Master thesis

# Does a stress mindset video improve mental well-being via an increase in internal locus of control? A randomized controlled trial.

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**Abstract**

*Background:* Brief online video interventions have the potential to reach and inform many people about the benefits of stress on performance and health. Such videos can elicit a stress-is-enhancing mindset. The aim of the current study was to examine the influence of a stress mindset video on stress mindset, mental well-being and internal locus of control and whether internal locus of control mediates the effect of a stress mindset video on mental well-being.

*Methods:* In this randomized controlled trial, 136 participants watched either a brief video about the positive effects of stress or a scam control video about an ethical theory. Participants completed online self-report questionnaires at baseline, post-test and 1-week follow-up.

*Results:* Watching a video about positive effects of stress improved participant's stress mindset more compared to a control video, $F(1, 134) = 16.39$, $p < .001$, $d = 0.40$. However, the stress-is-enhancing video had no significant effect on mental well-being compared to the control video and there was no evidence for a mediation by internal locus of control. Internal locus of control had a direct enhancing effect on mental well-being ($b = -.47$, $p < .001$). At baseline, internal locus of control correlated moderately with stress mindset ($r = .41$) and weakly with mental well-being ($r = .21$).

*Discussion:* The increase of stress mindset after watching the stress-is-enhancing video was larger than in other studies. This may be due to the low baseline stress mindset of the control group in the current study. Contrary to previous research, I measured not only emotional but also psychological and social well-being. This might explain that contrary to earlier research, the stress-is-enhancing video did not improve mental well-being. The moderate correlation between stress mindset and internal locus of control shows that the two constructs are related. The nature of this relationship should be further examined in future research.

*Limitations:* Firstly, the stress-is-enhancing video did not comply with modern design standards. Secondly. the study did not control for levels of stress, which might have provided an explanation for the divergence from previous study's results. Thirdly, using a stress-specific internal locus of control scale would have fitted the aim of the study better.

*Conclusions:* The current study added to research indicating that brief online video interventions can improve stress mindset. Results indicated that the video about the positive effects of stress has no impact on mental well-being and that internal locus of control has no mediating effect on this.

## Introduction

"Why mindset matters" – with this and similar slogans, researchers like Carol S. Dweck share their findings about mindsets online with lay-people on digital media platforms such as Vimeo and Youtube (Worldview, 2018). Dweck appears to use digital media for building a bridge that explains her research to the general public (Worldview, 2018). Via brief informational videos, the general public can learn about mindset research findings. Similar videos about the benefits of growth mindsets have led to beneficial effects regarding health and performance on participants in experimental settings (for an overview of growth mindset research see Dweck & Yeager, 2019). If findings of mindset research would generalize to online real life settings, videos as "Why mindset matters with Carol Dweck" (Worldview, 2018) would have a substantial potential to provide a wide range of the population with effective, cheap and easily accessible video-interventions about mindsets. The current study aims to contribute to this by improving an existing video about the beneficial effects of stress and investigating the video's effect on stress mindset, mental well-being and internal locus of control.

However, although digital media may be viewed as a chance to accelerate the transfer of knowledge from science to the general public, research itself remains a slow process and research often needs to be carried out in little steps in order to create solid findings. Regarding mindsets, research appears to be in its beginning. This is reflected in a lack of clear definitions of the concept of mindset: in several influential articles of mindset research, mindsets are described as "beliefs", whereas it is not explained how the concepts of mindsets and beliefs differ (e. g. Crum et al., 2013; Dweck, 2017; Dweck & Yeager, 2019). A more specific definition of mindsets has been published by Crum and Lyddy (2014):

> *"Mindsets are evaluative viewpoints or mental frames that focus attention and organize information in a manner allowing for simplified and automatic functioning in the presence of contradictory or uncertain information."*

Translating Crum and Lyddy's (2014) definition into more general terms, the present study defines mindsets as mental frames that guide cognitions and behaviour. Mindsets are domain specific and research has focussed for example on domains such as intelligence, stress and social judgements (Dweck and Yeager, 2019). A common distinction is made between growth and fixed mindsets. A growth mindset is an evaluative viewpoint, that human attributes can be developed, whereas a fixed mindset evaluates human attributes as stable (Dweck & Yeager, 2019).

Dweck and Yeager (2019) describe two lines of research regarding mindsets, of which the first line examines effects of mindsets on individuals. Across domains, growth mindsets

have been shown to correlate with beneficial outcomes regarding physical and mental health and performance in comparison to fixed mindsets (Dweck & Yeager, 2019.). The second line of mindset research engages with changing fixed mindsets into growth mindsets. Dweck and Yeager (2019) provide an overview of mindset interventions. They discuss that mindset interventions are often directed at individuals instead of groups and the interventions can be face-to-face workshops or short online experiences, such as texts and videos. Moreover, Maarsingh et al. (2019) have let participants play virtual reality games with biofeedback in order to change their mindsets towards a more enhancing one (Maarsingh et al., 2019). Changing fixed into growth mindsets has led to beneficial effects on mental health, such as increased positive affect (Crum et al., 2018), and improved performance, such as higher academic grades (Dweck & Yeager, 2019).

One domain of mindset research is stress. Crum et al. (2013) have provided a definition of a stress mindset:

> *"In the context of stress, one's stress mindset can be conceptualized as the extent to which one holds the belief that stress has enhancing consequences for various stress-related outcomes such as performance and productivity, health and wellbeing, and learning and growth (referred to as a "stress-is-enhancing mindset") or holds the belief that stress has debilitating consequences for those outcomes (referred to as a "stress-is-debilitating mindset")."*

Crum and Lyddy (2014) point out, that scientific evidence exists for both debilitating and enhancing effects of stress on performance and productivity, health and vitality, and well-being, a phenomenon called the "stress paradox" (Crum et al., 2013). The stress paradox states that there is scientific reason to believe that stress is beneficial, while there is also scientific reason to belief that stress is detrimental. Whether a specific experience of stress is more likely to elicit enhancing or debilitating effects depends in part on the stress mindset of the individual. Believing in an enhancing nature of stress increases the likelihood that specific stress indeed has enhancing effects (Jamieson et al., 2018).

Therefore, researchers have developed interventions to elicit stress-is-enhancing mindsets and examined its positive effect on mental well-being. Mental well-being is three-factorial and consists of emotional well-being (such as positive affect), psychological well-being (such as personal growth) and social well-being (such as social acceptance) (Keyes et al., 2008). Several studies showed that a stress-is-enhancing mindset is related to higher levels of general mental well-being (Crum et al., 2013; Jiang et al., 2019; Keech et al., 2018). In an RCT, participants watched either a video suggesting that stress is enhancing or one suggesting that

stress is debilitating (Crum et al., 2013). Their stress mindsets changed accordingly and participants in the stress-is-enhancing video condition had an increased work performance and decreased anxiety and depressive symptoms (Crum et al., 2013). Improving a stress mindset also has beneficial effects on positive and negative affect, proactive behaviour, perceived distress, and academic performance in students with high baseline perceived distress (Keech et al., 2019). Changing stress mindset towards a more enhancing one furthermore leads to more beneficial, protective physiological responses to performance stress than a more debilitating stress mindset (Hogue, 2019). The positive correlation between stress mindset and well-being has been found to be stronger for individuals with certain moderating characteristics, such as higher perceived distress (Keech et al., 2019), certain genetic characteristics (Crum et al., 2018) or female gender (Jiang et al., 2019). For example, in a study in Beijing, China, stress mindset predicted life satisfaction in female, but not male adolescent migrants (Jiang et al., 2019). In sum, there are first indications that eliciting a stress-is-enhancing mindset might improve mental well-being (Jiang et al., 2019; Keech et al., 2018, 2019).

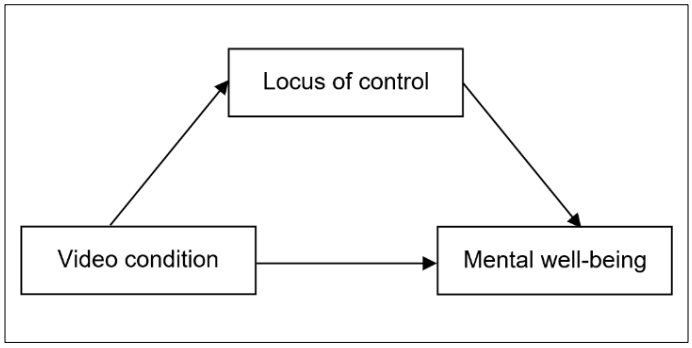
Research has suggested that an increased sense of control over one's life is a mediator of the enhancing influence of stress mindset on mental well-being (Keech et al., 2018; Schleider, et al., 2019). A well-established concept is locus of control. Locus of control is an essential concept in Julian Rotter's (1966) theory of social learning. Rotter's theory (1966) states, that individuals hold generalized expectancies about when reinforcements occur. People with an internal locus of control expect that reinforcements depend on their own behaviour. People with an external locus of control expect that reinforcements depend on external factors, such as for example chance, fortune or powerful others (Rotter, 1966). An internal locus of control has been related to both growth mindset and mental well-being. Regarding mindsets, Burgoyne et al. (2018) suggested a similarity of the constructs of growth mindset and internal locus of control. According to Burgoyne et al. (2018), a mindset reflects "how much control individuals feel they have in their skill development". As a consequence, individuals with a growth mindset may feel more control over their development and therefore have a stronger internal locus of control than those with a fixed mindset. This was confirmed in Burgoyne et al.'s (2018) study, where growth mindset and internal locus of control were positively correlated, and a mindset intervention led to increases of both growth mindset and internal locus of control. It may be hypothesized that analogously to growth mindset, also individuals with a stress-is-enhancing mindset may feel more control over their stress and that stress mindset interventions analogously lead to increases in both stress mindset and internal locus of control. Such a stress-related internal locus of control may in turn motivate individuals to make positive

use of their stress. This could then explain the positive effect of a stress-is-enhancing mindset on mental well-being. In fact, internal locus of control has already been shown to be related to well-being. In a study by Gore et al. (2016), an internal locus of control predicted a higher amount of well-being in undergraduate students. The positive relationship between internal locus of control and well-being has been demonstrated also for domain-specific loci of control and for various nations (Spector et al., 2001; Fröhlich et al., 2007). For example, a work-specific internal locus of control was related to a higher level of job satisfaction, absence of psychological strain, and absence of physical strain in managers in 24 different nations and territories. (Spector et al., 2001). Furthermore, a higher health-related internal locus of control correlated with more emotional well-being in cancer patients (Fröhlich et al., 2007). In sum, research suggests that internal locus of control is related to both growth mindset and mental well-being. To my best knowledge, no one has yet examined whether these relationships can explain that stress-is-enhancing interventions can improve mental well-being. Also, research about the relationship of mental well-being with growth mindset and locus of control has measured emotional but not psychological and social aspects of mental well-being.

Therefore, the aim of this study was to examine the effect of a brief stress mindset video intervention on stress mindset, mental well-being and internal locus of control. To my best knowledge, the present study is the first one to examine the full concept of mental well-being, including emotional, social and psychological well-being (Keyes. 2008) in the context of stress mindset and internal locus of control. Specifically, I hypothesized that [1] watching a brief video about positive effects of stress on health and performance leads to increases in [1a] stress mindset [1b] mental well-being and [1c] internal locus of control compared to watching a control video. Secondly, I hypothesized that [2] the effect of the video on mental well-being is partly mediated by an increase of internal locus of control, see Figure 1.

**Figure 1**

*Hypothesized mediation effect*



## Method

### Study design

This study consists of a double blind randomised controlled trial with a baseline, post- and follow-up assessment and with two conditions: one video about the enhancing effects of stress and one control video. Before data collection, this research was approved by the ethics committee of the University of Twente (request number 191189). All participants gave online informed consent.

**Table 1**

*Baseline characteristics and test of equality of means*

| | Total (n=136) | Experimental group (n=68) | Control group (n=68) | p[a] |
|---|---|---|---|---|
| Age, M(SD) | 34.10 (15.36) | 34.60 (15.19) | 33.60 (15.62) | .706 |
| Gender, n(%) | | | | .878 |
| Female | 87 (64.0) | 44 (64.7) | 43 (63.2) | |
| Male | 47 (34.6) | 23 (33.8) | 24 (25.3) | |
| Education, n(%) | | | | .668 |
| Low | 7 (5.1) | 3 (4.4) | 4 (5.9) | |
| Medium | 51 (37.5) | 28 (41.2) | 23 (33.8) | |
| High | 78 (57.4) | 37 (54.4) | 41 (60.3) | |
| Employment status, n(%) | | | | |
| Payed working | 76 (56.0) | 39 (57.4) | 37 (54.4) | |
| In education | 58 (42.7) | 29 (42.7) | 29 (42.7) | |
| Not working | 12 (8.8) | 4 (5.8) | 8 (12.4) | |
| Stress mindset, M(SD) | 2.87 (.70) | 2.74 (.74) | 3.01 (.62) | .023 |
| Mental well-being, M(SD) | 4.24 (.77) | 4.24 (.81) | 4.25 (.73) | .924 |
| Internal locus of control, M(SD) | 2.17 (.79) | 2.22 (.88) | 2.13 (.69) | .492 |

[a] independent samples t-test for equality of means

**Participants**

A non-clinical sample of 182 German-speaking adults was recruited in September and October 2019 via convenience sampling. Public posts on social media and private messages to acquaintances of the researchers in social media were used. 182 persons signed up online for the study. 136 participants fulfilled the inclusion criteria of providing a valid email address and completing the baseline assessment. The final sample of 136 participants had a mean age of 34.10 (SD = 15.36). Two thirds of the participants were female (64 %) and most participants were highly (57.4 %) or intermediately educated (37.5 %) and either in a payed working position (56.0 %) or in education (42.7 %), see Table 1.

**Procedure**

Figure 2 provides an overview of the procedure. Participants received emails with a link to each survey on the online survey portal Qualtrics. Participants chose voluntarily whether, when exactly and where to fill in the surveys. After baseline assessment (T0), each participant was randomly assigned to either the experimental or the control condition via www.randomizer.org by a researcher not actively involved in recruitment and analysis. One week after the baseline assessment (T1), participants watched either the experimental or the control video and filled in post-manipulation surveys. Two weeks after baseline (T2), participants filled in the follow-up assessments. Reminder emails were sent out twice per assessment period. Participants were able to contact an involved researcher with questions and concerns. Participants who completed the last assessment received debriefing information.

**Conditions**

Each of the two conditions consisted of watching one brief educational video. The videos were similar in length (approximately 3.10 minutes) and form, containing images, German language and music. Both videos have been chosen and designed with the intention of providing convincing and comprehensible information to persons without prior psychological knowledge. The content of the video was different for the experimental and the control group.

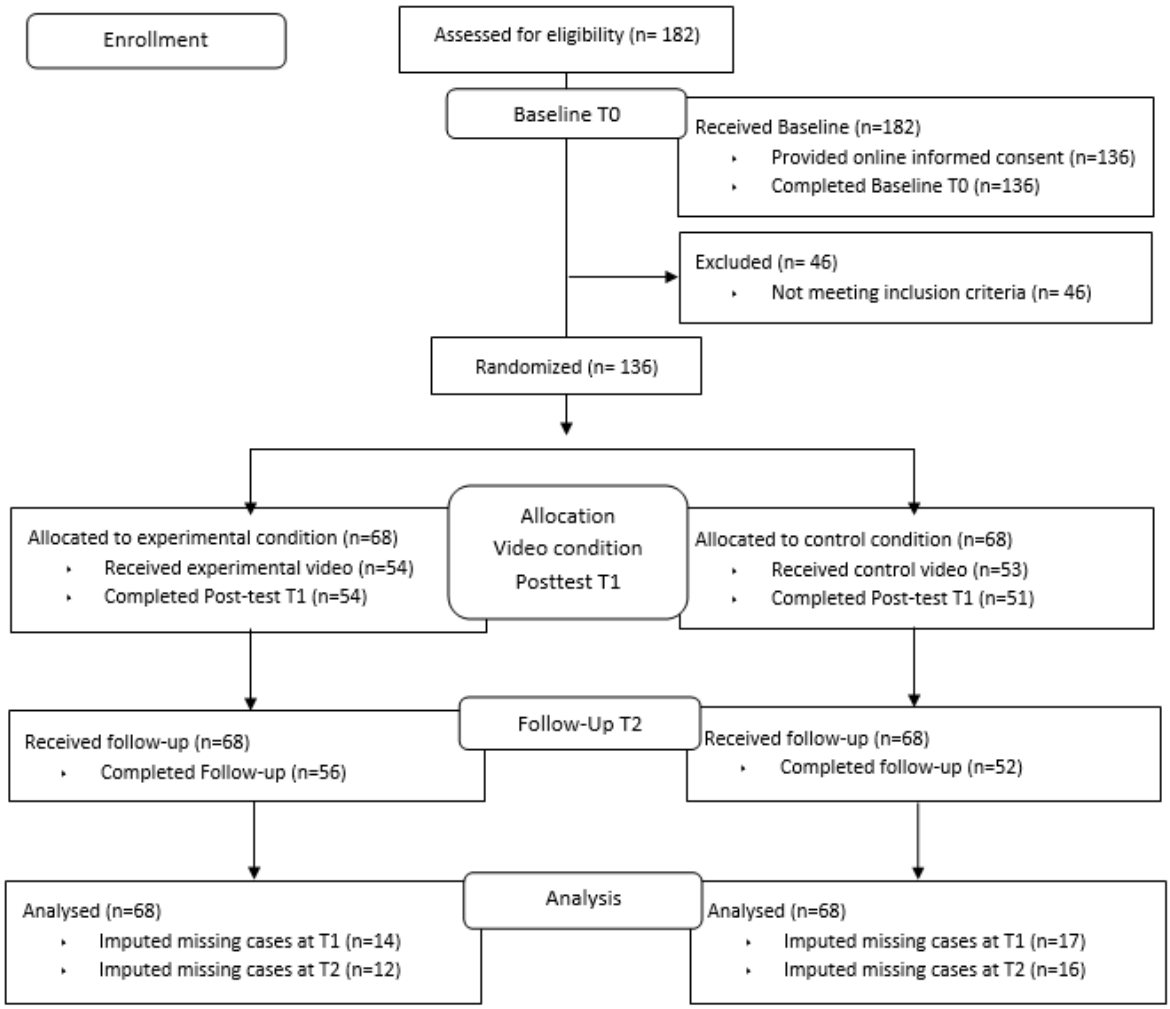
The video in the experimental condition was a transformed version of a video developed by Crum et al. (2017). For the present study, the written language in the video was translated into German and some content was added. The experimental video in the current study explains how the physical stress reaction enhances performance. It provides examples and cites studies which showed positive effects of stress on performance. The video states that stress also enhances health and well-being and that believing in this positive effect of stress increases the

effect. The video was used with the intention of changing participant's stress mindsets towards a more enhancing stress mindset. It can be retrieved from https://youtu.be/R-x0AMOS4g0.

The video in the control condition was retrieved online from https://youtu.be/w91P_m1203Q. The video uses images and spoken language to explain the ethical theory of the categorical imperative as introduced by Immanuel Kant. It states that, according to the categorical imperative, people should act in such a way, that their behaviour could become a general ethical rule. The control video was used with the intention of having no influence on stress mindset, mental well-being and locus of control.

**Figure 2**

*Flow chart of the current study's participants and procedure*



## Measures

**Demographics.** Participants filled in demographic items about their age, gender, education and employment status at baseline assessment.

**Stress Mindset.** The 8-item Stress Mindset Measure - General (SMM-G) was used to assess stress mindset (Crum et al., 2013). The SMM-G measures the subjective belief about whether the effect of stress on health, vitality, performance, productivity, learning and growth is positive or negative and should be utilised or avoided. Participants answered German translations of items like "*Experiencing stress improves my health and vitality"* on a five-point-Likert-scale (1 = "*Strongly disagree*" to 5 = "*Strongly agree*"). After reversing scores of items 1, 3, 5 and 7 for the analysis, higher mean scores were interpreted as indicating a more enhancing stress mindset (Crum et al., 2017). The internal consistency of the SMM-G in the current study was good to excellent (T0: $\alpha$=.88; T1: $\alpha$=.99; T2: $\alpha$= .90) and comparable to earlier measures of internal consistency of the SMM-G (Crum et al., 2013, 2017). In a validation study, the SMM-G has been shown to have a uni-factorial structure and it has yielded satisfactory results regarding criterion and distinctive validity (Crum et al., 2013).

**Mental Well-Being.** A German translation of the 14-item Mental Health Continuum – Short Form (MHC-SF) was used for assessing mental well-being (Keyes et al., 2008). Participants answered items about their perceived frequency of emotional, psychological and social well-being. The items and Likert scale of the MHC-SF were adjusted to ask about the past week instead of month in order to measure differences in well-being over the course of the study. For example, participants answered items like *"During the past week, how often did you feel satisfied with life?"* on a six-point-Likert-scale (1 = "*never*" to 6 = "*almost always*"). Higher mean scores were interpreted as indicating more mental well-being. Internal consistency of the total MHC-SF in the current study was good to excellent (T0: $\alpha$=.89; T2: $\alpha$= .91) and higher than in an earlier study (Keyes et al., 2008).

**Internal locus of control.** A brief version of the Locus of Control Scale was used to assess internal locus of control (Levenson, 1973; Sapp & Harrod, 1993). Participants answered German translations of the 3-item subscale Internal Locus of Control (ILOC; items 1, 2 and 3), including items like "*My life is determined by my own actions*", on a seven-point-Likert-scale (1 = "*strongly agree*" to 7 = "*strongly disagre*e"). Lower values on the ILOC indicated a larger amount of internal locus of control. Internal consistency of the ILOC was acceptable to good (T0: $\alpha$=.74; T1: $\alpha$=.73; T2: $\alpha$= .85) and comparable to earlier measures of internal consistency of the scale (Sapp & Harrod, 1993).

### Statistical Analysis

Data were analysed in IBM SPSS Statistics 26 for Windows and with PROCESS 3.4 (Field, 2013; Hayes, 2017). P-values lower than .05 were determined as significant. Mean scores of stress mindset, mental well-being and internal locus of control were screened for completion. Little's MCAR analysis showed that missings of mean scores at T1 and T2 were random, $\chi^2$ (14) = 16.87, $p$ = .263) and missing mean scores were imputed by Expectation Maximization. Independent samples t-tests were conducted in order to compare baseline characteristics of the experimental and control group. Pearson correlations of baseline outcomes were calculated.

Repeated measures ANOVA and t-tests were used to examine whether the experimental video enhanced the stress mindset, internal locus of control and mental well-being in the experimental group more compared to the control group (1st hypothesis). The 2 x 3 repeated measures ANOVA assed an interaction effect of the between-groups factor Video Condition (1 = stress-is-enhancing video, 0 = control video) and the within-group factor Time (T0, T1, T2). Cohen's *d* effect sizes for ANOVA with multiple groups were calculated on www.psychometrica.de. Plots were used to interpret possible interaction effects. Post hoc paired samples t-tests within the experimental group were used to assess within group changes of stress mindset over time.

In PROCESS (Field, 2013; Hayes, 2017), it was examined whether the stress-is-enhancing video (independent variable: condition) improved mental well-being at T2 (dependent variable) via a mediator variable internal locus of control at T1 (2nd hypothesis). A significant coefficient *b* indicated direct and indirect effects between the variables.

## Results

### Baseline characteristics

Table 1 shows baseline characteristics. The experimental and control group did not differ regarding demographic characteristics, mental well-being and internal locus of control at baseline. However, the control group had significantly more enhancing stress mindsets at baseline than the experimental group, $t$ = 2.30, $p$ = .023. All Pearson correlations at baseline were significant. Higher levels of mental well-being were moderately correlated with higher levels of internal locus of control ($r$ = -.41). Higher levels of mental well-being correlated weakly with higher levels of a stress-is-enhancing mindset ($r$ = .21). Higher levels of a stress-

is-enhancing mindset correlated weakly with higher levels of internal locus of control ($r$ = -.25).

**Interaction effects**

Mean scores of stress mindset, mental well-being and internal locus of control are displayed per assessment point in Table 2. There was a significant Time x Group interaction effect on stress mindset, $F(1, 134) = 16.39$, $p < .001$, $d = 1.04$, indicating a stronger increase of a stress-is-enhancing mindset after watching the stress-is-enhancing video compared to the control video. Figure 3 shows, that stress mindset mean scores increased from T0 to T1 and decreased from T1 to T2 in both the experimental and the control group. However, the changes in stress mindset were larger for the experimental group than for the control group, thus watching the stress-is-enhancing video predicted stronger increases of stress mindset than watching the control video. Post hoc paired samples t-tests within the experimental group showed that the increase in stress mindset over time was significant and large from T0 to T1, $t(0, 67) = -8.87$, $p < .001$, $d = 1.00$, and medium from T0 to T2, $t(0,67) = -6.49$, $p < .001$, $d = -.59$. The Cohen's d values indicate that the increase in stress-is-enhancing mindset was preserved but reduced over time.

There were no significant Time X Condition interaction effects on internal locus of control, $F = .63$, $p = .532$, $d = 0.24$ and mental well-being, $F = .67$, $p = .416$, $d = 0.09$. Thus, watching the stress-is-enhancing video had no effect on internal locus of control or mental well-being.

**Mediation analysis**

The results of the mediation analysis are displayed in Figure 4. There was no significant effect of watching a video about the benefits of stress on mental wellbeing, neither directly, $b = .10$, $p = .395$, nor indirectly via internal locus of control, $b = -.05$; 95% BCa $CI$ [-.16, .05] compared to watching a control video. Also, the stress-is-enhancing video had no effect on internal locus of control compared to the control video, $b = .12$, $p = .307$. However, a stronger internal locus of control at T1 predicted increases of mental well-being at T2, $b = -.47$, $p < .001$. Thus, no evidence was found for the hypothesis that watching a video about the benefits of stress increases mental well-being via increasing internal locus of control.

**Table 2**

*Means and standard deviations of total scores of stress mindset, internal locus of control and mental well-being and repeated measures Time x Condition ANOVA interaction effects*

| | | Total sample | Experimental group | Control group | | | |
|---|---|---|---|---|---|---|---|
| | | *M (SD)* | *M (SD)* | *M (SD)* | *F* | *p* | *d* |
| Stress mindset | T0 | 2.87 (.70) | 2.74 (.74) | 3.01 (.62) | | | .40 |
| | T1 | 3.33 (.68) | 3.46 (.70) | 3.19 (.64) | 16.39 | <.001 | .40 |
| | T2 | 3.14 (.68) | 3.17 (.72) | 3.11 (.64) | | | .09 |
| Mental well-being | T0 | 4.24 (.77) | 4.24 (.81) | 4.25 (.73) | .67 | .416 | .01 |
| | T2 | 4.20 (.76) | 4.23 (.86) | 4.18 (.65) | | | .06 |
| Internal locus of control | T0 | 2.17 (.79) | 2.22 (.88) | 2.13 (.69) | | | .11 |
| | T1 | 2.22 (.66) | 2.28 (.82) | 2.17 (.44) | .63 | .532 | .17 |
| | T2 | 2.31 (.77) | 2.30 (.79) | 2.31 (.76) | | | .01 |

**Figure 3**

*Mean stress mindset per video condition and assessment time*

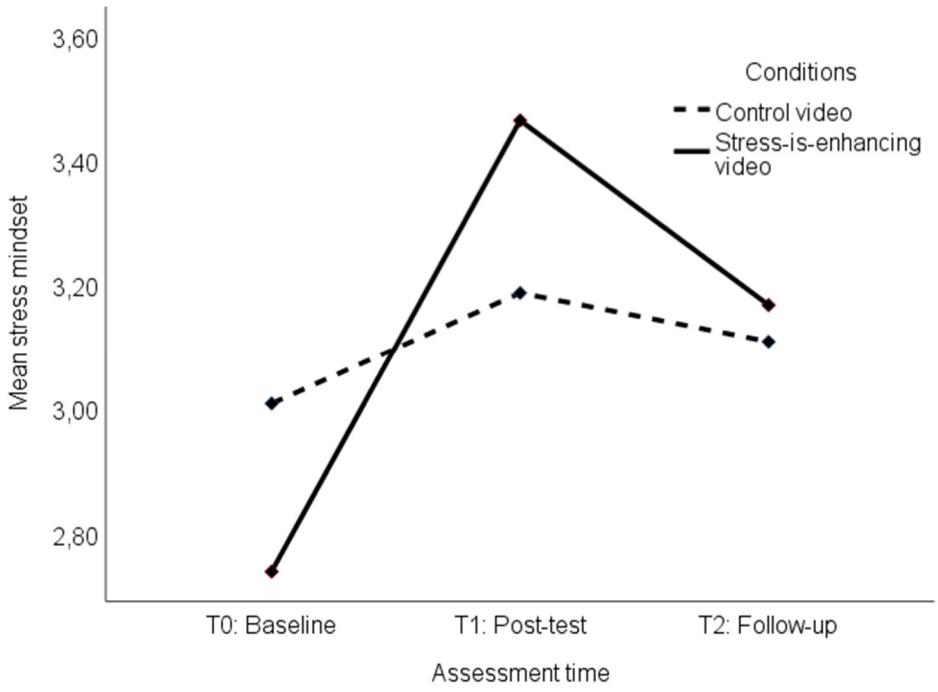
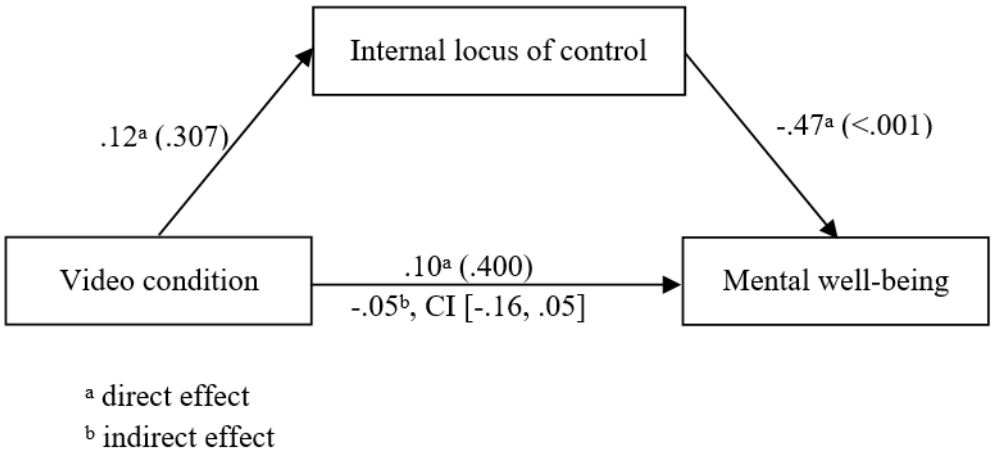


**Figure 4**

*Results of mediation analysis, b(p).*




## Discussion

The aim of this study was to examine the relationship between stress mindset, internal locus of control and mental well-being. Results demonstrated that watching a brief video about positive effects of stress increased participant's stress-is-enhancing mindset more compared to watching a control video. However, the video had no significant effect on internal locus of control and mental well-being. In addition, no evidence was found for the hypothesis that internal locus of control mediates the effect of stress mindset on mental well-being.

The stress-is-enhancing video of the current study was as effective in improving stress mindset as in Crum et al, 2017, where the video was first used. Compared to the videos used in Crum et al. (2013), the video of the current study led to a larger increase of stress mindset. This is remarkable, because Crum et al. (2013) had shown three videos to the participants. The current study's larger effect at post-test can be explained by the fact that the experimental group's stress mindset was significantly lower than the control group's stress mindset at baseline, so the experimental group had more room to grow than the control group in the current study. A further explanation is, that I assessed the raise of stress mindset directly after the experimental induction and Crum assessed it two to three days later. This indicates that showing one video about the positive effects of stress is sufficient to increase, but not to maintain a stress-is-enhancing mindset. Future research should focus on improving the quality of the video in order to see whether the increase of the stress-is-enhancing mindset can be maintained to follow-up.

In line with earlier research (Crum et al., 2013), the current study found a weak correlation between stress mindset and mental well-being. Contrary to earlier research (Jiang et al., 2019), the current study did not find an effect of the stress-is-enhancing video on mental well-being. This can be explained firstly by the relatively high baseline level of mental well-being compared to prior studies (Keyes et al., 2008): due to a ceiling effect, the sample might have required a more intense intervention to further improve mental well-being than a sample with lower baseline levels of mental well-being. A second explanation that the stress-is-enhancing video did not improve mental well-being in the current study is that I measured the full construct of mental well-being, including emotional, psychological and social well-being, while prior studies focussed solely on emotional well-being. Baseline stress levels might be another explanation that improving stress mindset led to improved levels of mental well-being in Jiang's (2019) study but not in the current study: Jiangs's (2019.) sample was assessed during a particularly stressful life event, while the current study did not control for participant's stress levels. Therefore, Jiang's participants might have been more prone to making active use of their improved stress mindset, which could explain their raise in mental well-being. Future research could examine whether stress levels mediate the influence of a stress-is-enhancing video on mental well-being.

Another possibility is that the previously found effect of stress mindset on mental well-being is not direct but indirect via a mediator variable, which has not yet been identified. For instance, maybe an intervention is only effective when it raises both stress mindset and internal locus of control. In the case of the current study, only stress mindset was increased. Thereby, participants have developed more positive beliefs about stress, but possibly did not get a stronger sense of how they could control the effects of stress, because their internal locus of control did not increase. A sense of control over the effects of stress might however be necessary to increase mental well-being. Indeed, internal locus of control did significantly predict mental well-being in the current and previous studies (Fröhlich et al., 2007; Gore et al., 2016; Spector et al., 2001). Therefore, although the video in this study did not show an effect on internal locus of control, there is still reason to further examine the role of internal locus of control in the domain of stress mindset and well-being.

**Strengths and limitations**

The present study contributes to mindset research in various ways. Firstly, to my best knowledge, this is the first study that examined the relationship between all three of stress mindset, mental well-being and internal locus of control. Secondly, measuring the complete

construct of mental well-being (emotional, psychological and social well-being) was innovative compared to prior studies about internal locus of control. Thirdly, the present study used a strong design with a randomized controlled trial and a scam video as control condition. Finally, for the current study, a German version of the stress-is-enhancing video has been developed and proven effective in improving stress mindset.

A weakness of the current study was the design of the stress-is-enhancing video. Although the video was effective, its design did not match modern standards and its content could better be transmitted in a more convincing form. Furthermore, the study did not control for stressful life events and current stress levels, which might have influenced the results, because high baseline levels of perceived distress strengthen the relationship between stress mindset and mental well-being (Keech et al., 2019). Finally, the use of the Internal Locus of Control Scale and the Stress Mindset Measure may not have been fully adequate to measure the theorised concepts in this study. The Locus of Control Scale assesses general, but not stress specific internal locus of control. The Stress Mindset Measure distinguishes clearly between positive and negative effects of stress in its items but does not provide a corresponding cut-off score for a stress-is-enhancing mindset.

**Future research**

Future research can further improve the stress-is-enhancing video intervention to also reach sustainable effects on mental well-being and internal locus of control. Pilot studies could be implemented to check whether small changes of the stress-is-enhancing video, like using spoken instead of written language, lead to effects on internal locus of control and mental well-being. Also, future research could examine whether a text with the same content leads to similar effects as the video. Moreover, future research about stress mindset and internal locus of control could use different measures in order to measure the concepts more specifically. Firstly, I recommend using a stress-specific scale of internal locus of control in future research. Stress-specific internal locus of control might be a stronger mediator of a stress mindset – mental well-being relationship and it might more easily be improved by a stress mindset intervention (Norman & Bennett, 1996). Secondly, the Stress Mindset Measure might be improved by allowing more nuanced answers. For example, it should be possible to indicate a belief in both negative and positive effects without sounding contradictory. Finally, future research could analyse the subscales of the Mental Health Continuum (psychological, emotional and social well-being) and examine whether a stress mindset intervention improves some aspect of mental well-being more than others.

To conclude, the current study added to research indicating that a brief online video can improve stress mindset. Results indicated that the video about the positive effects of stress has no impact on mental well-being and that internal locus of control has no mediating effect on this.

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