Self-affirmation enhances the intention to improve physical inactivity through health risk messages1)

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Abstract

This study examined how self-affirmation influences people’s intention to improve health behaviors after reading messages about health risks from physical inactivity. A usual physical activity level, measured by a smartphone app, was used as a moderator. Participants (103 Japanese undergraduates) reported their usual physical activity (average walking and running distances) measured by a health management app. They then completed a writing task, in which they affirmed (or did not affirm) important personal values. After the task, they read health risk messages about physical inactivity and reported their intention to increase their daily physical activity. The results revealed that participants with low physical activity levels displayed a significantly stronger intention to increase their daily physical activity when they self-affirmed than when they did not. Conversely, participants with high levels of physical activity did not show a significant effect of self-affirmation. These results suggest that the effect of self-affirmation on improving physical inactivity is moderated by the level of usual physical activity, highlighting the significance of the relevance of the health messages.

Key Words: self-affirmation, health risk message, physical inactivity, smartphone app

Introduction

Health promotion campaigns have attempted to improve health behaviors by sending targeted messages about the potential health risks of certain behavioral habits (e.g., excessive drinking, smoking, and lack of exercise). However, many studies suggest that most presentations of health risk messages are less likely to be accepted by high-risk individuals and that they are less effective in improving health behaviors (e.g., Good & Abraham, 2007; Liberman & Chaiken, 1992).

According to the self-affirmation theory (Sherman & Cohen, 2006), this tendency for health risk messages to be less effective is due to the self-defensive responses of message recipients. This theory assumes that people are motivated to maintain self-integrity, which is a global sense that “one is a good and appropriate person” (Sherman & Cohen, 2006, p. 186). Self-integrity comprises various self-domains that people consider crucial (e.g., values, group identities, and relationships). For most people, being healthy is one of the most important domains that constitute self-integrity; personal health risk messages thus increase people’s perceptions that they are engaging in maladaptive behaviors, which threatens self-integrity (Sherman &

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Cohen, 2006). Therefore, to defend their self-integrity, people avoid or resist such messages. Health risk messages are consequently less effective at improving the health behaviors of those who are at high risk (Good & Abraham, 2007; Sherman & Cohen, 2006).

Self-affirmation can mitigate such defensive responses. Due to the self-system’s flexibility, even if a specific domain is threatened, self-integrity can be maintained by affirming the self-worth of other important domains (i.e., self-affirmation; Sherman & Cohen, 2006). Therefore, self-affirmation allows people to cope with the threats of health risk messages, and it eliminates the need to react defensively. Consequently, people are more likely to be open to such messages, which increases their beneficial effects (e.g., increased intention to improve health behaviors; Sherman & Cohen, 2006). For example, Sherman, Nelson, & Steele (2000) found that compared to female coffee drinkers who did not self-affirm, those who did, accepted the article content suggesting a link between caffeine intake and breast cancer; further, self-affirmation increased their behavioral intention to reduce caffeine intake.

Given this knowledge, this study focuses on health risk messages regarding physical inactivity and examines whether self-affirmation amplifies the effect of improving physical inactivity (using the degree of usual physical activity as a moderator). Physical inactivity is a global public health problem (World Health Organization, 2018), with 23% of adults and 81% of adolescents worldwide not meeting the World Health Organization’s global recommendations for physical activity (World Health Organization, 2018). Therefore, examining how self-affirmation affects health risk messages regarding physical inactivity is vital when considering how this global public health problem should be addressed.

Previous studies have revealed that people who engaged in self-affirmation reported more positive attitudes toward the message content compared to those who did not (Cooke, Trebaczyk, Harris, & Wright, 2014). Further, they had stronger intentions and self-efficacy to improve their health behaviors after reading a health risk message (Cooke et al., 2014; Strachan et al., 2020). Conversely, some studies have reported that self-affirmation did not affect the improvement of physical inactivity (e.g., Epton et al., 2014). Strachan et al. (2020) asserted that one reason for these mixed findings is that several studies did not consider their participants’ baseline physical activity levels.

Health risk messages about physical inactivity are relevant to people with low physical activity levels; thus, the messages trigger their self-defensive response. Therefore, self-affirmation effectively increases their tendency to accept the messages and intention to improve their behaviors. However, these messages are not relevant to people with high physical activity levels, indicating that self-affirmation might not be effective for them.

**The Present Research**

This study examined the following hypotheses: for participants with low physical activity, those who self-affirmed would show stronger intention to improve their health behaviors after reading health risk messages about physical inactivity than those who do not. Conversely, for participants with high physical activity, self-affirmation would not greatly affect those who read the messages.

This study used the objective measure of physical activity as a moderator; specifically, the Health App on the iPhone (https://www.apple.com/ios/health/) was used, which automatically measures and records physical activity indicators (e.g., walking and running distances). Other studies have considered such measurements practical for research (e.g., Amagasa et al., 2019).

**Method**

**Participants and Design**

The experiment involved 103 university students in Japan. Among them, 16 students who did not own iPhones and five who did not answer the self-affirmation task were excluded from the analysis. A total of 82 students were included in the analysis (56 men, 25 women, and 1 unknown; M<sub>age</sub> =19.02 years, SD=0.77). A sensitivity power analysis using G*Power (Faul, Erdfelder, Buchner, & Lang, 2009) indicated that the current sample size (n=82) was sufficient to detect a minimum effect size of f<sup>2</sup>=0.10 with a statistical power of 80% under an alpha error probability of 0.05.

The independent variable was self-affirmation (self-affirmation vs. no self-affirmation: between subjects), and the moderator was physical activity (the continuous variable). The dependent variable was the intention to improve health behavior after reading a health risk message about physical inactivity. Additionally, the familiarity of the message content was used as a control variable.
Procedure and Materials
The experiment was conducted in a group setting in a lecture hall. Two types of questionnaires that differed only in self-affirmation writing task content were randomly distributed to the participants, thereby assigning them to the self-affirmation or no self-affirmation condition. To control the experimental settings, participants responded to each question in turn, following the experimenter’s instructions. After the experiment was completed, a debriefing was conducted.

Physical activity. Participants with iPhones were asked to open the Health App and write down their “average daily walking and running distance (km) for the past month,” as recorded in the app.

Self-affirmation manipulation. Based on previous studies (e.g., Sherman et al., 2000), this study conducted a self-affirmation manipulation. First, all participants were presented with a list of nine different domains (e.g., friends/lovers, study, and fashion) and asked to rank them in order of “importance” in their lives. Next, participants in the self-affirmation condition were asked to specify why they personally valued the domain they ranked first. In contrast, participants in the no self-affirmation condition were asked to specify why others would personally value the domain that they ranked ninth.

Health message. The participants read an article on “Physical inactivity and health risks.” The article was created (including content that differed from the information) based on information on the Internet and consisting of three parts: “Lack of exercise among youth,” “Lack of exercise and brain decline,” and “Lack of exercise and lifestyle diseases.” The “Lack of exercise among youth” section contained the results of a survey demonstrating that many youths were not getting enough exercise. “Lack of exercise and brain decline” demonstrated that lack of exercise among young people increases the risk of brain decline in the future and that it is important to exercise from a young age to prevent this decline. Additionally, it illustrated that the average daily walking distance required to maintain good health is 6.8 km or more.3) The “Lack of exercise and lifestyle diseases” section demonstrated that lack of exercise is deeply related to lifestyle diseases such as high blood pressure and diabetes. A pilot survey confirmed that this article’s content was appropriate as health risk messaging regarding physical inactivity (see Online Appendix 1).

Dependent variable and control variable. The participants responded to items containing a dependent and control variable to evaluate their own opinions of the article content. The dependent variable included four items (e.g., “I will make time to exercise as much as possible”) that related to their intention to improve their health behavior created by referring to previous studies (e.g., Sherman et al., 2000). The control variable included one item relating to familiarity (“I have already known that information for a while”). Participants used a six-point scale for their responses (1=strongly disagree to 6=strongly agree).4)

Results
A principal component analysis was conducted on the four items relating to intention. The results revealed loadings of .67 or higher, which confirms unidimensionality (α=.80, ω=.87). These four items were averaged and used as the dependent variable for intention.

A hierarchical regression analysis was then conducted to test the hypothesis, in which familiarity was the control variable in Step 1; self-affirmation (0=no self-affirmation, 1=self-affirmation) and physical activity (centered around its mean) were the main effects in Step 2; and the interaction term of self-affirmation × physical activity was entered in Step 3.5) The results indicated that the model in Step 3 was significant (F(4, 77)=2.64, p=.040, R²=.12) and that the interaction was significant (B=-.42, SE=.14, t(77)=3.01, p=.004, 95% CI [-.69, -.14], β=-.41). A simple slope analysis demonstrated that the self-affirmation condition was a significantly higher intention than the no self-affirmation condition for participants with low physical activity.

2) It was noted that participants who are familiar with health risk messages might have prior beliefs and attitudes regarding the information, which might lead to biased responses (Liberman & Chaiken, 1992). Therefore, this study used familiarity in the analysis as a control variable.
3) This figure (6.8 km) was set by referring to several Internet sources (e.g., Ministry of Health, Labour and Welfare, Japan, 2000) and estimating college students’ approximate average walking distance.
4) The materials used in this research are available from the corresponding author upon reasonable request.
activity (1 SD below the mean; \(B=0.81, SE=0.32, t(77)=2.52, p=.014, 95\% CI [0.17, 1.45], \beta=.39\), but not for those with high physical activity (1 SD above the mean; \(B=-0.60, SE=0.34, t(77)=1.77, p=.081, 95\% CI [-1.27, 0.08], \beta=-.29\)). Further, participants with low physical activity (1 SD below the mean) displayed a significantly higher intention than those with high physical activity (1 SD above the mean) in the self-affirmation condition (\(B=-0.30, SE=0.11, t(77)=2.71, p=.008, 95\% CI [-0.52, -0.08], \beta=-.48\), but not in the no self-affirmation condition (\(B=0.12, SE=0.09, t(77)=1.41, p=.163, 95\% CI [-0.05, 0.29], \beta=.19\); see Figure 1 and Online Appendix 2).

**Discussion**

This study examined how self-affirmation affects people’s intention to improve health behavior after reading health risk messages about physical inactivity. The results revealed the predicted interaction effect, in which participants with low physical activity reported higher intention to exercise in the future when they self-affirmed compared to when they did not. In contrast, participants with high physical activity did not display this pattern. These results support the hypothesis that self-affirmation is effective only when the health risk messages are relevant. That is, the health risk message was relevant for participants with low physical activity, which increases the threat of a self-defensive response. However, self-affirmation allowed these people to cope with the threat and mitigate their self-defensive responses; thus, they could respond more positively to the messages (i.e., they increased their intention). Conversely, the message was not relevant to participants with high physical activity levels; hence, it did not increase their threat for self-defensive responses. Therefore, the effect of self-affirmation was not revealed.

In summary, this study demonstrated that the effect of self-affirmation on people’s intention to improve health behaviors after reading health risk messages about physical inactivity was moderated by usual physical activity.

This study has several limitations. First, it focused on intention as the dependent variable, but it did not examine

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5) In an additional analysis, the effect of sex differences was examined. Specifically, sex was dummy coded (0=male, 1=female), and the following factors were added to the hierarchical regression analysis in hypothesis testing: main effect of sex (step 2), two-factor interaction terms of sex × self-affirmation, and sex × physical activity (step 3), and the three-factor interaction term of sex × self-affirmation × physical activity (step 4). The result demonstrated that all effects involving sex were not significant (\(\beta_{s}=-.057 \text{ to } -.003, p_{s}=.754 \text{ to } .985\)). Thus, the effect of sex differences was not illustrated in this study. However, given that some surveys (e.g., Ministry of Health, Labour and Welfare, Japan, 2020) have suggested that the average daily physical activity level varies by sex, the experimental design may have needed to account for such sex differences. For example, the health risk message in this study stated that “the average daily walking distance required to maintain good health is 6.8 km or more,” but it might have been better to provide the appropriate distance for each sex.
the effect of intention on actual behavior. In previous studies (e.g., Cooke et al., 2014; Strachan et al., 2020), follow-up surveys were conducted after a certain time following the experiment to determine whether the amount of physical activity had increased. Based on these studies, future studies will need to examine behavioral improvement. Second, this study did not examine the different effects relating to the quality of health risk messages. Studies have recently revealed that the effect of self-affirmation differs depending on the content of health risk messages (e.g., gain or loss-framed messages; Strachan et al., 2020). Based on these findings, further examining the content of health risk messages to increase the effect of self-affirmation is also necessary. Third, this study used the average daily walking and running distance in the Health App as an objective measure of physical activity level, but the influence of other physical activity factors that are not recorded in the app was not considered. For example, it is necessary to consider the influence of physical activity factors that are not recorded in the Health App, such as whether participants regularly engage in physical activity at a sports club or gym. Fourth, we did not examine the effect of the timing of the measurement of physical activity level. We measured physical activity level at the beginning of the experiment, which indicates that the participants performed the self-affirmation task and read the health message after knowing their physical activity level. Therefore, this prior awareness may have influenced the effects of self-affirmation that we did not anticipate. It would be possible to compare the effects of the different timing of physical activity measurements on the effect of self-affirmation, and future studies should examine this effect on physical activity level.

Despite these limitations, the present study has methodological implications in examining the effect of self-affirmation on improving physical inactivity through health risk messages. One is that this study highlighted the importance of considering the moderator variable of usual physical activity level. The other is that this study was conducted using an objective index of physical activity level (moderator) measured by a smartphone application. This index can easily measure the objective physical activity level by simply operating a smartphone. Therefore, it is expected to be further utilized in the same research context as this study.

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