# A Mind set on Stress: Exploring connections between Stress-Mindsets and Mental Health and what Stress-Mindset people hold by default

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**Abstract**

Stress has a bad reputation in both science and the media. The mindset individuals hold on stress has been found to influence the way we deal with stress. Thus, this bad reputation may have negative repercussions for people who experience stress. It was examined whether individuals hold a stress-is-debilitating mindset by default. Differences in self-reported mental health between individuals who hold a stress-is-enhancing mindset as compared to individuals who hold a stress-is-debilitating mindset were examined. Higher levels of well-being were expected for individuals who hold a stress-is-enhancing mindset. The study was online-survey based with a between-groups design. The results indicate that the stress-is-debilitating mindset is the default mindset. No significant differences in self-reported mental-health were found between participants in the stress-is-enhancing condition as compared to the stress-is-debilitating condition. Considering previous research, on the impact negative mindsets have on our lives, the findings call for a change in how stress is perceived and portrayed. Furthermore, the topics of stress-mindsets and mindsets, in general, hold great potential for research.

*Keywords:* stress, stress-mindset, mental health

# Introduction

## Stress

In our daily lives, stress seems almost omnipresent. Many of us appear to either experience it on a regular basis or know someone who does. In scientific literature, stress is a concept that has been thoroughly examined. Even early philosophers like Aristotle and Hippocrates already showed awareness of it (Fink, 2010). While there are different conceptualisations of the term stress, it can generally be defined as an individual's physical and mental response to experiencing or anticipating an environmental situation or a task which challenges or threatens said individual's resources to deal with the experience (Crum, Salovey, & Achor, 2013; Fink, 2010; Marten, 2017). Such a situation or task can also be called a 'stressor', while the physical and mental response is called a 'stress response' (Schneiderman, Ironson, & Siegel, 2005).

## The common view: Stress as detrimental

Nowadays, stress seems to be regarded negatively. To illustrate, the World Health Organisation (WHO) called stress an "epidemic" of our time (Fink, 2010, p. 5). At the same time, stress is portrayed in a negative light, in the popular press (Crum et al., 2013).

In scientific literature, stress has been linked to mostly negative outcomes in several domains of life. Schneiderman et al. (2005) list several health aspects that are negatively influenced by stress, specifically chronic stress, such as cardiovascular disease, HIV progression, inflammation, and the immune system. Furthermore, they found associations between experiencing stress and showing symptoms of anxiety and depression (Schneiderman et al., 2005). Similarly, Dyson and Renk (2006) found a positive association between stress-levels and levels of depressive symptomology. Freshmen college students in their study who reported alleviated stress-levels also reported greater depressive symptomology. In line with this finding, research has shown that well-being and perceived stress are negatively related among students (Sugiura, Shinada, & Kawaguchi, 2005).

Overall, this negative view on stress itself may pose a threat. As outlined further below, Crum et al. (2013) found that differences in the attitude an individual has towards stress can have an effect on the way stress affects them. A pervasive negative attitude towards stress, for instance, can cause negative outcomes when facing stressors. Thus, the view on stress in our society may already be problematic. This becomes especially relevant considering how prevalent stress seems to be in our lives. In their study, Saleh, Camart, and Romo (2017) found that over 70% of their student sample experienced high levels of stress. In line other research

(Dyson & Renk, 2006; Schneiderman et al., 2005), they also found high levels of depression and anxiety.

**Recent years: Positive Aspects of Stress.**

While the negative view on stress seems to be the norm in scientific literature, recent studies have found more positive effects and, thus, started to tackle this view. One study showed how stress can influence well-being both negatively or positively, depending on coping-strategies that are used to deal with it (Karlsen, Dybdahl, & VittersØ, 2006). In their study, O'Sullivan (2011) found that positive responses to stress positively influence life-satisfaction among students. Benefits of stress have been found in other domains, as well. Studies have shown that stress can benefit cognitive processes like memory consolidation, through activation of stress hormones such as epinephrine (Cahill, Gorski, & Le, 2003), or focus, by directing cognitive resources towards relevant stimuli (Hancock* & Weaver, 2005). On the subject of health, Simmons and Nelson (2001) found that nurses in their study reported better health when they also reported positive stress. These findings match more recent research about stress, which seem to have been more inclusive than in the past.

This could indicate that research is already moving towards a more substantiated and exhaustive view about stress, which emphasises the benefits of stress, as well. The attitude towards stress that individuals hold, or their 'stress-mindset', can influence the way they are affected by stress (Crum et al., 2013). Thus, this change towards a more nuanced and less negative portrayal of stress, or a more positive stress-mindset, may be beneficial for us as a society.

**Mindset**

A mindset can, in general, be defined as the attitude an individual has towards a specific concept like stress, health or ageing. It has been shown that people's mindsets affect the way they experience related events, situations, or processes. Specifically, mindsets influence whether these events or processes have a positive or negative effect on people's health and behaviour (Crum et al., 2013; Levy & Myers, 2004; Levy, Slade, Kunkel, & Kasl, 2002).

It follows, that mindsets have a strong impact on people's lives. In their study, Aronson, Fried, and Good (2002) found that African American students often experience stereotype threat in academic settings. To illustrate, these students have internalised the beliefs that intelligence is fixed (fixed mindset) and that African Americans on average score lower on intelligence tests than White Americans. This mindset causes a debilitating fear of reinforcing

the stereotype. This fear will then disturb those students' conduct and negatively influence their performance (Aronson et al., 2002). As a further example of the importance of mindsets, it was found that the mindset one holds about ageing can even influence one's own survival (Levy et al., 2002). Individuals who hold positive rather than negative self-perceptions on ageing on average live 7.5 years longer. In addition, positive self-perceptions about ageing are also associated with pursuing preventive health behaviours, such as, diet and exercise (Levy & Myers, 2004). These findings all highlight the impact mindsets, in general, can have in life. Furthermore, they show how positive mindsets may help people react to respective situations or processes, such as exams or ageing, in more adaptive ways that, in turn, are beneficial to them.

**Stress-Mindset**

As mentioned above, mindsets have been investigated in the domain of stress, too. In their study, Crum et al. (2013) first supported the reliability and validity of the Stress Mindset Measure (SMM), which assesses whether an individual holds a *stress-is-enhancing mindset* or a *stress-is-debilitating* mindset. Furthermore, they found that stress-mindset is a separate variable that can alter how stress affects outcomes such as health. They then demonstrated that one's stress-mindset can be changed by watching short videos featuring either positive or negative information about stress. Lastly, Crum et al. (2013) found that individuals who hold a stress-is-enhancing mindset react to stressful situations in ways that create opportunities for personal growth. In line with this last finding, it has been shown that such individuals also show greater positive emotions and experience more physiological thriving when faced with a stressor (Crum, Akinola, Martin, & Fath, 2017). Like in the domains of ageing and intelligence, making the change toward a positive mindset about stress may, thus, improve people's lives.

While Crum et al. (2013) showed that making the change toward a stress-is-enhancing mindset is possible, it remains unclear what stress-mindset people hold by default. Examining this may help us better understand the prevalence rates of stress-related diseases, such as cardiovascular disease (Schneiderman et al., 2005). It may also reveal new working points for therapy for such diseases, considering how stress-mindsets can alter the way stress affects people (Crum et al., 2017; Crum et al., 2013). An indication for the answer is that the information people receive about stress influences their stress-mindset (Crum et al., 2013). This effect could be further facilitated by the *confirmation bias*. This describes the phenomenon of looking for, interpreting, and recalling information that confirms existing beliefs (Nickerson, 1998). Repeated exposure to negative information on stress could, thus, make people adopt a

stress-is-debilitating mindset and then continuously reinforce it as such information would, subsequently, be accepted more readily. Accordingly, the negative portrayal of stress in scientific literature and the media makes it likely that most people hold a stress-is-debilitating mindset.

**Stress Mindsets and Mental Health**

Stress-mindsets have been shown to be related to aspects of mental health. The World Health Organization (2004) mental health is "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (p. 12). Previous research has outlined that a stress-is-enhancing mindset is related to having fewer symptoms of both depression and anxiety and also higher quality of life (Crum et al., 2013). Moreover, holding a stress-is-enhancing mindset is related to experiencing better mood and more positive emotions (Crum et al., 2017). Thus, individuals who hold a stress-is-enhancing mindset may show better mental health overall as compared to those holding a stress-is-debilitating mindset.

**The present study**

The aim of the present study was to examine what stress-mindset people hold by default and to investigate whether individuals who hold a stress-is-enhancing mindset show better mental health as compared to their stress-is-debilitating counterparts. Based on the literature review, the following research questions were addressed:

*RQ1: What is the default stress-mindset that people hold?*

*RQ2: To what extent do individuals who hold a stress-is-enhancing mindset differ in self-reported mental health as compared to individuals who hold a stress-is-debilitating mindset?*

Information we receive about stress can influence the stress-mindset we hold and how negatively stress is portrayed (Crum et al., 2013; Fink, 2010; Schneiderman et al., 2005). Moreover, research indicates that people who hold a stress-is-enhancing mindset show greater well-being and fewer pathological symptoms (Crum et al., 2017; Crum et al., 2013). Subsequently, the following hypotheses were formulated:

*H1:* By default, people hold a stress-is-debilitating mindset.

*H2:* Individuals who hold a stress-is-enhancing mindset show better mental health as compared to individuals who hold a stress-is-debilitating mindset.

## Methods

### Design

For the present study, a cross-sectional, online survey was conducted. A between-subjects design was employed to answers the research questions. It was examined what stress-mindsets people tend to hold by default. Additionally, participants' stress-mindset as the independent variable and mental health as the dependent variable were examined.

### Participants and Recruitment

Participants for this study were recruited using the SONA system at the University and by sharing the link to the survey on the website Qualtrics on the researcher's social media platforms, such as Facebook and WhatsApp. Participants in SONA received one (1) SONA credit as reimbursement for participation. Participants had to be over the age of 18 to be eligible for the present study.

Initially, there were 160 participants. Participants were excluded if they did not fill out all the relevant scales on both administrations. Some responses were from participants who filled out the pre-test twice. After exclusion, 72 valid participants who filled out the relevant scales on both the pre- and post-test were left. They were between 18 and 29 years old ($M$ = 21.9, SD = 2.5). Out of those participants, 52 were female (72.2%), 59 were of German nationality (81.9%) and 68 were students (94.4%).

### Materials

For the present study, an online survey was uploaded to Qualtrics. Demographical data, such as age, gender, nationality, and occupational status, were assessed during the pre-test. As this study was conducted in collaboration with other researchers with a focus on different topics, the online survey included three questionnaires that were not used in the present study but were filled out by all participants to obtain measures of other variables. Namely, the depression subscale of the Hospital Anxiety and Depression Scale (Bjelland, Dahl, Haug, & Neckelmann, 2002), the Perceived Stress Scale (Lee, 2012), the State Self-Esteem Scale (Heatherton & Polivy, 1991).

**The Mental Health Continuum-Short Form**

Mental Health Continuum-Short Form (MHC-SF) was used to assess participants' self-reported levels of mental health (Lamers, Westerhof, Bohlmeijer, ten Klooster, & Keyes, 2011). The MHC-SF is a 14-item survey with three dimensions, namely, Emotional well-being (E), Psychological well-being (P), and Social well-being (S). Items are assessed on the dimension "In the past month, how often did you feel …". Example items for each dimension respectively are "Happy" (E), "That you had warm and trusting relationships with others" (P), and "That people are basically good" (S) (p. 6). The psychometric properties of MHC-SF have been validated in research (Lamers et al., 2011; Silverman, Forgeard, Beard, & Björgvinsson, 2018). Cronbach's alpha was used as the reliability value, with a value of higher than .70 considered acceptable and higher than .80 referred to as high (Kline, 2013). Lamers et al. (2011) found that the MHC-SF had high reliability and validity in their study ($\alpha = .89$). In the present study, the MHC-SF showed high reliability for both the pre- ($\alpha = .92$) and the post-test ($\alpha = .92$).

**The Stress Mindset Measure-General**

Next, to assess participants' stress-mindset, the survey featured the Stress Mindset Measure-General (SMM-G) (Crum et al., 2013). The SMM-G is an eight-item survey. Items are assessed on a five-point Likert scale from "Strongly Disagree" to "Strongly agree". Items include statements such as "The effects of stress are negative and should be avoided" and "Experiencing stress improves my health and vitality" (Crum et al., 2013; p. 17). In their study, Crum et al. (2013) confirmed the high reliability and validity of the SMM-G ($\alpha = .86$). In the present study, the SMM-G also showed high reliability for both the pre- ($\alpha = .80$) and the post-test ($\alpha = .89$) measure.

**Open Question – Aspects of Stress**

There was an additional open question at the end of the post-test, namely "What aspects of stress do you remember from the videos?" Only participants in the stress-is-enhancing condition and stress-is-debilitating condition (described below) were asked this question.

The answers to the open question were coded per separate statement a participant made. An example from the data would be, "Being stressed is bad for your well-being and health" was coded as two separate statements, one about stress and well-being and one about stress and health. They were categorised into either "Positive Statements", "Negative Statements", or "Neutral or Unclear Statements". A statement would fall in the "Positive Statement" category if it highlighted an enhancing or positive effect stress has on people. An example from the data

would be “Stress is helpful when learning.” A statement would fall in the “Negative Statement” category if it highlighted a debilitating or negative effect stress has on people. An example from the data would be “Being stressed is bad for your well-being and health.” Lastly, a statement would fall in the “Neutral or Unclear Statement” category if the statement about stress was either neutral or it was not clear whether the participant meant it in a positive or negative way. Examples from the data would be “Anxiety.” Here, it is unclear whether the participant meant that stress has positive or negative effects on anxiety or whether they meant that it can cause anxiety. Another example of this category would be “Learn how to utilize it.” Again, it is not fully clear as to whether the participant saw this as something positive or negative.

Coding was done by the researcher and a second coder, specifically a University of Twente psychology student who was not otherwise involved in the research. As described as appropriate by Kottner et al. (2011), the second coder was representative of the sample. She was female, German, and a student, similarly to most participants in the sample. Cohen’s Kappa was calculated to assess the inter-rater reliability for the three categories respectively and combined and for only the positive and negative statements combined. The inter-rater reliability was substantial for the positive statements ($\kappa = .77$; $p < .001$), the negative statements ($\kappa = .78$; $p < .001$), and the neutral statements ($\kappa = .68$; $p < .001$). Reliabilities were substantial for all three categories combined ($\kappa = .69$; $p < .001$) and for only the positive and negative statements combined ($\kappa = .70$; $p < .001$), as well (Landis & Koch, 1977).

**Procedure**

Approval was obtained from the ethical committee of the University of Twente. The data collection period lasted four weeks. It started on the 9th of April and was closed on the 5th of May. Participants could enter the present study by following either a direct link to the survey on Qualtrics or via the SONA system as used by the University of Twente, which lead to the survey on Qualtrics. Participants were first provided with an informed consent form (Appendix A). After accepting it, they were able to begin the study. During the first pre-test, participants were asked to enter a personal code to enable the researchers to identify each respondent’s first and second responses. They were then asked to provide information on their demographics, such as sex or occupational status. Next, they were asked to fill out the survey which took approximately 20 minutes. Towards the end of the pre-test, each participant was randomly assigned to one of the three conditions through the randomisation feature of Qualtrics. The conditions were, namely, the stress-is-enhancing condition (SIE), the stress-is-debilitating condition (SID), and the control group (CG).

Six videos featuring information on stress were used as manipulation between the pre- and post-test (Appendix B). Participants in the SIE condition watched three of those videos which presented only positive aspects of stress. Such information included, for instance, the positive influences on learning processes stress can have. Participants in the SID condition watched three videos that featured only information on negative aspects of stress, such as long-term health detriments. Participants in the control condition were asked to only fill out a short filler questionnaire instead. The videos were between two and four minutes long and the filler questionnaire featured 3 questions and approximately took 1 minute (Appendix C). The videos and filler questionnaire were presented first immediately after the first administration. Three days after the pre-test, each participant received an email containing a link to either a video on positive aspects of stress (SIE), a video on negative aspects of stress (SID), or the filler questionnaire (CG) depending on their condition. Three days after that, they received the last email containing a link to either the third video on positive aspects of stress (SIE), a video of negative aspects of stress (SID), or the filler questionnaire (CG) and were then redirected to the post-test. Lastly, participants were thanked for participation and could exit the study.

**Data Analysis**

After the data collection period, the raw data were obtained from Qualtrics. SPSS 24.0 was used to analyse the data. First, descriptive statistics were computed. These included, means, aggregated means, standard deviations, skewness, and Cronbach's alpha for the MHC-SF and SMM-G scores. The scores on the MHC-SF and SMM-G post-test were checked for normality using the Shapiro-Wilk test and homogeneity of variances was examined using Levene's test. Statistical significance was set at $p < .05$. Boxplots were created to check for outliers on both variables in the post-test. Correlations between the aggregated means, age, sex, and nationality were computed. Next, A one-way ANOVA was run on age for the three conditions to check whether randomisation was successful. Additionally, a Chi-Square analysis was conducted on sex and condition. To test whether manipulation was successful, a repeated measures ANOVA with a Bonferroni post-hoc analysis was conducted on the pre- and post-test of the SMM-G as the within-subjects variable and the condition as the between-subjects variable. Additionally, a paired-samples t-test was conducted on the SMM-G pre- and post-test scores in the control group.

To investigate which mindset is the default mindset, first, a one-way ANOVA was run on SMM-G post-test scores between the three conditions with the addition of a Games-Howell post-hoc test. The control group was not manipulated and, thus, would resemble people with

the default mindset. The SIE and SID conditions were manipulated towards a stress-is-enhancing and stress-is-debilitating mindset, respectively. A score below three on the 5-point scale indicates a stress-is-debilitating mindset (Crum et al., 2013). If the SID and CG conditions both scored on the debilitating side of the scale without significant differences, it would indicate that participants in both conditions hold more of a stress-is-debilitating mindset. Additionally, if the SIE condition showed a significantly higher score on the SMM-G as compared to the other two conditions, it would indicate that only in this condition people showed more of a stress-is-enhancing mindset. Thus, combined these two cases would indicate that the stress-is-debilitating mindset is the default mindset.

Secondly, after coding, a repeated measure ANOVA was run on the number of positive and negative statements as the within-subjects variable and the condition as the between-subjects variable. It was assumed that people would recall negative information about stress more readily than positive information, due to the negative portrayal of stress in scientific literature and the media (Crum et al., 2013; Schneiderman et al., 2005) and confirmation bias (Nickerson, 1998). As such, it was assumed the second hypothesis would be supported if the following cases were found: (1) Overall, more negative statements are made than positive ones. (2) The number of positive statements in the SIE condition is smaller than the number of negative statements in the SID condition. (3) The difference between the number of positive and negative statements in the SIE condition is smaller than the difference between positive and negative statements in the SID condition. Additionally, to examine whether these two conditions differed in the number of positive and negative statements, one-way ANOVAs were run.

To examine differences in self-reported mental health scores between the three conditions, a one-way ANOVA was run on the MHC-SF post-test scores. Differences between groups would indicate that mental health differs based on the stress-mindset one holds and call for a post hoc analysis to examine where those differences lie. As the data was not normally distributed but negatively skewed, a reflection and a log-transformation were conducted. This did not change the outcome. No exact norm tables exist for the MHC-SF. However, According to Keyes (2002), an individual is *flourishing* in life if they show a high level on at least one measure of emotional well-being and on at least six measures of positive functioning. Individuals are *languishing* vice versa. Cases in between are *moderately mentally healthy* (Keyes, 2002). Looking at mean scores instead, an individual would, thus, have to obtain mean score of at least three to be flourishing.

## Results

### Preliminary Analysis

On the SMM-G, participants scored consistently on the debilitating side of the scale (Crum et al., 2013) in both the pre- and the post-test. The only exception was the SIE condition ($M$ = 3.15; $SD$ = .8) in the post-test (Table 1). Participants were flourishing (Keyes, 2002) on both administrations both overall and in the three conditions respectively (Table 1).

To test whether the scores on stress-mindset and mental health were normally distributed, the Shapiro-Wilk test was employed. For stress-mindset, the results were not significant ($p$ = .108), indicating that the data was normally distributed. For mental health, the results were significant ($p$ < .001), indicating that the data was not normally distributed. Levene's test was employed to examine the homogeneity of variance. For stress-mindset, the results were significant ($p$ = .028), which indicates that there was no homogeneity of variance. For mental health, the results were not significant ($p$ = .568), indicating homogeneity of variance.

No significant correlations were observed, between the demographical variables age, sex, and nationality and the aggregated means of MHC-SF and SMM-G scores. The only exception is a minuscule negative correlation between sex and age (Table 2).

Table 1

*Number of Participants (n), Mean Scores (M), and Standard Deviations (SD) of all Participants on the Mental health and Stress-Mindset Scales in the Pre-Test and Post-Test*

| | Overall | | | SIE | | | SID | | | CG | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Measure | *n* | *M* | (*SD*) | *n* | *M* | (*SD*) | *n* | *M* | (*SD*) | *n* | *M* | (*SD*) |
| MHC-$SF_{pre\text{-}test}$ | 72 | 4.14 | (.9) | 23 | 4.08 | (1.0) | 21 | 4.34 | (.9) | 28 | 4.03 | (.9) |
| SMM-$G_{pre\text{-}test}$ | 72 | 2.77 | (.8) | 23 | 2.86 | (.6) | 21 | 2.74 | (.6) | 28 | 2.71 | (.6) |
| MHC-$SF_{post\text{-}test}$ | 72 | 4.22 | (.9) | 23 | 4.23 | (.9) | 21 | 4.42 | (.7) | 28 | 4.06 | (1.0) |
| SMM-$G_{post\text{-}test}$ | 72 | 2.69 | (.8) | 23 | 3.15 | (.8) | 21 | 2.28 | (.6) | 28 | 2.59 | (.6) |

**Randomisation and Manipulation Check**

A one-way ANOVA was conducted on age across the three conditions to examine whether randomisation was successful. No significant differences were found on either variable across the three conditions ,$F_{age}(2,69)=.24$; $p_{age}=.79$; $F_{sex}(2,69)=.55$; $p_{sex}=.58$. This indicates that the randomisation was successful. Furthermore, the results of the Chi-Squared test of Association (2x2) show that there was no significant association between sex and participants'

Table 2

Inter-correlations between Demographical Characteristics, Mental health, and Stress-Mindset

| Variables | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Age | | -.29* | .06 | .05 | .04 |
| Sex | | | -013 | -.06 | -.11 |
| Nationality | | | | .11 | -.20 |
| Mental Health | | | | | -.07 |
| Stress-Mindset | | | | | |

* $p < .05$

[a] $N=72$

condition, $X^2(2, N = 72) = 1.13$, $p = .568$. This also indicates that the randomisation was successful.

To check whether manipulation was successful, a repeated measures ANOVA was conducted on the pre- and post-test of the SMM-G as the within-subjects variable and the condition as the between-subjects variable. There was no significant effect of time, Wilks' Lambda = .97, $F(1, 69) = 2.39$; $p = .127$, while there was a significant effect of interaction between time and condition, Wilk's $\lambda = .76$, $F(2,69) = 10.76$; $p < .001$. The Bonferroni post-hoc analysis revealed significantly more enhancing stress-mindsets in the SIE condition as compared to the SID condition ($M_{difference} = .496$; $p = .020$). There were no significant differences between the CG and SIE conditions ($M_{difference} = .354$; $p = .107$) and the CG and SID conditions ($M_{difference} = .142$; $p = 1.0$). No significant difference in SMM-G scores in the control group were found between the pre- ($M = 2.71$, $SD = .6$) and post-test ($M = 2.59$, $SD = .59$; $t = 1.88$, $p = .071$) . This indicates that the manipulation was successful.

**Hypothesis Testing**

**Hypothesis 1 – Analysis of Stress Mindset.** A one-way ANOVA on stress-mindset revealed a significant difference between one or more conditions ,$F(2.69) = 9.45$; $p < .001$. A Games-Howell post hoc analysis showed no significant difference between the SID and CG conditions ($M_{difference} = .314$; $p = .157$). Additionally, scores in the SIE condition were significantly higher than in the SID ($M_{difference} = .872$; $p = .001$) and the CG condition ($M_{difference} = .558$; $p = .029$). This supports the first hypothesis that the stress-is-debilitating mindset is the default mindset.

**Hypothesis 1 – Analysis of Statements.** A repeated measure ANOVA on the positive and negative statements as the within-subjects variable and the condition as the between-subject variable showed that valence had no significant effect on the number of positive or negative statements a participant made, Wilk's $\lambda = .94$, $F(1, 42) = 2.77$, $p = .104$. A significant interaction effect of valence and condition was found, Wilk's $\lambda = .55$, $F(1, 42) = 34{,}13$, $p = <.001$. Overall, there were more negative statements than positive statements. Furthermore, there were fewer positive statements in the SIE condition than negative ones in the SID condition (Table 3). Lastly, the difference between the number of positive and negative statements was smaller than in the SID condition (Figure 1). A one-way ANOVA revealed significant differences in average number of positive statements, $F(1, 42) = 9.25$; $p < .05$, and negative statements, $F(1, 42) = 26.55$; $p < .001$, between the two conditions. This also supports the first hypothesis.

Table 3

*Number of Positive and Negative Statements*

| Condition | Positive Statements | | | Negative Statements | | |
|---|---|---|---|---|---|---|
| | n | M | (SD) | n | M | (SD) |
| SIE | 33 | 1.43 | (2.0) | 8 | .35 | (.9) |
| SID | 2 | .10 | (.4) | 43 | 2.05 | (1.3) |
| Total | 35 | .80 | (1.6) | 51 | 1.16 | (1.4) |

**Hypothesis 2.** A one-way ANOVA on self-reported mental health scores in the post-test showed no significant differences between the three conditions, $F(2,69) = .97$; $p = .383$. A reflection and log-transformation of the data did not yield different outcomes. This does not support the second hypothesis that individuals who hold a stress-is-enhancing mindset show better mental health as compared to individuals who hold a stress-is-debilitating mindset.

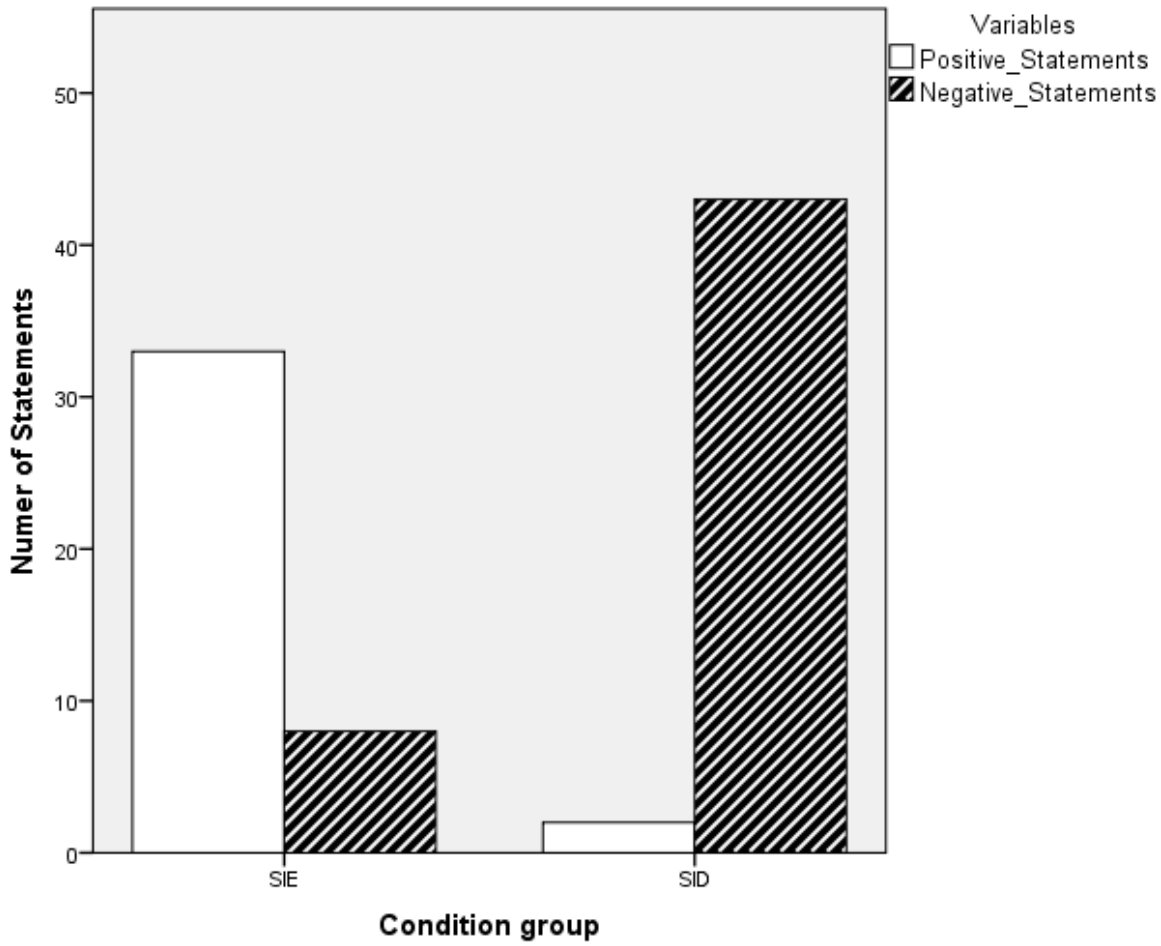


*Figure 1*: Number of positive and negative statements per condition.

## Discussion

The purpose of the present research was to investigate people's stress-mindsets and people's mental health based on their stress-mindset. Precisely, the aim was to examine what stress-mindset people hold by default and to examine whether individuals who hold a stress-is-enhancing mindset differ in mental health in comparison to individuals who hold a stress-is-debilitating mindset. The first hypothesis was that people hold a stress-is-debilitating mindset by default. The second hypothesis was that individuals who hold a stress-is-enhancing mindset show better mental health as compared to individuals who hold a stress-is-debilitating mindset. The results supported the first but not the second hypothesis.

Individuals in the SID and CG conditions showed no differences in stress-mindset. Both conditions scored lower on stress-mindset as compared to the SIE condition. Only the latter condition showed a stress-is-enhancing mindset in the post-test. Concerning the number of positive and negative statements, all three expected cases occurred. The results suggest that people hold a stress-is-debilitating mindset by default. This finding fits in the framework of confirmation bias (Nickerson, 1998) considering the negative portrayal of stress in scientific

literature and the media (Crum et al., 2013). As such, as stress is mostly portrayed negatively in scientific literature and the media (Crum et al., 2013), it makes sense that people hold a stress-is-debilitating mindset by default as they are presented with more negative information about stress than positive information. Examining previous research, this had so far only been speculated (Crum et al., 2013). Thus, these findings add new knowledge to the pool of information on stress-mindsets. Furthermore, this may have problematic implications for daily life. Marten (2017) found that the stress-is-debilitating mindset and stress-is-enhancing mindset influenced the amount of distress and eustress people perceive, respectively. Considering the present findings, most people will, therefore, suffer from serious negative health effects when experiencing stress, as stress has been linked to, for instance, the six most common causes of death (Crum et al., 2013; Schneiderman et al., 2005). On the upside, these findings imply that changing stress-mindsets can serve as a new approach to dealing with stress-related diseases and health issues. More importantly, it opens a whole approach to preventing such diseases, as a change in stress-mindset towards a stress-is-enhancing mindset brings about health benefits (Crum et al., 2017; Crum et al., 2013; Marten, 2017).

Contrary to expectations, the SIE and SID conditions showed no differences in mental health. Since the scores on mental health were not normally distributed, this finding needs to be treated with caution. This finding does not support previous research. A stress-is-enhancing mindset is connected to fewer symptoms of depression and anxiety and greater satisfaction with life (Crum et al., 2013). It is possible, that stress-mindset is only relevant for mental health when faced with specific stressors or in times of general high stress. For instance, individuals who hold a stress-is-enhancing mindset show more positive emotions when faced with a stressor (Crum et al., 2017). Similarly, Jiang, Zhang, Ming, Huang, and Lin (2019) found that adolescents who hold a stress-is-enhancing mindset had a smaller tendency to experience depression when faced with stressful life events. Thus, it is possible that mental health does not significantly differ between individuals who hold a stress-is-enhancing mindset do not differ from their counterparts when they are not faced with specific stressors or stressful times. In line with this, another possible explanation for the findings is that people with different stress-mindsets only show differences in mental health over longer periods of time. Considering the prevalence of stress (Saleh et al., 2017), people likely face more stressful events and situations over extended periods of time. If people held a stress-is-enhancing mindset for a long time, they would be affected by stress in more adaptive ways during this time while their stress-is-debilitating counterparts would be affected maladaptively (Crum et al., 2013). This could then

result in differences in mental health. Thus, it is possible that the period of one week between administrations of the MHC-SF was not enough to find differences.

**Limitations**

The sample size in the present study was low. This is especially true for the three conditions, respectively. There is a chance that the findings were at least partly due to, for instance, specific characteristics in the sample. Thus, the findings are disputable and cannot be generalised without caution.

Secondly, there was no follow-up measure. The question remains as to how enduring the changes in mindset were. It is possible that the changes in stress-mindset in the post-test were due to, for instance, recency effect as participants in the SIE and SID conditions watched the last videos on stress shortly before the post-test. The respective stress-mindsets as found in the post-test may represent more of a short-lived, extrinsic change rather than a deep-seated change in attitude. If changes in stress-mindset were short-lived rather than internalised, this possibly had an influence on the lack of found differences in mental health scores as well. A follow-up measure would indicate whether the change in stress-mindset was enduring and, thus, make the findings more reliable.

Furthermore, participants were not faced with specific stressors in the present study. As such, the possibility remains that they experienced no stressful events between the pre- and post-test. It seems likely that differences in stress-mindset do not influence stress-related outcomes when no stress is experienced.

Lastly, the observed differences in stress-mindset between the SIE and SID conditions were significant but relatively small. It remains possible that individuals who show greater differences in stress-mindset exhibit differences in mental health.

**Implications for Future Research**

Future research in this regard should look to confirm the present results. As such, the study should be repeated across a longer time period, with a larger sample size and a follow-up measure and to ensure an enduring change in stress-mindset and more reliable results. Especially the findings concerning mental health should be further examined, as previous research seems to indicate that holding a stress-is-debilitating mindset is good for at least certain aspects of mental health (Crum et al., 2017; Crum et al., 2013).

The present study indicates that the stress-is-debilitating mindset is the most common in society. Considering research findings on the negative effects of this mindset (Crum et al.,

2017; Crum et al., 2013) this is likely to have negative repercussions on our lives. Thus, future research should further investigate how lasting change in stress-mindsets can be achieved through interventions. A possible intervention could entail elements similar to the manipulation in the present study. However, it should last for a long time and include elements apart from videos. Such an element could be a variation of the *three-good-things exercise* (Seligman, Steen, Park, & Peterson, 2005). In this exercise, participants list three good things about their day every night. This exercise has been shown to improve well-being and decrease symptoms of depression (Seligman et al., 2005). It is conceivable that a similar exercise where people capture three good things about stress on a regular basis could result in lasting changes in stress-mindset. This assumption should also be tested in future research.

## Conclusion

The present research indicates that people hold a stress-is-debilitating mindset by default. This finding along with previous research on the detriments of this mindset call for a change in the way we perceive and possibly in the way we portray stress. According to the present findings, people with different stress-mindsets do not differ in mental health. Considering previous research, this finding has to be treated with caution.

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*(Appendices follow)*

# Appendix A

## Informed Consent Form

### Informed Consent

Dear participant,

We would like to express our gratitude for taking part in this study

You are invited to take part in a research project on the subject of stress. This research project is conducted by third-year psychology undergraduate students at the University of Twente as part of their bachelor's theses.
Participation in this study is completely voluntary. There will not be any negative consequences should you decide not to participate. Please be aware that if you decide to participate, you can stop participation at any point in time without giving a reason.
For this study, you will first be asked to fill out a questionnaire. This will take approximately 20-30 minutes. You will be asked questions about your attitude towards stress and your well-being. Sample questions include: "Experiencing stress enhances my performance and productivity" or "How often have you experienced or felt interested in life?" Some participants will be asked to watch a short video about stress in the course of the questionnaire. On the fourth day after completion, these participants will receive a second short video via email, which they will be asked to watch, as well. Other participants will receive a second, very short questionnaire. Lastly, on the seventh day after completion of the first survey, all participants will receive an email containing a link to a second survey, which they will be asked to fill out. For some participants, this will again contain a short video. The second questionnaire will take approximately 20-30 minutes as well. The videos are all between 2 - 3 minutes long.

Your responses will be kept confidential, and we do not collect identifying information such as your IP address. Your email address will be saved to enable the researchers to send follow-up emails. Your email address will be kept confidential. In case you want further information regarding the findings of the study, you can contact the researchers through the mail m.bosman@student.utwente.nl. All information is anonymised and will be kept confidential. All data is stored in a password protected electronic format. The results of this study will be used for scholarly purposes only and may be shared with University of Twente representatives.

We would like to appeal to your honesty in answering the questions. This will provide us with the best possible data for our research and the value it carries.
Once again, we would like to express our greatest gratitude for your time, effort and honesty.

By clicking 'I agree', you indicate that you have read the description of the study, are over the age of 18, and that you agree with the terms as described.
In case of further questions, please contact (m.bosman@student.utwente.nl).
Thank you in advance for your participation!

Mick Bosman
Linda Lorenz
Marie Miebert
Luca Rüter genannt Holthoff

*(Appendices continue)*

## Appendix B

## Videos

| Mindset | Enhancing | Debilitating |
|---|---|---|
| Title | Cognitive Performance | |
| ReThinking Stress: Stress and Performance | Benefits of stress to performance; adrenaline; enhancement of focus, decision making, memory cognitive performance<br><br>Used in Crum et al. (2017) | Detriments of stress to performance; adrenaline; diminishment of cognitive performance, capacity to solve problems<br><br>Used in Crum et al. (2017) |
| ReThinkStress | Benefits of stress to learning and growth; cortisol; heightened attention and focus lead to improved learning and growth<br><br>Used in Crum et al. (2013) | Detriments of stress to learning and growth; cortisol; heightened attention and focus lead to excessive awareness of demands and threats<br><br>Used in Crum et al. (2013) |
| ReThinking Stress: Learning and Growth | Benefits of stress to learning and growth; cortisol; heightened attention and focus lead to improved learning and growth<br><br>Used in Crum et al. (2013) | Detriments of stress to learning and growth; cortisol; heightened attention and focus lead to excessive awareness of demands and threats<br><br>Used in Crum et al. (2013) |

*(Appendices continue)*

## Appendix C

## Items and Instructions for the Filler Questionnaire

Please read each item carefully and select the answer option which comes closest to how you are feeling **at this moment.**

1) How are you feeling today?

- Very Good
- Good
- Neutral
- Bad
- Very Bad

2) How satisfied are you with the weather today?

- Very satisfied
- Satisfied
- Neutral
- Dissatisfied
- Very dissatisfied

3) Have you made a pleasurable experience today?

- Yes
- No

Please click 'Finish' below to finish the survey

- Finish