Brief Report

Associations between Stress Mindset and Changes in Positive Affect during a Speech Task: A Preliminary Study

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Abstract: A stress mindset is an individual's belief that stress has either enhancing (stress-is-enhancing mindset: SEM) or debilitating (stress-is-debilitating mindset: SDM) consequences. This study examined the associations between SEM and changes in positive affect during a speech task using a sample of 32 Japanese college students as participants. It was hypothesized that participants with SEM would show a greater increase in positive affect over time than those with SDM. The participants rested for three minutes, prepared for three minutes, delivered a speech about themselves in front of an evaluator and video camera (task period), and again rested for three minutes. Positive affect was measured immediately after the two resting periods and during the speech. The participants were divided into groups of 17 and 15 in the SEM and SDM groups, respectively, based on their stress mindset scores. Both groups were fairly matched concerning age and male/female ratio. Change patterns of positive affect did not differ between the two groups, which did not support the hypothesis. However, positive affect was significantly higher in the SEM group compared with the SDM group. The present results differed from previous findings reported in North America. Inconsistent results are discussed related to differences in the speech task and cross-cultural variations of happiness and coping with stressors between North America and Japan.

1. Introduction

Stress mindset [1] is a relatively new concept that has the potential to enhance our understanding of the relationship between stress and health [2–4]. This study defined stress as the process by which potentially stressful situations (stressors) cause stress responses in the form of emotional, behavioral, cognitive, and physiological changes [5]. A stress mindset is a belief that stress has enhancing (stress-is-enhancing mindset: SEM) or debilitating (stress-is-debilitating mindset: SDM) consequences in life domains such as productivity and well-being [1]. A growing body of research suggests that a stronger SEM is associated with better health [2,6,7]. Stress mindset has been reported to moderate the effects of stressors on outcomes related to health and well-being, such that more frequent

experiences of life event stressors are associated with an increased risk of depression in individuals with SDM as compared to those with SEM [8]. However, relatively little is known about how the adoption of SEM elicits such a moderating effect.

The evidence suggests that adopting SEM may elicit such an effect by leading to more frequent experiences of positive affect in response to stressors [9,10]. A limited number of experimental studies have examined the associations between a stress mindset and positive affect during the performance of a stressful task. Among these, Crum et al. [9] compared changes in negative and positive affect during a speech task (i.e., a mock interview) between individuals who adopted SEM and those who adopted SDM. Stress mindset was manipulated by watching a video that oriented participants to either enhance or debilitate the nature of stress. Participants with SEM showed a pattern of increase in positive affect from the baseline to the post-task, while those with SDM showed a pattern of decrease. The change in patterns of negative affect did not differ between the two groups. Positive affect has been suggested to enhance repertoires of thoughts and behaviors and enhance coping resources [11], while boosts to positive affect have been suggested to lead to successful adaptation to stressors in the long run [9].

Crum et al. [9] pointed out the necessity of replicating and extending their findings to different cultures, where beliefs about stress may differ from those in the United States. Some studies have reported differences in methods for coping with stressors between North American and Japanese individuals [12,13]. Tweed et al. [13] reported that Japanese participants, in comparison to European Canadians, were more likely to use coping strategies in response to stressors that aimed at internally targeted control. This control refers to attempts to control the self, not the stressor [13]. These results suggest that a stressor refers to something to which each individual needs to adapt and that such adaptation is required to a greater extent in the Japanese than in the North American context.

This preliminary study examined the associations between SEM and changes in positive affect during a speech task using a sample of Japanese college students. It was hypothesized that participants with SEM would show a greater increase in positive affect over time than those with SDM.

2. Materials and Methods

2.1. Participants

This study was conducted at a public college in the Tohoku region of Japan. A total of 32 undergraduate students were recruited after their university lectures. Each participant was contacted individually and participated according to their availability. The participants' mean age was 21.1 years (standard deviation = 1.17), and 15 were female (46.8%).

2.2. Measures

2.2.1. Stress Mindset

A Japanese version of the Stress Mindset Measure was used to assess stress mindset [14]. It is a single scale with eight items, consisting of four items related to SEM and four items related to SDM. An example item for the SEM subscale was "Experiencing stress facilitates my learning and growth". An example item for the SDM subscale was "The effects of stress are negative and should be avoided". Each participant rated each item on a five-point Likert scale ranging from 0 (strongly disagree) to 4 (strongly agree). The scores of the items that measured SDM were reversed, and the scores of all eight items were summed and averaged. A score equal to or more than 2 reflected SEM, whereas a score less than 2 reflected SDM [9]. The scale was found to be both reliable and valid [15].

2.2.2. Negative and Positive Affect

A short version of the Japanese UWIST mood adjective checklist (JUMACL) [16] was used to measure negative and positive affect. It comprises 12 items, of which six measure the fundamental dimensions of tense arousal (TA) and six measure the fundamental dimensions of energetic arousal (EA). Example items from the TA subscale were "tense" and "nervous".

Example items from the EA subscale were "energetic" and "vigorous". Each participant was asked to rate the items on a four-point scale ranging from 1 (definitely not) to 4 (definitely), and the scores were totaled so that higher energetic arousal and tension arousal values reflected greater TA and EA, respectively. The JUMACL was found to be both reliable and valid [16].

2.3. Procedures

Ethical approval for this study was granted by the Institutional Review Board of Kurume University (no. 269, approved on 10 November 2015). This study was conducted between June and July 2017. On arrival, the following points were thoroughly explained to the participants: (1) each participant would be asked to make a three-minute speech in front of an evaluator, which would be filmed; (2) they would be given three minutes of preparation time; (3) the recording would be further evaluated by a second evaluator; and (4) appearance and anxiety during the speech as well as speech comprehensibility would be evaluated by the second evaluator. After providing informed written consent, the experimenter invited the participants to a separate room where the experiment was conducted.

The participants were asked to relax for three minutes while the experimenter left the room. Three minutes later, the experimenter re-entered the room and asked the participants to complete the JUMACL. The following points were then explained to them: (1) the theme of the speech was "about yourself" and (2) they could not make notes when thinking about their speech. The experimenter then left the room.

Three minutes later, the evaluator entered the room. The evaluator seated themselves in front of the participant, pretended to press the record button on the camera, and said, "Please start". The evaluator consistently made natural facial expressions and pretended to evaluate the speech while not actually doing so. If the speech ended before three minutes had elapsed, the evaluator asked the participant to continue the speech. After three minutes, the evaluator told the participants to finish their speech and left the room. The experimenter then re-entered the room and asked the participant to complete the JUMACL. The participants were asked to relax again while the experimenter left the room. After three minutes, the experimenter re-entered the room and asked the participants to complete the JUMACL again.

After the experiment had ended, the experimenter told the participants that the evaluator was a red herring, that the speech had not been videotaped and evaluated, and that the purpose of telling them that the speech would be videotaped and evaluated was to increase tension and anxiety. The debriefing was conducted until the participants were sufficiently convinced.

2.4. Statistical Analyses

IBM SPSS version 27 was used for statistical analysis. The participants were divided into the SEM and SDM groups based on their scores on the Japanese version of the Stress Mindset Measure. Participants with a score of 2 or higher and those with a score below two were placed in the SEM and SDM groups, respectively. A series of unpaired *t*-tests were conducted to examine differences in age, male/female participant ratio, and stress mindset. Two analyses of variance were conducted to examine whether the changes in TA and EA differed between the two groups. Effect size estimates were interpreted according to Cohen [17]. Cohen's *d* values of 0.30, 0.50, and 0.80 were interpreted as small, medium, and large, respectively. Those of φ of 0.10, 0.30, and 0.50 were interpreted as small, medium, and large, respectively. The values of ω^2, the unbiased estimator of effect size, were calculated using the results of analyses of variance. Those of ω^2 of 0.01, 0.06, and 0.14 were interpreted as small, medium, and large, respectively. Those of ω^2 of less than 0 were interpreted as small.

3. Results

Table 1 shows the means and standard deviations of the variables as well as the correlations between them. The 32 participants were divided into two groups: 17 and 15 in the SEM and SDM groups, respectively. Both groups were fairly matched concerning age (SEM: 21.1 ± 1.22 vs. SDM: 21.1 ± 1.16, $t(30) = 0.12$, $p = 0.91$, and $d = 0.04$) and male/female participant ratio (SEM: 8/7 vs. SDM: 9/8, $\chi^2(1) = 0.00$, $p = 0.98$, and $\varphi^2 = 0.00$). Effect sizes were very small. The SEM group scored significantly higher on stress mindset (SEM: 2.4 ± 0.42 vs. SDM: 1.4 ± 0.36, $t(30) = 7.48$, $p = 0.00$, and $d = 2.65$) and the effect size was large.

Table 1. Means and standard deviations of and correlation coefficients among the studied variables.

	1.	2.	3.	4.	5.	6.	Mean	SD
1. Stress mindset							2.0	0.66
2. TA in the pre-task period	0.01						13.6	2.88
3. TA in the task period	0.18	0.41 *					13.8	4.05
4. TA in the post-task period	−0.08	0.41 *	0.75 **				9.9	3.43
5. EA in the pre-task period	0.37 *	−0.01	−0.09	−0.15			12.7	2.93
6. EA in the task period	0.23	−0.03	−0.46 **	−0.45 **	0.47 **		13.0	3.79
7. EA in the post-task period	0.27	0.15	−0.34	−0.40 *	0.61 **	0.80 **	13.3	3.72

Notes: * $p < 0.05$ and ** $p < 0.01$. Abbreviations: TA, tense arousal and EA, energetic arousal.

Table 2 shows the means and standard deviations of TA and EA at three assessment points. Analysis of variance for the TA score indicated that the assumption of sphericity was violated ($W = 0.81$, $\chi^2(2) = 6.29$, and $p = 0.04$), and the Greenhouse–Geisser correction was applied. A main effect of the period was found ($F (1.67, 50.21) = 25.96$, $p = 0.00$, and $\omega^2 = -0.36$), with its effect size being small. The subsequent Tukey's HSD comparisons indicated that the TA score was significantly higher in the pre-task ($p < 0.01$) and task periods ($p < 0.01$), respectively, compared to the post-task period. Neither the main effect of group ($F (1, 30) = 0.43$, $p = 0.52$, and $\omega^2 = -0.01$) nor the group by period interaction effect ($F (1.67, 50.21) = 1.36$, $p = 0.27$, and $\omega^2 = -0.01$) were significant. Both effect sizes were small.

Table 2. Means and standard deviations of tense and energetic arousal at three assessment points.

	Period		
	Pre-Task Period	**Task Period**	**Post-Task Period**
Tense arousal score			
SDM group	13.3 (3.01)	12.9 (4.65)	10.1 (4.28)
SEM group	13.8 (2.83)	14.7 (3.37)	9.8 (2.58)
Energetic arousal score			
SDM group	11.5 (2.53)	12.1 (3.99)	12.1 (3.83)
SEM group	13.7 (2.91)	13.9 (3.50)	14.4 (3.39)

Abbreviations: SEM, stress-is-enhancing mindset and SDM, stress-is-debilitating mindset.

The analysis of variance with the EA score as the dependent variable revealed the main effect of the group ($F (1, 30) = 4.18$, $p = 0.0497$, and $\omega^2 = -0.01$), with the effect size being small. The EA score was significantly higher in the SEM group than in the SDM group. Neither the main effect of the period ($F (2, 60) = 0.74$, $p = 0.48$, and $\omega^2 = 0.00$) nor the period by group interaction effect ($F (2, 60) = 0.10$, $p = 0.91$, and $\omega^2 = -0.01$) were significant. Effect sizes were small, respectively.

4. Discussion

This study aimed to examine the association between SEM and changes in positive affect in response to a speech task in a sample of Japanese college students. The hypothesis

was not supported. Our results indicated that positive effects did not change in participants with SEM. The non-significant change in positive affect may be explained by the limited chance to experience a feeling of social harmony with others. Uchida and Kitayama [18] reported that Japanese, compared to European-American undergraduates, were more likely to associate happiness with social harmony with others. However, the speech task used in this study was not naturally interactive. In addition, based on the findings of Tweed et al. [13], Japanese participants, compared to European Americans, were more likely to adapt themselves to a task in which participation in the experiment and delivery of the speech seriously were expected. These characteristics of the task and participants may leave little chance to experience a feeling of social harmony. These explanations are hypotheses and need to be further examined. It is essential to do so. The present results suggest that the associations of stress mindset with positive affect response to a speech task, as reported in Crum et al. [9], might appear in specific tasks, such as an interactive task, or cultures, such as North America. Examining these factors will increase our understanding of the associations of SEM with positive affect response to the speech task. Therefore, it is important to focus on cross-cultural differences of positive affect and the nature of the task to understand these relationships. The current results provide an impetus for further studies.

Interestingly, it was found that positive affect was higher in participants with SEM than in those with SDM throughout the experiment. This may be explained by the tendency of Japanese individuals with SEM to focus on the positive aspects of events. Takehashi, Toyosawa, Okubo, and Shimai [19] reported that Japanese workers were more likely to find enjoyable aspects of their work. It is difficult based on the present results to interpret why positive affect in the pre-task period was higher in participants with SEM than in those with SDM. One possibility is that the higher EA score in the SEM group reflects a higher baseline level of EA. Japanese individuals with SEM tend to focus on the positive aspects of events [19]. A relatively high EA level in daily life may cross over into the experiment. Another possibility is that participants with SEM focus on positive aspects of the situation during the anticipation and delivery of the speech. These explanations are hypotheses and should be examined in future studies. These results provided new insight into the pathways through which positive affect contributes to adaptation. In Japan, the present results suggest that positive affect is not necessarily enhanced in response to stressors but rather is enhanced in daily life, which contributes to successful adaptation in the long run.

The following limitations should be addressed in future studies. First, it was difficult to conclude that the speech task was stressful for participants. TA scores were significantly higher in the pre-task and task periods than in the post-task period. It is possible to interpret these changes in multiple ways. To examine how a stress mindset contributes to stressor adaptation, it is necessary to measure TA more frequently before delivering the speech to confirm that the speech is a stressful task. Second, this study may not comprehensively capture how a stress mindset relates to mood changes during potential stressors. Associations of stress mindset with mood changes during potential stressors can be affected by many factors and can be non-linear and circular. Crum et al. [20] proposed the new theory, which was based on the stress mindset, stress reappraisal (e.g., [21]), and emotion regulation (e.g., [22]). According to this model, one's stress mindset determines what one aims to achieve by using stress regulation techniques (e.g., to optimize stress or reduce stress) and which techniques one applies, which can alter stress mindset. Simultaneous measurements of these variables, with the assumption of a complex, non-linear, dynamic systems framework of the association, will provide a more comprehensive picture. Third, the participants included only college students, and the sample size was small. It is necessary to replicate the current findings with a more diverse and larger sample. Fourth, this study did not manipulate stress mindset and could not examine the causality between stress mindset and mood changes. Stress mindset has been reported to be manipulated by watching short videos [1]. Although the present results are preliminary, they provided the rationale for conducting such an experimental study.

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