I am someone who is relaxed, handles stress well.*") were used. Each subscale consists of 10 items for which there are five answer categories ranging from (1) "strongly disagree" to (5) "strongly agree". In the present study an overall score was calculated for each subscale, ranging from 12 to 60. Based on these scores participants' personality traits were assessed on a dimensional scale with low scores indicating lower levels and high scores higher levels of the three personality traits. The BFI-2 showed to have good psychometric qualities in a sample of adults in Germany, $n = 770$ ($\alpha = .88$) (Danner et al., 2016). In the present study total scores ranged from 17 to 57 (extraversion), from 15 to 54 (neuroticism), and from 28 to 56 (openness) ($\alpha = .68$).

Statistical Analysis

All analyses were performed using SPSS version 24. Only two-tailed tests were performed using an alpha of 0.05 and a confidence interval of 95%. Participant's baseline characteristics were analyzed using descriptive statistics and associations of baseline measures were determined using Pearson correlation coefficients. Differences between the two conditions at baseline as well as between completers and dropouts were analyzed using independent *t*-tests and χ^2 -tests. An analysis of variance (ANOVA) was used to determine condition x dropout interactions. To test for a significant change in stress mindset and mental well-being in the stress mindset condition compared to the control condition two two-way repeated measures ANOVA

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

were applied. Lastly, to test the moderating effect of personality on stress mindset three moderation analyses were performed using the PROCESS tool (Hayes, 2019) following the procedure outlined by Preacher and Hayes (2008). Stress mindset at post-test and follow-up assessment were entered in the regression analyses as dependent variables. The grand centered means of the three personality traits each as potential moderator and the condition x moderator interaction were used as independent variables. In case of a significant contribution of this interaction effect the moderation was further examined using plots.

Results

The baseline characteristics of the sample in this study are displayed in Table 1. The mean age was 36 ($SD = 17.72$) and the majority of the participants was female (61.5 %), had an intermediate education (59.0%) and was working (60.3%). There were no significant differences between participants in the stress mindset condition and the control condition on demographics or any baseline outcome measure.

Table 1

Baseline characteristics of participants in the stress mindset and control condition and baseline differences

	Stress Mindset Condition ($n = 43$)	Control Condition ($n = 35$)	<i>p value</i>
Age, $M (SD)$	37.02 (18.11)	35.77 (17.46)	.759
Gender, $n (%)$.478
Female	28 (65.1)	20 (57.1)	
Male	15 (34.9)	15 (42.99)	
Education, $n (%)$.266
Low	6 (14)	4 (11.4)	
Intermediate	28 (65.1)	18 (51.4)	

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

High	9 (20.9)	13 (37.1)	
Employment Status, <i>n</i> (%)			.401
Paid employment	27 (62.8)	21 (60)	
Student	15 (34.9)	10 (28.6)	
Retired	1 (2.3)	4 (11.4)	
Stress Mindset <i>M</i> (<i>SD</i>)	22.65 (5.58)	22.40 (5.53)	.843
Mental well-being <i>M</i> (<i>SD</i>)	55.67 (13.35)	58.46 (12.30)	.346
Personality <i>M</i> (<i>SD</i>)			
Extraversion	40.12 (8.95)	42.00 (6.76)	.216
Neuroticism	31.44 (10.21)	33.14 (8.11)	.425
Openness	42.93 (6.44)	43.11 (6.57)	.901

In Table 2 the bivariate correlations between the baseline measures are displayed. All Pearson correlation coefficients were significant with the exception of the correlation of stress mindset and mental well-being as well as openness. Weak to moderate correlations were found between stress mindset and extraversion and neuroticism (r between .29 and .30), mental well-being and the personality traits (r between .35 and .58), as well as between the three personality traits (r between .32 and .56), indicating that people with a more stress-is enhancing mindset have higher levels of extraversion and lower levels of neuroticism. .

Table 2
Bivariate correlations between baseline measures of stress mindset, mental-wellbeing and personality

	1	2	3	4	5
1. Stress mindset	1				
2. Mental well-being		1			
3. Extraversion	.29**	.58**	1		
4. Neuroticism	-.30**	-.53**	-.56**	1	

5. Openness	.36**	.52**	-.32**	1
-------------	-------	-------	--------	---

Dropouts

In total 90 (88.24 %) participants completed the post-test and 78 (76.47 %) the follow-up assessment. There were significantly more dropouts in the control condition (22.2%) compared to the stress mindset condition (4.4%), $\chi^2(1) = 6.15, p = .013$. Completers ($M = 36.46; SD = 17.72$) and dropouts ($M = 27.74; SD = 10.25$) differed significantly in age $t(107) = -2.57, p = .012$ but not on any other demographic or baseline measure. Completers were on average 8.72 years older than dropouts. The interaction tests of the outcome measures at baseline did not reveal different dropout patterns for any of the outcome measures.

Change in stress mindset

As shown in Table 3, the results of the mixed two-way repeated measures ANOVA on stress mindset demonstrated no significant time x condition interaction effect on the Stress Mindset Measure $F(2, 152) = 1.74, p = .179$. Thus, the stress mindset in the stress mindset condition did not change significantly more in the direction of a “stress-is-enhancing” mindset compared to the control group. The first hypothesis can therefore be rejected.

Change in mental well-being

As shown in Table 3, the results of the two-way repeated measures ANOVA demonstrated no significant time x condition interaction effect on mental well-being, $F(2, 152) = 1.12, p = .329$, indicating that the mental well-being in the stress mindset condition did not increase significantly compared to the control condition. The second hypothesis can therefore also be rejected.

Table 3

Means and standard deviations for stress mindset and mental well-being and results of the mixed repeated measures analysis of variance

	Stress mindset Condition ($n = 43$) $M (SD)$	Control Condition ($n = 35$) $M (SD)$	F	p
Stress Mindset			1.74	.179

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

Baseline	22.65 (5.58)	22.40 (5.53)		
Post-test	25.77 (6.11)	23.89 (5.21)		
Follow-up	25.07 (6.91)	23.63 (6.39)		
Mental Well-Being			1.12	.326
Baseline	55.67 (13.35)	58.46 (12.30)		
Post-test	57.77 (13.97)	61 (13.01)		
Follow-up	58.91 (12.21)	60.09 (13.69)		

F = interaction effect (time x condition).

Moderating effect of personality on stress mindset

Table 4 shows the condition x moderator interaction effects on stress mindset for each of the three personality traits (extraversion, neuroticism and openness). The moderation analyses did not reveal any significant interaction effects at post-test or at follow-up for extraversion $F(3, 74) = 3.55, p = .241$; $F(3, 74) = 3.09, p = .097$, neuroticism $F(3, 74) = 1.95, p = .476$; $F(3, 74) = .94, p = .830$, or for openness $F(3, 74) = .78, p = .602$; $F(3,74) = .32, p = .788$. Thus, the effects of the condition on stress mindset were not influenced by higher or lower levels of extraversion, neuroticism or openness. The third hypothesis can therefore be rejected.

Table 4
Moderator Analysis of stress mindset (moderator x condition)

	<i>SMM post-test</i>				<i>SMM follow-up</i>			
	<i>b</i>	95% CI	<i>p</i>	<i>t</i>	<i>b</i>	95% CI	<i>p</i>	<i>t</i>
Extraversion	.20	-.14 - .54	.241	1.18	.33	-.06 - .72	.097	1.68
Neuroticism	.11	-.19 - .40	.476	.72	.04	-.31 - .38	.830	.22
Openness	.11	-.30 - .52	.602	.52	.06	-.41 - .54	.788	.27

SMM = Stress Mindset Measure. *b* refers to the unique contribution of the interaction term (moderator x condition) in the prediction of the SMM after controlling for the separate effects of condition and moderator.

Discussion

The aim of the present study was threefold. First, it was intended to further examine whether our stress mindset could be changed through manipulation. It was expected that participants' mindset would change in the direction of a "stress-is-enhancing" mindset after they read a manipulative text. However, in contrast to a prior study by Crum and her colleagues (2003), the results of the present study did not show stress mindset to be changeable through manipulation and therefore the first hypothesis was rejected. Crum and her colleagues (2003) found stress mindset to be changeable in the direction of a "stress-is-enhancing" mindset by showing participants three different, three-minute-long videos containing information about the effects of stress on health, growth/learning and performance. There are five possible explanations for the difference in findings in the two studies. The first possible explanation lies in the form the manipulation occurred. While Crum and her colleagues used a video as manipulation, the present study's manipulation occurred in form of a text. Not only makes a video it easier for the participants to visualize the content, the videos used by Crum's study also appealed to more modalities than the present study, i.e. hearing and seeing. Participants might have been more motivated to watch a video than reading a text, thus increasing their attention and concentration on the manipulative content making it more persuasive (Mayer, 2009; Verdi, Johnson, Stock, Kulhavy & Whitman-Ahern, 1997). The second possible explanation is connected to this: some participants in the present study reported afterwards that they did not read the text because it was too long, which would have made the manipulation impossible. However, because they only mentioned this after and not in the study it was not possible to exclude them. A third possible explanation for the different findings is the different deployment of the manipulative groups. While the present study assigned participants only into either a control or a manipulative stress mindset condition in favor of a "stress-is-enhancing" mindset, Crum, Salovey and Achor (2003) allocated their participants into three groups - one control and two manipulative groups, one "stress-is-enhancing" and one "stress-is-debilitating". Thus, the contrast between the three groups might have been more apparent, producing a more obvious, significant change in stress mindset. The fourth possible explanation for the difference in findings between the two studies might be that Crum and her colleagues (2003) not only applied the manipulation once as was the case in the present study, but they showed the videos to their participants at three timepoints. This might have increased the effect of the manipulation on the participants' stress mindset. A

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

fifth reason for the different findings might be that the manipulation in the Crum study (2003) entailed more information and was longer in general, thus again increasing its effect. The findings of the present study therefore are contradictory to prior ones which is likely due to the differences in manipulation. More research is needed to investigate which forms of manipulation enable the changeability of stress mindset.

The second aim of the present study was to investigate the relation between stress mindset and mental health. It was expected that through manipulation mental well-being would increase correspondingly to a change in stress mindset: participants holding a rather stress-is-enhancing mindset, would also have a higher mental well-being. However, in contrast to prior studies (Crum, Salovey & Achor, 2003; Park & Helgeson, 2006; Tedeschi & Calhoun, 2004), the results did not reveal a significant association between stress mindset and mental well-being and therefore the second hypothesis was rejected. There are four possible explanations for the differences in findings. First, while the present study focused on stress mindset and mental well-being in particular the studies of Tedeschi and Calhoun (2004) and Park and Helgeson (2006) examined the effects of stress on a phenomenon they called stress-related growth. Contrary to the present study, they did not concentrate on stress mindset specifically but on stress in general. Furthermore, although the phenomenon of stress-related-growth incorporates aspects that resemble Keyes' construct of mental well-being, the studies still measured two different constructs. In a meta-analysis examining the relation between stress-related-growth and mental well-being, Helgeson, Reynolds and Tomich (2006) found that although stress-related growth was related to less depression and more positive affect it was not related to quality of life and associated with more intrusive thoughts about stressful life events. Thus the studies of Tedeschi and Calhoun (2004) and Park and Helgeson (2006) did not only examine the effects of stress from a different starting point, i.e. stress in general and not stress mindset specifically, but they also did not examine mental well-being in particular but a phenomenon that shares only some of its aspects. Likewise, a second reason for the different findings could be Crum and her colleagues (2003) using the Mood and Anxiety Symptom Questionnaire to assess their participants' mental health. In contrast to the MHC-SF that was used in the present study, the MASQ measures the negative side of mental health as for example symptoms of anxiety and depression, rather than the positive side. Therefore, the studies examined mental health from two different angles and although they are related, they are not the same. Thus, the second possible

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

explanation for the differences in findings lies in the studies measuring different versions of mental health. A third reason for the contradictory findings of Crum's study and the present one could be that Crum and her colleagues reported the change in stress mindset in the direction of a "stress-is-enhancing" mindset being accompanied by corresponding changes in mental health, or more specifically in psychological symptoms. However, as aforementioned the present study did not achieve a significant change in participants' stress mindset, making it impossible to assess whether the change in stress mindset was connected to a change in mental well-being. Therefore, it could not be examined whether the change in stress mindset also brought with it an increase in mental well-being. A fourth reason could be that the effects of the manipulation were measured immediately afterwards, thus possibly influencing its effectiveness. According to Hauser, Ellsworth and Gonzales (2018), manipulation checks can act as interventions themselves and thereby decrease, increase or interact with the effects of a manipulation. In contrast to the present study, Crum and her colleagues (2003) assessed their participants mental health only two to three days after the manipulation, thus minimizing the possible influence of the manipulation check on the outcomes. The findings of the present study thus are contradictory to prior ones which is likely due to the non-success of the manipulation in the present study and the differences in constructs that were investigated compared to prior studies. More research is needed to investigate the corresponding positive effects of a change in stress mindset.

In the third place, the present study aimed to examine personality as a possible moderator on the relation between condition and stress mindset. It was expected that extraversion, neuroticism and openness would moderate the relation between condition (stress mindset or control condition) and stress mindset measure. High scores of extraversion and openness were proposed to facilitate a change in stress mindset in the direction of a "stress-is-enhancing" mindset whereas high scores of neuroticisms were proposed to impede this change. However, in contrast to prior studies (Kilby, Sherman, and Wuthrich, 2018; Gallagher, 1990; Schneider, 2004; Schneider, Rench, Lyons & Riffle, 2012; Shewchuk, Elliott, MacNair-Semands & Harkins, 1999; Xin, Wu, Yao, Guan, Aleman, & Luo, 2017) the results of the present study did not confirm personality's significant role in relation to stress and therefore the third hypothesis was rejected. A possible explanation for the differences in findings lies in the constructs the studies measured. While the present study investigated the construct stress mindset, the prior studies examined stress appraisal. Although the two constructs are shown to be associated they

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

are both independent and distinct constructs: “Whereas appraisal of stress refers to the evaluation of a particular stressor as more or less stressful, stress mindset refers to the evaluation of the *nature of stress itself* as enhancing or debilitating” (Crum, Salovey & Achor, 2003). Thus, a reason for the differences in findings could be the studies investigating different constructs: stress mindset and stress appraisal. A second possible explanation might be that the manipulation did not work, i.e. that the relation between the manipulation condition and stress mindset was not significant. Thus, the study did not find overall effects which made testing for a moderation effect on this relationship redundant. A third explanation for the differences in findings might be the too small sample size of the present study. While the other studies had a minimum of 141 participants the present study only had a sample of 78 eligible cases and did not impute missing data. For moderation analyses this sample size was simply too small. Thus, further reasons for the contradictory findings of the present study compared to prior ones is the non-existent overall effect and the too small sample size.

Strengths and Limitations

Notwithstanding the contrasting and non-significant results, the present study still had its strengths. First, it is one of the few studies investigating the phenomenon of stress mindset. In contrast to prior studies, it not only investigated the consequences of a specific stress mindset but also its formation by considering personality as a possible moderator. A second strength is the study design. As the present study was a randomized control trial it made use of one of the strongest statistical designs, rendering structural equivalence of the groups (Stang, 2011). Third, only measurement instruments found to have good psychometric properties were used, which were also proven in the present study. Fourth, with the age minimum at 18 and the maximum at 84 the study covered a wide age range. This makes the sample more representative of the general population and thus more generalizable compared to prior studies who included only participants from one generation, mostly students.

However, when interpreting the results, some limitations need to be taken into account as well. First, the nonsuccess of the manipulation. Reading only a short informative text about stress mindset at one time point did not seem to be persuasive enough to change participants’ stress mindset. To ensure that the manipulation is effective, a possible step would be to perform a qualitative pretest of different manipulations. Thus, it would be advisable to test for the form,

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

frequency and duration of manipulations that a future sample would find most persuasive. Possible options would be comparing a manipulative text to a video, a researcher informing about it to an animation, a length of one minute to five minutes and an assignment of the manipulation at one time point to an assignment at three time points. Connected to this first limitation is a second one. Some participants mentioned not having read the text at all because it was too long. This being only the participants who honestly reported not taking the effort, it is unknown how many other participants did not read the text or only skimmed through. Although participants were asked to summarize shortly what the text said, this did not require them to read the text carefully, thus there was no insurance that they actually read it attentively. Again, a possible solution might be the use of a qualitative pretest investigating which form of manipulation would be most persuasive, leading to the most significant change in stress mindset. A third limitation is the high dropout rate. Of the 106 participants that were recruited, only 78 completed all three questionnaires. This may also be due to the lack of compensation. The only motivation participants would have had to take part in this study was thereby intrinsic. Although, in case of non-completion of a questionnaire participant received an email reminder, this might not have been incentive enough to complete the study. To overcome this obstacle future research could compensate participants in some manner. A fourth limitation concerns participants' high scores on the stress mindset measure. This study actually presupposed participants to hold a stress mindset that lies rather in the debilitating dimension. However, the majority of the participants scored high on the baseline assessment of the stress mindset measure, thus indicating that they already were holding a more "stress-is-enhancing" mindset prior to the study. To overcome this obstacle, it might help to use a third stress-is-debilitating condition as Crum and her colleagues did. This could at least show whether participants' mindset can be manipulated in any direction.

Practical implications and future research

Although the present study did not reveal any significant results the topic it investigated still is of great importance. With society perceiving more and more stress and this being associated with several health problems, physiologically as well as psychologically (American Psychological Association, 2013; Hammen, 2005; Mayo Clinic, 2016; McEwen & Seeman, 1999; Schwabe & Wolf, 2010; Wang, 2005; Huang et al., 2011; Schneiderman, Ironson & Siegel, 2005; Cohen, Tyrrell & Smith, 1991) it would be of advantage to know how to minimize

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

this threat. The phenomenon of stress mindset, if successfully changeable, would not only shield us from those negative aspects but may even have the potential to enhance performance and well-being as was shown in the study by Crum and her colleagues (2003). Therefore, it is still of great importance to further investigate in the field of stress mindset as it holds promising implications for our health, performance and life satisfaction (Crum, Salovey & Achor, 2003).

Future research should further examine ways to manipulate people's' stress mindsets as well as its limits. Are there for instance factors that facilitate or impede the manipulation of stress mindset? Furthermore, it would be of advantage to know which further implications a change in stress mindset can have. With the growing agenda of adding life to years mental health is becoming more and more important in today's society (Drewnowski & Evans, 2001), making it of high priority to investigate how we could further enhance it. With the study of Crum and her colleagues (2003) only examining the negative side of mental health and the present study although considering mental health's positive side, but without a significant change in stress mindset, it is still not answered which positive implications such a change could have on the positive side of mental health. Thus, future studies should focus on doing qualitative tests of manipulations to ensure their persuasiveness and ability to significantly change people's stress mindset. After a successful manipulation the implications of this change for mental well-being should further be investigated using randomized controlled trials.

References

- Aitken, A., Crawford, L. (2007). Coping with stress: Dispositional coping strategies of project managers. *International Journal of Project Management*, 25(7), 666-673. doi: 10.1016/j.ijproman.2007.02.003
- American Psychological Association (2013). *How stress affects your health*. Retrieved from: <https://www.apa.org/helpcenter/stress>
- American Psychological Association (2018). *Stress Effects on the Body*. Retrieved from: <https://www.apa.org/helpcenter/stress/index>
- Brunet (n.d). *Stress: a social issue*. Retrieved from: <https://www.brunet.ca/en/advice/stress-a-social-issue.html>
- Carver, C. S., & Connor-Smith, J. (2010). Personality and coping. *Annual Review of Psychology*, 61, 679–704. doi:10.1146/annurev.psych.093008.100352
- Cherry, K. (2019). *The Big Five Personality Traits*. Retrieved from: <https://www.verywellmind.com/the-big-five-personality-dimensions-2795422>
- Chong, J. (2017). *5 reasons why modern life causes us stress (and what to do about it)*. Retrieved from: <https://theskillcollective.com/blog/modern-life-causes-stress>
- Cohen, S. Tyrrell, D.A., Smith, A.P. (1991). Psychological stress and susceptibility to the common cold. *N Engl J Med*, 325(9), 606-612. doi:10.1056/NEJM199108293250903
- Crum, A. J., & Langer, E. J. (2007). Mind-Set matters: Exercise and the placebo effect. *Psychological Science*, 18, 165–171. doi:10.1111/j.1467- 9280.2007.01867.x
- 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.
- 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
- Drewnowski, A., Evans, W.J. (2001). Nutrition, physical activity and quality of life in older adults. *The Journals of Gerontology: Series A*, 56(2), 89-94. doi: 10.1093/gerona/56.suppl_2.89
- 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
- Ellis, B.J. & Del Giudice, M. (2014). Beyond allostatic load: Rethinking the role of stress in regulating human development. *Dev Psychopathol* 26(1), 1-20. doi:10.1017/S0954579413000849
- Gallagher, D. J. (1990). Extraversion, neuroticism and appraisal of stressful academic events. *Personality and Individual Differences*, 11(10), 1053–1057. doi: 10.1016/0191-8869(90)90133-C.
- Gollwitzer, P. M. (1999). Implementation intentions: Strong effects of simple plans. *American Psychologist*, 54, 493–503. doi:10.1037/0003-066X.54.7.493

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

- Gu, J., Strauss, C., Bond, R., & Cavanagh, K. (2015). How do mindfulness-based cognitive therapy and mindfulness-based stress reduction improve mental health and wellbeing? A systematic review and meta-analysis of mediation studies. *Clinical psychology review*, 37, 1-12. doi.org/10.1016/j.cpr.2015.01.006
- Hammen, C. (2005). Stress and Depression. *Annual Reviews*, 1, 293-219. doi:10.1146/annurev.clinpsy.1.102803.143938
- Hauser, D.J., Ellsworth, P.C., & Gonzalez, R. (2018) Are Manipulation Checks Necessary? *Frontiers in Psychology*, 9. doi: 10.3389/fpsyg.2018.00998
- Hayes, A.F. (2019). *The Process macro for SPSS and SAS*. Retrieved from: <http://processmacro.org/download.html>
- Helgeson, V. S., Reynolds, K. A., & Tomich, P. L. (2006). A meta-analytic review of benefit finding and growth. *Journal of Consulting and Clinical Psychology*, 74, 797–816. doi:10.1037/0022-006X.74.5.797
- Huang, C.J., Stewart, J.K., Franco, R.L., Evans, R.K., Lee, Z.P., Cruz, T.D., Webb, H.E., Acevedo, E.O. (2011). LPS-stimulated tumor necrosis factor-alpha and interleukin-6 mRNA and cytokine responses following acute psychological stress. *Psychoneuroendocrinology* 36(10), 1553-1561. doi:10.1016/j.psyneuen.2011.04.009
- Keyes, C.L.M. (2005). Mental illness and/or mental health? Investigating axioms of the complete state model of health. *Journal of Consulting and Clinical Psychology*, 73(3), 539-48. doi: 10.1037/0022-006X.73.3.539
- Keyes, C.L.M., Wissing, M., Potgieter, J.P., Temane, M., Kruger, A., & van Rooy, S. (2008). Evaluation of the mental health continuum-short form (MHC-SF) in Setswana speaking South Africans. *Clinical Psychology and Psychotherapy*, 15(3), 181-92. doi: 10.1002/cpp.572.
- Kilby, C.J., Sherman, K.A., & Wuthrich, V. (2018). Towards understanding interindividual differences in stressor appraisal: a systematic review. *Personality and Individual Differences* 135,92-100. doi:10.1016/j.paid.2018.07.001
- Kunz-Ebrecht, S. R., Mohamed-Ali, V., Feldman, P. J., Kirschbaum, C., & Steptoe, A. (2003). Cortisol responses to mild psychological stress are inversely associated with proinflammatory cytokines. *Brain, Behavior, and Immunity*, 17, 373–383. doi:10.1016/S0889-1591(03)00029-1
- Lamers, S.M.A., Westerhof, G.J., Bohlmeijer, E.T., ten Klooster, P.M., & Keyes, C.L.M. (2010). Evaluating the psychometric properties of the Mental Health Continuum-Short Form (MHC-SF). *Journal of Clinical Psychology*, 67, 99-110. doi:10.1002/jclp.20741
- Larsen, R. J., & Buss, D. M.(2013). *Personality psychology: Domains of knowledge about human nature*. (5th ed.) McGraw Hill Education
- Lehavot, K., & Simoni, J. M. (2011). The impact of minority stress on mental health and substance use among sexual minority women. *Journal of consulting and clinical psychology*, 79(2), 159. doi.org/10.1037/a0022839
- Lieberman, V., Samuels, S. M., & Ross, L. (2004). The name of the game: Predictive power of reputations versus situational labels in determining prisoner’s dilemma game moves. *Personality and Social Psychology Bulletin*, 30(9), 1175–1185. doi:10.1177/0146167204264004
- Matthews, G., Emo, A.K., Funke, G., Zeidner, M., Roberts, R.D., Costa Jr, P.T., & Schulze, R. (2006). *Journal of Experimental Psychology: Applied*, 12(2), 96-107. doi: 10.1037/1076-898X.12.2.96

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

- Matz S., Chan Y.W.F., Kosinski M. (2016) *Emotions and Personality in Personalized Services*. Switzerland: Springer, Cham
- Mayer, R. (2009). *Multimedia Learning*. Cambridge: Cambridge University Press. doi:10.1017/CBO9780511811678
- Mayo Clinic. (2016) *Stress Symptoms: Effects on your body and behaviour*. Retrieved from: <https://www.mayoclinic.org/healthy-lifestyle/stress-management/in-depth/stress/art-20046037>
- McCrae, R.R., Costa Jr., P.T. (1999). *Handbook of personality: Theory and research* (2nd ed.). New York: Guilford
- McEwen, B.S. (1999) Protective and Damaging Effects of Mediators of Stress: Elaborating and Testing the Concepts of Allostasis and Allostatic Load. *Annals of the New York Academy of Science*, 896(1), 30-47. doi: 10.1111/j.1749-6632.1999.tb08103.x
- Nabi, R. L., Prestin, A., & So, J. (2013). Facebook friends with (health) benefits? Exploring social network site use and perceptions of social support, stress, and well-being. *Cyberpsychology, Behavior, and Social Networking*, 16(10), 721-727. doi.org/10.1089/cyber.2012.0521
- Neece, C. L. (2014). Mindfulness-based stress reduction for parents of young children with developmental delays: Implications for parental mental health and child behavior problems. *Journal of Applied Research in Intellectual Disabilities*, 27(2), 174-186. doi.org/10.1111/jar.12064
- Oswald, L.M., Zandi, P., Nestadt, G., Potash, J., Kalaydjian, A.E., & Wand, G.S. (2006). Relationship between cortisol response to stress and personality. *Neuropsychopharmacology*, 31(7), 1583-1591. doi: 10.1038/sj.npp.1301012
- Park, C. L., & Helgeson, V. S. (2006). Introduction to the special section: Growth following highly stressful life events—Current status and future directions. *Journal of Consulting and Clinical Psychology*, 74, 791–796. doi:10.1037/0022-006X.74.5.791
- Preacher, K.J., & Hayes, A.F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behaviour Research Methods*, 40, 879–891. doi: 10.3758/BRM.40.3.879
- Sapolsky, R. M. (1996). Stress, glucocorticoids, and damage to the nervous system: The current state of confusion. *Stress*, 1, 1–19. doi:10.3109/10253899609001092
- Schneider, T. R. (2004). The role of neuroticism on psychological and physiological stress responses. *Journal of Experimental Social Psychology*, 40(6), 795–804. doi: 10.1016/j.jesp.2004.04.005.
- Schneider, T.R., Rench, T. A., Lyons, J. B., & Riffle, R. R. (2012). The influence of neuroticism, extraversion and openness on stress responses. *Stress and Health*, 28(2), 102–110. doi: 10.1002/smi.1409.
- Schneiderman, N., Ironson, G., & Siegel, S. D. (2005). Stress and health: Psychological, behavioral, and biological determinants. *Annual Review of Clinical Psychology*, 1, 607–628. doi:10.1146/annurev.clinpsy.1.102803.144141
- Schwabe, L. & Wolf, O.T. (2010). Learning under stress impairs memory formation. *Neurobiol Learn Mem* 93(2), 183-8. doi: 10.1016/j.nlm.2009.09.009
- Selye, H. (1975). Stress and distress. *Comprehensive Therapy*, 1, 9–13
- Shapiro, S. L., Brown, K. W., & Biegel, G. M. (2007). Teaching self-care to caregivers: Effects of mindfulness-based stress reduction on the mental health of therapists in training.

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

- Training and Education in Professional Psychology*, 1(2), 105-115. doi.org/10.1037/1931-3918.1.2.105
- Shewchuk, R. M., Elliott, T. R., MacNair-Semands, R. R., & Harkins, S. (1999). Trait influences on stress appraisal and coping: An evaluation of alternative frameworks. *Journal of Applied Social Psychology*, 29(4), 685–704. doi: 10.1111/j.15591816.1999.tb02019.x.
- Stang, A. (2011). Randomized Controlled Trials—an Indispensable Part of Clinical Research. *Deutsches Ärzteblatt International* 108(39), 661–662. doi: 10.3238/arztebl.2011.0661
- Taylor, S. E., & Gollwitzer, P. M. (1995). Effects of mindset on positive illusions. *Journal of Personality and Social Psychology*, 69, 213–226. doi:10.1037/0022-3514.69.2.213
- Tedeschi, R. G., & Calhoun, L. G. (2004). Posttraumatic growth: Conceptual foundations and empirical evidence. *Psychological Inquiry*, 15, 1–18. doi:10.1207/s15327965pli1501_01
- Verdi, M.P., Johnson, J. T., Stock, W. A., Kulhavy, R. W., Whitman-Ahern, P. (1997). Organized spatial displays and texts: Effects of presentation order and display type on learning outcomes. *Journal of Experimental Education*, 65, 303-317. doi:10.1080/00220973.1997.1 080 6 6 06
- Wang, J. (2005). Work stress as a risk factor for major depressive episode(s). *Psychol Med*, 35(6), 865-871. doi:10.1017/S0033291704003241
- Watson, D., Weber, K., Assenheimer, J. S., Clark, L. A., Strauss, M. E., & McCormick, R. A. (1995). Testing a tripartite model: I. Evaluating the convergent and discriminant validity of anxiety and depression symptom scales. *Journal of Abnormal Psychology*, 104, 3–14. doi:10.1037/0021-843X.104.1.3
- Westerhof, G.J., Keyes, C.L.M. (2009). Mental Illness and Mental Health: The Two Continua Model Across the Lifespan. *Journal of Adult Development*, 17(2), 110–119. doi: 10.1007/s10804-009-9082-y
- World Health Organization (2014). Mental Health: a state of well-being. Retrieved from: http://www.who.int/features/factfiles/mental_health/en/
- Xin, Y., Wu, J., Yao, Z., Guan, Q., Aleman, A., & Luo, Y. (2017). The relationship between personality and the response to acute psychological stress. *Scientific reports*, 7(1). doi: 10.1038/s41598-017-17053-2.

Appendix A

Informed consent

Welcome to the study!

The purpose of this study is to investigate how people perceive new information. This study consists of three parts. The first part starts after you have read and agreed to this informed consent. If you agree with the conditions to participate in this study, you will be automatically redirected to the first survey. This first survey will take approximately 20 to 30 minutes. Please complete this survey before the 07.04. to be able to participate in this study.

On Friday - 12.04. - you will receive an email with a link to the second survey. You will also receive some information to read. This survey (including the reading) will take approximately 15 minutes. Finally, on Friday - 19.04. - you will receive an email with a link to the final survey which will take approximately 5 minutes. Please complete each survey within 3 days. Each survey contains some questions about your personality and wellbeing.

Your data will be collected entirely online and treated confidentially. Therefore, we use your name and email address only for sending you the three personalized surveys. All materials will be identified by an assigned participant number, not by your name. During the research period, your data will be treated with great confidentiality and only be accessible by the main researcher dr. Marijke Schotanus-Dijkstra. Your individual privacy will be maintained in all published and written data resulting from this study.

Participation in this study is voluntary. If you decide to participate, you will be asked to agree to the informed consent. After that, you are still free to withdraw at any time and without giving a reason for your withdrawal.

If you have any comments or questions regarding this study, please contact dr. Marijke Schotanus-Dijkstra (m.schotanus@utwente.nl).

I have read and I understand the provided information. I understand that my participation is voluntary and that I am free to withdraw at any time, without giving a reason. I voluntarily agree to take part in this study.

Principal Investigators

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

Natascha Berden, Morticia Boroch, Helen Brand, Pia Hülsmann, Miriam Kebernik, Carina Schreiber, Lara Watermann, Felizia Wellinger
Under supervision of dr. Marijke Schotanus-Dijkstra
University of Twente

Herzlich Willkommen!

Das Ziel unserer Studie ist zu untersuchen, wie Menschen neue Informationen wahrnehmen. Diese Studie besteht aus drei Teilen. Der erste Teil beginnt, nachdem Sie diese Einverständniserklärung gelesen und ihr zugestimmt haben. Wenn Sie zustimmen, teilzunehmen, werden Sie automatisch zu der Studie weitergeleitet. Der erste Fragebogen wird etwa 20 bis 30 Minuten dauern. Bitte füllen Sie diese Studie vor dem 07.04. aus, um an der Studie teilnehmen zu können.

Am Freitag, dem 12.04., werden Sie eine E-Mail mit dem Link für den zweiten Fragebogen erhalten. Sie werden ebenfalls Informationen zum lesen bekommen. Dieser Fragebogen (inklusive des Lesens) wird ungefähr 15 Minuten dauern. Bitte füllen Sie diese Studie vor dem 14.04. aus. Am Ende, am Freitag dem 19.04. werden Sie eine E-Mail mit dem Link für den letzten Fragebogen erhalten, welcher ungefähr 5 Minuten dauern wird. Bitte füllen Sie jeden Fragebogen innerhalb von 3 Tagen aus. Jeder Fragebogen erhält einige Fragen über Ihre Persönlichkeit und Ihr Wohlergehen.

Ihre Daten werden ausschließlich online erfasst und vertraulich behandelt. Daher nutzen wir Ihren Namen und E-Mail Adresse nur, um Ihnen die drei personalisierten Fragebögen zu schicken. Alle Daten werden durch eine Teilnehmernummer identifiziert, nicht durch Ihren Namen. Während der Forschungsperiode werden Ihre Daten mit größter Vertraulichkeit behandelt und sind nur der Hauptforscherin Dr. Marijke Schotanus-Dijkstra zugänglich. Ihre Daten unterliegen in allen veröffentlichten und schriftlichen Formen dem Datenschutz.

Die Teilnahme in dieser Studie ist freiwillig. Wenn Sie sich dazu entscheiden teilzunehmen, werden Sie gefragt, dieser Einverständniserklärung zuzustimmen. Danach haben Sie immer noch die Möglichkeit, jederzeit die Studie zu beenden, ohne einen Grund für die Beendigung zu nennen.

Wenn Sie Fragen oder Anmerkungen zu der Studie haben, kontaktieren Sie bitte Dr. Marijke Schotanus-Dijkstra (m.schotanus@utwente.nl).

Ich habe die oben genannte Information gelesen und zur Kenntnis genommen. Ich weiß, dass meine Teilnahme freiwillig ist und dass ich die Studie jederzeit ohne die Angabe von Gründen beenden kann. Ich stimme freiwillig zu, an dieser Studie teilzunehmen.

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

Forscher

Natascha Berden, Morticia Boroch, Helen Brand, Pia Hülsmann, Miriam Kebernik, Carina Schreiber, Lara Watermann, Felizia Wellinger

Unter der Leitung von Marijke Schotanus-Dijkstra

University of Twente

Appendix B

Manipulation Text

The beneficial nature of stress

Did you know that stress is beneficial for your health and personal growth? Although stress is being portrayed in a negative way in the media and by the people around us, there is also a positive side of experiencing stress. For example, people who believe that stress is positive have higher energy levels, show better workplace performance, are more satisfied with their life in general and have fewer symptoms of depression and anxiety. How do you interpret a stressful situation? Do you find stress negative or positive?

Recent scientific studies have shown that experiencing stress puts the body and the brain in an optimal condition to function in order to fulfill the demands and tasks asked for. Therefore, the attention is focused on the demands and this will boost memory and performance. Stress is an essential ingredient of being able to fulfill everyday tasks as well as more difficult challenges. Thus, individuals who perceive stress as a necessary and positive aspect of life are more likely to succeed and feel happy.

Taken together, if you believe that stress is positive, this can have a great beneficial impact on your personal growth, performance and your health.

Die positive Seite von Stress

Wussten Sie, dass Stress sehr vorteilhaft für Ihre Gesundheit und Ihr persönliches Wachstum sein kann? Auch wenn Stress in den Medien und von vielen unserer Mitmenschen als negativ dargestellt wird, hat er auch eine positive Seite. Zum Beispiel haben Menschen, die glauben, dass Stress positiv ist, ein höheres Energielevel sowie bessere Arbeitsleistungen, sie sind generell mehr mit ihrem Leben zufrieden und zeigen zudem weniger Depressions- oder Angstsymptome. Wie interpretieren Sie eine stressige Situation? Empfinden Sie die Situation als negativ oder positiv?

Studien haben kürzlich herausgefunden, dass Stress den Körper und das Gehirn in einen optimalen Zustand setzt, um Leistung zu erbringen. Dabei wird die Aufmerksamkeit auf die zu erfüllende Aufgabe fokussiert und dadurch wird das Gedächtnis und die Leistungsfähigkeit gesteigert. Stress ist also ein wichtiger Bestandteil, um sowohl alltägliche Aufgaben als auch schwierige Herausforderungen zu meistern. Aus diesem Grund sind Menschen, die Stress als einen notwendigen und positiven Aspekt des Lebens betrachten eher dazu veranlagt erfolgreicher und glücklicher zu sein.

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

Insgesamt lässt sich sagen, dass wenn Sie daran glauben, dass Stress positiv ist, dass eine sehr vorteilhafte Wirkung auf Ihr persönliches Wachstum, Ihre Leistungsfähigkeit und Ihre Gesundheit haben kann.

Appendix C

Control Text

The Big Five

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.

The Big Five

Wussten Sie, dass “the Big Five” nicht nur Tiere sind, sondern auch Ihre Persönlichkeit erklären? Während sich “the Big Five” in Afrika auf die fünf am schwierigsten zu jagenden Wildtiere bezieht - den Löwen, den Leoparden, das Nashorn, den Elefanten und den Büffel - benutzen Psychologen den Ausdruck “the Big Five”, um die fünf Kerneigenschaften Ihrer Persönlichkeit zu beschreiben:

1. **Offenheit für Erfahrungen:** Neugierde, weites Interessenspektrum und offen neue Dinge zu probieren
2. **Gewissenhaftigkeit:** Bedächtigkeit, Planung, Organisation und Aufmerksamkeit fürs Detail
3. **Extraversion:** kontaktfreudig, gesprächig, durchsetzungsfähig, selbstbewusst, aufgeschlossen und energiegeladen.
4. **Verträglichkeit:** treu, gütig, kooperativ, und sorgend um andere Leute

IT IS ALL JUST PSYCHOLOGICAL: MINDSET MATTERS

5. **Neurotizismus:** emotional instabil, Stimmungsschwankungen und Neigung zu negativen Verstimmungen

Neueste wissenschaftliche Studien zeigen, dass sowohl biologische als auch umweltliche Einflüsse eine Rolle in der Persönlichkeitsentwicklung spielen. Außerdem sollen diese fünf großen Persönlichkeitszüge im Erwachsenenalter relativ stabil sein. Wichtig zu wissen ist, dass jeder dieser fünf Persönlichkeitsfaktoren einen Bereich zwischen zwei Extremen darstellt. Zum Beispiel starke Extraversion im Gegensatz zu starker Introversion, und Neurotizismus (emotionale Instabilität) im Gegensatz zu emotionaler Stabilität. In der Realität liegen die meisten Leute irgendwo zwischen den beiden Extremen jeder Persönlichkeitsdimension.

Ihre Persönlichkeit kann also in fünf Hauptpersönlichkeitszüge kategorisiert werden, die relativ stabil sind.

Appendix D

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.