JOURNAL OF PHYSICAL EDUCATION RESEARCH

Journal of Physical Education Research, Volume 5, Issue III, September 2018, pp.20-25
ISSN: Print-2394 4048, Online-2394 4056

SENSE OF COHERENCE AND TIME-MANAGEMENT BEHAVIOR FOR EXERCISING BY JAPANESE UNIVERSITY STUDENTS

YUTAKA SONOBE*, KOSUKE HIRAYAMA, TAKERU HARADA, RYO YAMADA, TOSHIRO IZUMI
Department of Business Management, Faculty of Modern Life, Teikyo Heisei University, Tokyo, JAPAN.
***Email:** y.sonobe@thu.ac.jp*

How to cite this article: Sonobe, Y., Hirayama, K., Harada, T., Yamada, R., & Izumi, T. (September, 2018). Sense of coherence and time-management behavior for exercising by Japanese university students. Journal of Physical Education Research, Volume 5, Issue III, 20-25.

Received: July 15, 2018 **Accepted:** September 22, 2018

ABSTRACT

Promoting physical activity is one of the most important issues worldwide, and sense of coherence (SOC) is a psychosocial concept associated with physical activity. People who have a strong SOC also have advantages in conducting better healthy activities because they exercise actively. However, people who have a weak SOC do not exercise actively, because they have no time to do so. Therefore, this study aimed to show that SOC is a factor in promoting time-management behavior for exercising. Participants were 1,257 Japanese university students (687 males, 570 females; age 18.33 ± 0.59). Questionnaires were used to investigate (1) SOC and (2) exercise time-management behavior and exercise-implementation status. The hypothetical model "SOC affects exercise implementation through time management" was developed with covariance structure analysis by multiple-indicator modeling. Results indicated the model's goodness of fit. Therefore, SOC affects exercise implementation through time management, and results suggested that SOC promotes time-management behavior for exercising.
Keywords: *Exercise adherence, coping, covariance structure analysis.*

1. INTRODUCTION

In 2010, the World Health Organization identified physical inactivity as the fourth-leading risk factor for mortality globally, following high blood pressure, tobacco use, and high blood glucose. Countermeasures for this issue are crucial, and in 2010, the Global Advocacy Council for Physical Activity urged people in all countries to increase their levels of physical activity. Sense of coherence (SOC) is a psychosocial concept involved in physical activity. Antonovsky (1979) systemized SOC as a core concept of salutogenesis, defined as "The extent to which one has a pervasive, enduring though dynamic feeling of confidence that one's environment is predictable and that things will work out as well as can reasonably be expected." People who have a strong SOC have an advantage in conducting healthy activities. Previous studies have demonstrated that the relation between physical activity and SOC has relevance to the frequency of exercise (e.g., Kuuppelomäki & Utriainen, 2003; Suominen, Gould, Ahvenainen, Vahtera, Uutela, & Koskenvuo, 2005; Read, Aunola, Feldt, & Ruoppila, 2005; Öztekin & Tezer, 2009). These studies suggest that a strong SOC promotes physical activity.

However, environmental and emotional causes often prevent physical activity. One cause is inadequate time management. According to a 2015 survey by the Japanese government's Cabinet Office, 42.6% of people (427 participants; aged 20 or above) who had not exercised over the past year said that they had "No time to exercise. Work and child-rearing take up too much

Correspondence: Yutaka Sonobe, Ph.D., Lecturer, Sports Psychology, Department of Business Management, Faculty of Modern Life, Teikyo Heisei University, Tokyo, JAPAN, Email: y.sonobe@thu.ac.jp.

time." This reason was the most common. According to a study by Ishii, Inoue, Ohya, Odagiri, Takamiya, and Shimomitsu (2009), people begin to recognize that they have no time to exercise during the stage of change in the transition from pre-contemplation to contemplation. King and Frederiksen (1984) and Leon and Rosenthal (1984) suggested that coping behavior is required under such circumstances. From the above, physical activity was related to strength of SOC (e.g., Kuuppelomäki & Utriainen, 2003; Suominen et al., 2005; Read et al., 2005; Öztekin & Tezer, 2009). This study examined whether SOC is a factor promoting time-management behavior for exercising.

2. METHODS AND MATERIALS

2.1 Participants

Participants were 1,354 private university students in the Tokyo metropolitan area, narrowed to 1,257 students (687 males, 570 females; age 18.33 ± 0.59) who agreed with the study's objective and fully completed the SOC-13 and the Physical Activity Assessment Scale (PAAS).

2.2 Measures

2.2.1 SOC: To measure SOC, SOC-13 (Japanese version by Yamazaki, 1999), an abbreviation of SOC-29 (Antonovsky, 1987, 1993) was used. SOC-13's reliability and validity were confirmed by Togari, Yamazaki, Takayama, Yamaki, and Nakayama (2008). This study's participants chose from seven rankings on a scale from 1 to 7. Cronbach's alpha for this sample was 0.71.

2.2.2 Time-management behavior for exercising and exercise-implementation status: To evaluate time-management behavior for exercising and exercise-implementation status, the PAAS (Wakui & Suzuki, 1997) was used. The PAAS consists of 19 items in the following three factors:

- Time Management (5 items): Coping behavior to make time to exercise.
- Exercise and Sports Activity (7 items).
- Daily Activity (7 items).

In this study, "Time Management" and "Exercise and Sports Activity" are measured variables. The reliability and validity of the PAAS were confirmed by a study with university students (Wakui & Suzuki, 1997). Participants chose from five rankings on a scale from 1 to 5. In this study, the factor "Exercise and Sports" was called "Exercise" because "Sports" was considered a sub-entity of "Exercise," as in a study by Caspersen, Powell, and Christenson (1985). Cronbach's alphas of this sample were Time Management = 0.96 and Exercise = 0.89.

2.3 Procedures

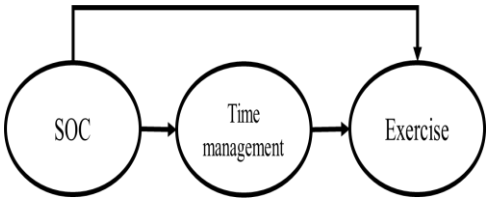
In accordance with the Helsinki Declaration, participants received an explanation of this study's objective and content. They were informed that their answers for the SOC-13 and PAAS should be given at their free will and that their personal information would be used only for the study. Finally, the study obtained participants' informed consent.

2.4 Statistical Analysis

First, to evaluate the relationship of SOC between Time Management and Exercise, a Pearson correlation analysis was used, and the hypothetic model "SOC affects exercise implementation

through time management" was developed (Figure 1). Then, a covariance structure analysis by multiple-indicator modeling with structural equation modeling was conducted. A goodness of fit index (GFI), adjusted goodness of fit index (AGFI), comparative fit index (CFI), and root mean square error of approximation (RMSEA) were used to determine the model's validity. The model shows goodness of fit when the GFI, AGFI, and CFI are 0.9 or more and the RMSEA is less than 0.06 (Hooper, Coughlan, & Mullen, 2008). EZR (Kanda, 2013) and IBM Amos Ver. 25 were used for statistical analysis. Significance probability was set at less than 5%.

Figure 1: Initial model: SOC effects exercise and time management



3. RESULTS

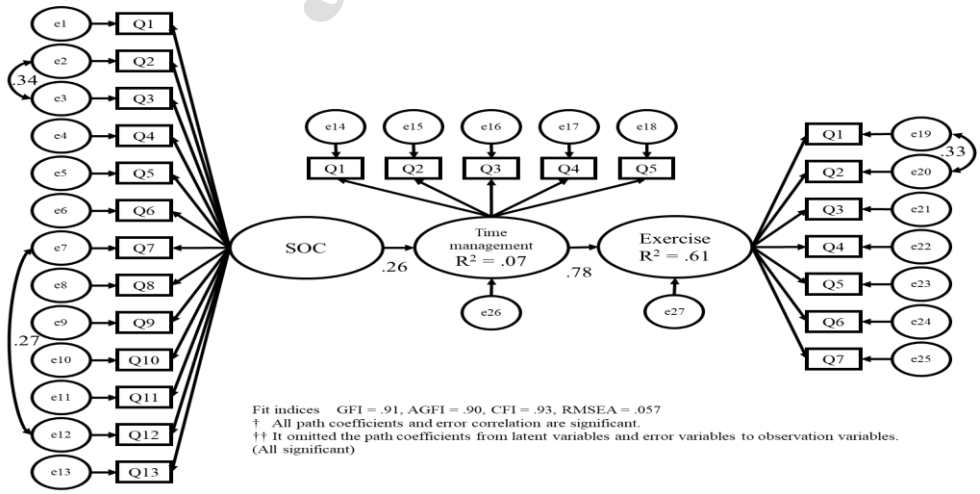
Table 1: Correlation analysis between variables

	SOC	Time management	Exercise
SOC	-	0.21*	0.19*
Time management		-	0.74*
Exercise			-

*p< 0.001

A Pearson correlation analysis was conducted with the average scores between variables (Table 1). Results show positive correlations between variables: SOC and Time Management (r = 0.21, p < 0.001); SOC and Exercise (r = 0.19, p < 0.001); and Time Management and Exercise (r = 0.74, p < 0.001).

Figure 2: Evaluation by covariance structure analysis



The initial model "SOC affects exercise implementation through time management" was evaluated with path analysis, and a direct path from SOC to Exercise was also added at the same time (Figure 1). When relevance criteria were not applied, the model was modified repeatedly until criteria were rationally explainable and an acceptable goodness of fit was obtained. As a result, the direct path from SOC to Exercise was eliminated. The goodness of fit results were GFI = 0.91, AGFI = 0.90, CFI = 0.93, and RMSEA = 0.06; these results were adequate for applicability. Then, a path coefficient, which is a partial assessment, was estimated, and the validity of all variables was analyzed. From SOC to Time Management was $\beta = 0.26$ ($p < 0.001$) and from Time Management to Exercise was $\beta = 0.78$ ($p < 0.001$), showing a significant positive effect. Determination coefficients were Time Management $R^2 = 0.07$ and Exercise $R^2 = 0.61$.

4. DISCUSSION

This study analyzed whether SOC is a promotional factor for time-management behavior to exercise. Results of the correlation analysis confirmed a significant positive correlation between all variables, demonstrating that the variables applied to the hypothetical model were connected. Moreover, the goodness of fit from the covariance structure analysis was acceptable. Therefore, SOC affects exercise implementation through time management, and results suggested that SOC promotes time-management behavior for exercising.

A study with carriers of HIV on the relation between SOC and disease-management behavior by Cederfjäll, Langius-Eklöf, Lidman, and Wredling (2002) revealed that a weak SOC was relevant to decreasing the number of medication doses and that SOC plays an important role in disease-management behavior. From this result, enhancing SOC seems required to promote time-management behavior.

The study by Nakamura et al. (2003) on mediating factors for enhancing SOC showed that male workers (average age 43) who experienced a one-year fitness program increased their SOC and promoted their exercise behavior. This suggests that enhancing individual SOC leads to better time-management behavior and the habit of exercising.

This study's results indicated that SOC aids time-management behaviors for exercising. To enhance SOC, potential exercisers need to be aware of the potential resources that are available and to learn how to use them (Langeland, Riise, Hanestad, Nortvedt, Kristoffersen, & Wahl, 2006). Improving one's awareness of resources is also effective in enhancing one's SOC.

This study is cross-sectional, so the possibility that the model's relationship between time management and SOC could be reversed must be considered. According to salutogenesis modeling by Antonovsky (1979), people are always in a continuum between health and disease, and their quality of life always consists of a spiral involving their degree of SOC, health, and disease. Since it is therefore possible that time-management behavior causes SOC, the question of whether time management affects exercise implementation through SOC should be researched in the future.

5. CONCLUSION

Within the limit and limitation of the study and the covariance structure analysis performed in this study it is concluded that, the model fit was acceptable, showing that SOC affects exercise implementation through time management. It also suggested that SOC promotes time-management behavior for exercising.

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