Sports Activities and Sense of Coherence (SOC) among College Students

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The purpose of this study was to compare the level of Sense of Coherence (SOC) in athletes to that in non-athletes in a college population. Subjects were 716 students (315 males, 401 females; mean age 19.4 ± 1.4 years; age range 18-37 years) from metropolitan colleges. SOC was measured by standard questionnaires (Antonovsky, 1987) including the Japanese version of the SOC-13 translated by Yamazaki (1999) which can also measure three sub-concepts of SOC, namely, senses of comprehensibility, manageability, and meaningfulness. The sports activities the subjects engaged in were also surveyed in terms of their affiliated athletic organizations, sporting events, frequency of play, successive years of play, and experience of playing sports. From the frequency of play at the time of survey, the subjects were categorized into three groups: high frequency sports activity (HFS), medium frequency sports activity (MFS), and Low frequency or No sports activity (LNS) groups. Additionally, from the number of successive years of play of their current sports, subjects were categorized into four groups: 0-2 years, 3-4 years, 5-9 years, and > 10 years. Significant differences in SOC and meaningfulness scores were found between the HFS, MFS, and LNS groups ($\chi^2 = 12.53, 11.80$; both $p < 0.01$). Significant differences in the SOC, meaningfulness, and comprehensibility scores were also found between the four duration groups ($Z = 3.68, 2.77, 3.19, p < 0.001$ or 0.01) with several sex differences. The results showed the possibility that sports activities related to SOC, and athletes possessed higher SOC than that of non-athletes. The findings suggested that experience of successive years of sport activities enhanced SOC. This hypothesis was discussed mainly in terms of General Resistance Resources (GRRs) and the three SOC sub-concepts.

Keywords: Sense of Coherence, sports activity, General Resistance Resources, college students

1. Introduction

1.1. Mental and physical problems accompanying change in environment

A lack of places to physically move one’s body as well as disturbed lifestyle patterns invite unbalanced eating habits and a decrease in physical activity. This has resulted in an increase in the lifestyle diseases that cause the majority of deaths among the Japanese; namely, cancer, cardiovascular disease, cerebrovascular disease, and diabetes (Health and Welfare Statistics Association Japan, 2005).

In addition to the changes in lifestyle described above, it has also been pointed out that life environ-
"Not in Education, Employment or Training" (NEET) has been recognized as a social problem for quite some time (Hanashi, 1999). Furthermore, many cases of serious crimes related to violence and drug dependence have been reported. One possible cause of these psychological problems may be that young people are forced to live in environments with value systems that overemphasize intellectual development during critical growth periods for both physical and psychological development. In relation to these problems, researchers have indicated the importance of physical activities, physical expression through group activities, human interaction and human contact, as well as improved interpersonal skills (Higuchi, 2002; Nozawa, 2002).

1.2. Psychological effects of sports

The importance of physical activities has generally been emphasized in terms of physical strength and lifestyle illnesses. However, recent neurophysiological and psychological research shows that physical exercise may play a crucial role in brain and psychological functioning. For example, neuroscientific research has revealed that physical reactions and sensory information are extremely important for cognitive processes in the brain (Damasio, 1994, 1999). Research has also shown that physical exercise has positive psychological effects, which have been explained by the Monoamine Hypothesis, Heat Hypothesis, and Endorphine Hypothesis (Leith, 1994; Nishijima, 2002). Participation in sports activities is expected to lead to happiness, increased meaningfulness in life, enriched humanity, and an enjoyable school life (Research Committee Meeting on the Sports Activities of Middle and High School Students, 1997). Flow is one of the well-known positive psychological experiences associated with sports, and is a concept proposed by Csikszentmihalyi (1975) in his research on internal motivation. It is defined as a holistic feeling that is experienced when one becomes completely absorbed in an activity (Yagi and Sakairi, 2009).

1.3. Salutogenic model and sense of coherence

In the medical field, a considerable amount of medical research has been devoted to the treatment of various diseases, and examination of the factors that lead to disease (pathogenesis) has been the primary method of inquiry. However, in step with the current emphasis on preventative health, recently more attention has been paid to salutogenesis, or the theory that examines why people can stay healthy and which focuses on maintenance and promotion of health (Kichbusch, 1996). Central to this theory is the Salutogenic Model schematized by medical sociologist Antonovsky in the 1980s (Antonovsky, 1979, 1987). Instead of conventionally examining the factors that disrupt health, the model focuses on factors that actively contribute to a healthy state and is characterized by its examination of these factors within value systems and worldviews based on life experiences (Antonovsky, 1987). Antonovsky also suggested that health and illness are not on or off states. Rather, individuals occupy a place on a continuum of health and illness, with "health-ease" and "dis-ease" at opposite ends. Currently the Salutogenic Model is valued as a basic theory for health promotion (Kichbusch, 1996).

Antonovsky's Salutogenic Model arose from the following observations (Antonovsky, 1979). Antonovsky compared the mental health of women who were placed in harsh German concentration camps during World War II to the mental health of women without such experience (control group). The results showed that 71% of women who had been placed in the camps had impaired health, in contrast to 49% of the control group. Antonovsky became interested in the 29% of women who maintained positive mental health states despite their experiences in the harsh conditions of the camps and questioned how they could maintain such states. He subsequently found that Sense of Coherence (SOC) was the health factor that existed at the core of individuals with experience of extreme stressors or trauma who nonetheless were able to maintain psychophysical health and had successful coping. According to Yamazaki (2008), SOC, as the term suggests, refers to a perception and sense of one's experiences in the world in which one is living as coherent, consistent, reasonable, and comprehensible.

SOC is composed of the following three concepts (Antonovsky, 1979, 1987; Yamazaki, 2008), i.e., senses of meaningfulness, comprehensibility, and manageability. Meaningfulness is the motivational component of the SOC and refers to the extent to which a person feels that problems and demands are worth investing energy in, are worthy of commitment and engagement, sees as challenges rather than
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burdens. Comprehensibility is the cognitive component of the SOC and refers to the extent to which a person perceives the stimuli that face you, deriving from the internal and external environments. In addition, comprehensibility expects that stimuli they encounter in the future will be predictable, ordered, and explicit. Manageability is the instrumental/behavioral component of the SOC and the extent to which a person perceives that resources are adequate to meet the demands. In other wards manageability refers to resources under the person’s own control or to resources controlled by others.

1.4. Sports activities and SOC

SOC is a general, lasting perspective of the world and one’s life in it (Antonovsky, 1979). However, the existence of an area subjectively deemed important within one’s life is essential for an increase in SOC (Antonovsky, 1987). Thus, SOC is suspected to be enhanced when individuals have a purpose in life and are leading meaningful lives, which in turn largely contributes to a healthy lifestyle.

In general, performance in sports is not only determined by physiological factors, but is also closely linked to numerous psychological and mental factors including sense, decision, memory, emotions, and affect (Tatano, 1995). Reports on psychological skills among sport athletes reveal that successful athletes are marked by high self-confidence and low levels of stress and anxiety. Additionally, athletes with better performance are psychologically stable; they have effective coping strategies for stress, have a low tendency for feelings of anxiety, and have a higher threshold for feelings of stress (Kerr and Cox, 1991). In a survey targeting athletes, scores on the Purpose in Life (PIL) Test, which is a measure of a sense of purpose for living, were higher for those who engage in sports activities compared with those who did not (Endo et al., 2010a). Additionally, this tendency was particularly notable in athletes having a high number of successive years of play (Endo et al., 2009). These reports suggest the possibility of enhancing one’s SOC through the acquisition of positive psychological states and various psychological skills brought about by sports activities.

1.5. Purpose of the present study

Previous SOC research with high-school and nursing students found a correlation between SOC scores and students with high marks in physical education as well as higher SOC scores among students who were physically active compared to those who were not (Kristensson and Ohlund, 2005; Kuuppelomaki and Utriainen, 2003). In general, SOC is thought to be flexible, and several experiences in puberty are important for enhancing SOC. However, no studies to date have examined the level of SOC in athletes or the effects of duration of involvement in the sports activity in the past. Thus, the purpose of this study was to compare the level of SOC in athletes to that of non-athletes in a college population in terms of their current and past sports activities.

2. Methods

2.1. Subjects

Subjects were 716 students (315 males, 401 females; mean age 19.4 ± 1.4 years; age range 18-37 years) from metropolitan colleges including seven different faculties. The survey was conducted after the subjects received an explanation of the purpose of the study and provided their consent to participate. The survey was anonymous, and due consideration was paid so that the subjects could not be identified.

2.2. Measurement of SOC

As mentioned before, SOC is composed of the following three elements, i.e., the sense of meaningfulness (a feeling of fulfillment and meaningfulness in daily living, including dealing with stress), the sense of comprehendability (a feeling that one can predict or comprehend the circumstances where one is or will be placed), and the sense of manageability (a feeling that things will be fine somehow and that one can handle the situation).

SOC and its three elements scores were measured by questionnaires (SOC-13 or SOC-29) developed by Antonovsky (1987). The present study used the Japanese version of SOC-13 translated by Yamazaki (1999), for which the stability of factor structure was confirmed by Togari et al. (2008). This scale was consisted of 4-items of meaningfulness (e.g., Do you have the feeling that you don’t really care about what goes on around you?), 5-items of comprehensibility (e.g., Are you surprised by the behavior of
people whom you thought you knew well?), and 4-items of manageability (e.g., Has it happened that people whom you counted on have disappointed you?). On a 7-point scale used for scoring each item, subjects were asked to choose the number that best represents how they feel about each item. The higher the total score, the higher the subject’s capacity for stress coping and his/her capacity for maintaining good health.

2.3. Sports activities among the subjects

Sports activities among the subjects were surveyed in terms of their affiliated athletic organizations, sporting events, frequency of play, successive years of play, and past experience of playing sports.

2.3.1. Affiliated athletic organizations and sporting events (Question 1)

Subjects were asked to choose whether they a) play for an athletic team, b) play sports in sports-related social groups, or c) are not a member of any team or group. Then they were asked to describe in writing the sporting events in which they participate.

2.3.2. Frequency of play at the time of survey (Question 2)

The frequency of engagement in sports is generally asked in weekly and monthly units (Iwasaki et al., 2004; Hassmen, 2000; Nakamura et al., 2003). Subjects in the present study could choose one response from the following; a) nearly every day; b) three to four times a week; c) once or twice a week; d) two or three times a month; e) once a month; and f) seldom play sports.

2.3.3. Past history of sports (Questions 3 and 4)

The subjects were surveyed on the number of successive years of play. Previous studies divided the years into four groups, with 10 years set as the longest duration (Tokunaga et al., 1994; Kashizuka et al., 2000). The present study followed this by offering choices of a) 0-2 years (short); b) 3-4 years (semi-short); c) 5-9 years (semi-long); and d) > 10 years (long) (Question 3). Subjects were asked to reflect on all the sports activities they engaged in given specific age parameters, and to write a free response about these activities (Question 4).

2.3.4. Categorization by frequency of engagement

in sports

Subjects who were active in a school-affiliated athletic organization (Question 1-a) reported that they engaged in sports activities nearly every day (Question 2-a). Therefore, for the sake of convenience, subjects were categorized into the following three groups based on their frequency of engagement in sports at the time of the survey.

(1) High frequency sports activity (HFS) group: subjects who reported engaging in sports activities nearly every day in a school-affiliated athletic organization (Question 1-a, Question 2-a).
(2) Medium frequency sports activity (MFS) group: subjects who reported engaging in sports activities on a weekly basis regardless of affiliations with any athletic groups (Question 2-b, 2-c).
(3) Low frequency or No sports activity (LNS) group: subjects judged to have a low frequency of engaging in sports or no sports activity (Question 2-d, 2-e, 2-f).

2.4. Statistical analysis

SOC-13 was reported to be effected by individual differences in variances of SOC scores (Togari and Yamazaki, 2005). Additionally, these categories were not considered to be at regular intervals, and generally these data have been used to analyze by using nonparametric tests (Maruyama and Eto, 2010). Therefore, we dealt with SOC scores as categorized data. In this study, the Kruskal Wallis test was used to determine differences in SOC between the SOC elements scores for the HFS, MFS, and LNS groups. When significant differences were noted, the Steel-Dwass test was used for multiple comparisons. In addition, the category of past history of sports was ordinal. The Jonckheere-Terpstra and Steel-Dwass tests were used to determine differences in SOC and its elements scores for each group according to the number of years of past sport experiences.

We used SPSS (ver.18 for Windows) and R program for statistical tests.

3. Results

3.1. The sports activities of college students and differences between males and females in the SOC scores

Table 1 shows the distributions of current sports
Table 1 Distributions of the three groups according to current sports activities and the four groups according to past sports activities

<table>
<thead>
<tr>
<th>Group</th>
<th>Sex</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>Females</td>
</tr>
<tr>
<td>Current</td>
<td></td>
<td></td>
</tr>
<tr>
<td>HFS (High frequency sports activity)</td>
<td>92</td>
<td>50</td>
</tr>
<tr>
<td>MFS (Medium frequency sports activity)</td>
<td>131</td>
<td>152</td>
</tr>
<tr>
<td>LNS (Low frequency or No sports activity)</td>
<td>92</td>
<td>199</td>
</tr>
<tr>
<td>Past</td>
<td></td>
<td></td>
</tr>
<tr>
<td>a) 0-2 years (short)</td>
<td>27</td>
<td>92</td>
</tr>
<tr>
<td>b) 3-4 years (semi-short)</td>
<td>18</td>
<td>49</td>
</tr>
<tr>
<td>c) 5-9 years (semi-long)</td>
<td>101</td>
<td>143</td>
</tr>
<tr>
<td>d) &gt;10 years (long)</td>
<td>169</td>
<td>117</td>
</tr>
</tbody>
</table>

Table 2 Multiple comparisons of SOC and its three elements scores for the three groups divided by current sports activities

<table>
<thead>
<tr>
<th>Score</th>
<th>Group</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
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<tr>
<td></td>
<td></td>
<td>Median</td>
<td>Median multiple</td>
<td>Median</td>
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<tr>
<td></td>
<td></td>
<td>comparison</td>
<td>comparison</td>
<td></td>
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<tr>
<td>SOC</td>
<td>HFS</td>
<td>54.0 (7.5)</td>
<td>**</td>
<td>56.5 (7.4)</td>
</tr>
<tr>
<td></td>
<td>MFS</td>
<td>52.0 (5.5)</td>
<td>*</td>
<td>52.0 (6.0)</td>
</tr>
<tr>
<td></td>
<td>LNS</td>
<td>50.0 (5.5)</td>
<td></td>
<td>51.0 (5.9)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td>52.0 (6.0)</td>
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<td></td>
<td></td>
<td></td>
<td>50.0 (6.0)</td>
</tr>
<tr>
<td>meaningfulness</td>
<td>HFS</td>
<td>19.0 (2.5)</td>
<td>**</td>
<td>19.0 (2.5)</td>
</tr>
<tr>
<td></td>
<td>MFS</td>
<td>18.0 (3.0)</td>
<td>*</td>
<td>18.0 (3.5)</td>
</tr>
<tr>
<td></td>
<td>LNS</td>
<td>17.0 (2.5)</td>
<td></td>
<td>17.0 (2.9)</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td>17.0 (2.5)</td>
</tr>
<tr>
<td>comprehensibility</td>
<td>HFS</td>
<td>19.0 (3.1)</td>
<td></td>
<td>20.0 (2.9)</td>
</tr>
<tr>
<td></td>
<td>MFS</td>
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<td></td>
<td>20.0 (3.5)</td>
</tr>
<tr>
<td></td>
<td>LNS</td>
<td>18.0 (3.0)</td>
<td></td>
<td>19.0 (3.5)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>17.5 (3.5)</td>
<td></td>
<td>17.0 (3.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>18.0 (3.0)</td>
</tr>
<tr>
<td>manageability</td>
<td>HFS</td>
<td>16.0 (2.5)</td>
<td></td>
<td>16.0 (2.5)</td>
</tr>
<tr>
<td></td>
<td>MFS</td>
<td>16.0 (2.5)</td>
<td></td>
<td>16.0 (3.0)</td>
</tr>
<tr>
<td></td>
<td>LNS</td>
<td>15.0 (2.5)</td>
<td></td>
<td>15.0 (3.0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>14.5 (2.5)</td>
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<td>15.0 (2.5)</td>
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<td></td>
<td></td>
<td></td>
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<td>15.0 (2.0)</td>
</tr>
</tbody>
</table>

*: p<0.05, **: p<0.01, ***: p<0.001
Note: Each value in the brackets shows quartile deviations.

activities (current). Of the 137 subjects who were members of school-affiliated athletic teams (88 males, 49 females; Question 1-a), 84 subjects engaged in sports activities nearly every day (Question 2-a). Of the 247 subjects who were part of sport-related social groups (118 males, 129 females; Question 1-b), 143 (74 males, 69 females) engaged in sporting activity once or twice a week (Question 2-c). As for the 332 individuals who were not members of any organization (109 males, 223 females; Question 1-c), 193 (59 males, 134 females) responded that they seldom play sports (Question 2-f).

On the basis of these results, we assigned 142 (92 males, 50 females) subjects to the HFS group, 283 (131 males, 152 females) to the MFS group, and 291 (92 males, 199 females) to the LNS group (Table 1).

The SOC and comprehensibility scores for males were higher than those for females scores by the Mann-Whitney test ($U = 52543.00, p<0.001$; $U = 46510.50, p<0.001$). Manageability scores for males were lower than those for females ($U = 55499.50, p<0.001$).

3.2. Current sports activities and SOC

The Kruskal Wallis test showed significant differences in the scores of SOC ($\chi^2 = 12.53, p<0.01$) and meaningfulness ($\chi^2 = 11.80, p<0.01$) among the three groups. The Steel-Dwass test for multiple comparisons showed significant differences in the SOC scores between the HFS and LNS groups ($t = 3.22, p<0.01$) and between the MFS and LNS groups ($t = 2.50, p<0.05$) (Table 2). Additionally, the Steel-Dwass test showed significant differences in the
meaningfulness scores between the HFS and LNS groups \((t = 3.24, p < 0.01)\) and between the MFS and LNS groups \((t = 2.41, p < 0.05)\) (Table 2).

In term of sex, the Kruskal Wallis test in males showed significant differences in the scores of SOC \((\chi^2 = 7.94, p < 0.05)\) and meaningfulness \((\chi^2 = 7.72, p < 0.05)\) among three groups. The Steel-Dwass test showed significant differences in the SOC and meaningfulness scores between the HFS and LNS groups \((t = 2.85, p < 0.05)\) (Table 2). On the other hand, the Kruskal Wallis test for females showed significant differences in the scores of meaningfulness \((\chi^2 = 2.28, p < 0.05)\) among the three groups (Table 2). The Steel-Dwass test showed significant differences between the MFS and LNS groups \((t = 2.49, p < 0.05)\) (Table 2).

3.3. Duration of successive sports play and SOC

The results regarding the number of successive years of play of subjects are given in the “Past” column of Table 1. The Jonckheere-Terpstra test showed significant differences in the scores of SOC \((Z = 3.68, p < 0.001)\), meaningfulness \((Z = 2.77, p < 0.01)\), and comprehensibility \((Z = 3.19, p < 0.001)\) among the four duration groups. As shown in Table 3, the Steel-Dwass test for multiple comparisons revealed significant differences in SOC scores between the short (a) and long (d) groups \((t = 3.24, p < 0.01)\) and between the semi-long (c) and long (d) groups \((t = 2.82, p < 0.05)\), as well as significant differences in meaningfulness scores between the short (a) and long (d) groups \((t = 2.79, p < 0.05)\) and between the semi-long (c) and long (d) groups \((t = 2.61, p < 0.05)\) (Table 3).

In term of sex, the Jonckheere-Terpstra test in males showed significant differences in the scores of SOC \((Z = 3.88, p < 0.001)\), meaningfulness \((Z = 2.19, p < 0.05)\), comprehensibility \((Z = 2.79, p < 0.01)\) and manageability \((Z = 2.59, p < 0.05)\) among the four groups (Table 3). The Steel-Dwass test showed significant differences in the SOC and comprehensibility scores between the short (a) and long (d) groups \((t = 3.80, p < 0.001; t = 3.34, p < 0.01)\) (Table 3). Additionally, the Steel-Dwass test showed significant differences in the manageability scores between the short (a) and long (d) groups \((t = 2.73, p < 0.05)\), semi-short (c) and long (d) groups \((t = 2.62, p < 0.05)\) (Table 3). On the other hand, the Jonckheere-Terpstra test for females showed significant differences in the scores of meaningfulness,

\[\text{Table 3} \quad \text{Multiple comparisons of SOC and its three elements scores for the four groups divided by past sports activities}\]

<table>
<thead>
<tr>
<th>Score</th>
<th>Duration</th>
<th>Total</th>
<th>Male</th>
<th>Female</th>
</tr>
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<tr>
<td></td>
<td></td>
<td>Median</td>
<td>Median</td>
<td>Median</td>
</tr>
<tr>
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<td></td>
<td>multiple</td>
<td>multiple</td>
<td>multiple</td>
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<tr>
<td></td>
<td></td>
<td>comparison</td>
<td>comparison</td>
<td>comparison</td>
</tr>
<tr>
<td>SOC</td>
<td>(a) 0-2 years</td>
<td>50.0 (5.0)</td>
<td>47.0 (5.0)</td>
<td>51.5 (5.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>**</td>
<td>***</td>
<td>n.s.</td>
</tr>
<tr>
<td></td>
<td>(b) 3-4 years</td>
<td>51.0 (5.5)</td>
<td>50.5 (7.0)</td>
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<td></td>
<td></td>
<td></td>
<td>51.0 (6.5)</td>
<td>50.0 (6.0)</td>
</tr>
<tr>
<td></td>
<td>(c) 5-9 years</td>
<td>50.0 (6.0)</td>
<td>55.0 (6.0)</td>
<td>50.0 (6.0)</td>
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<td>(d) &gt; 10 years</td>
<td>53.0 (6.0)</td>
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<tr>
<td>meaningfulness</td>
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<td>16.0 (2.5)</td>
<td>17.0 (3.0)</td>
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<td>*</td>
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<td>n.s.</td>
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<td>(b) 3-4 years</td>
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<td>(c) 5-9 years</td>
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<td>19.0 (2.6)</td>
<td>19.0 (2.5)</td>
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<tr>
<td></td>
<td>(d) &gt; 10 years</td>
<td>19.0 (2.6)</td>
<td></td>
<td></td>
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<tr>
<td>comprehensibility</td>
<td>(a) 0-2 years</td>
<td>18.0 (3.0)</td>
<td>16.0 (2.0)</td>
<td>18.0 (3.0)</td>
</tr>
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<td></td>
<td></td>
<td>*</td>
<td>***</td>
<td>n.s.</td>
</tr>
<tr>
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<td>(b) 3-4 years</td>
<td>18.0 (3.0)</td>
<td>19.0 (5.0)</td>
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<td>18.0 (2.8)</td>
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<tr>
<td></td>
<td>(d) &gt; 10 years</td>
<td>19.0 (3.1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>manageability</td>
<td>(a) 0-2 years</td>
<td>15.0 (2.0)</td>
<td>15.0 (2.5)</td>
<td>15.0 (2.4)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>n.s.</td>
<td></td>
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</tr>
<tr>
<td></td>
<td>(b) 3-4 years</td>
<td>15.0 (2.0)</td>
<td>13.5 (3.0)</td>
<td>15.0 (2.0)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>16.0 (3.5)</td>
<td>15.0 (2.0)</td>
</tr>
<tr>
<td></td>
<td>(c) 5-9 years</td>
<td>15.0 (3.0)</td>
<td></td>
<td>15.0 (2.5)</td>
</tr>
<tr>
<td></td>
<td>(d) &gt; 10 years</td>
<td>16.0 (2.5)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*: \(p < 0.05\), **: \(p < 0.01\), ***: \(p < 0.001\)

Note: Each value in the brackets shows quartile deviations.
Sports Activities and Sense of Coherence

\( Z = 2.10, \ p < 0.05 \) among the four groups (Table 3). However, the Steel-Dwass test showed no significant differences in the meaningfulness scores.

4. Discussion

4.1. Current sports activities and SOC

4.1.1. Frequency of engagement in sports and SOC

The International Society of Sport Psychology (1992) summarizes psychological benefits of regular exercise as follows: a) decrease in state anxiety; b) improvement in mild to moderate depressive states; c) a decrease in neurosis and anxiety disorders; d) supplementation of treatment for patients with severe depression; e) reduction in stress markers; and f) benefits on affect. In addition, specific states of feelings and emotions brought about by sports activities have been widely studied. Studies from other countries report that factors of the transient, specific emotional states of exercise include positive engagement and tranquility (Gauvin and Rejeski, 1993), positive well-being (McAuley and Courneya, 1994), and positive affect (Lox et al., 2000). In Japanese studies, factors such as pleasure, feelings of relaxation and satisfaction (Hashimoto and Tokunaga, 1995), sports competence, an attractive body, physical strength, and physical self-worth (Uchida et al., 2003) have been reported. Factors examined in these studies were related to positive moods and emotions (Gauvin and Rejeski, 1993; Hashimoto, 2000; McAuley, 1991; Yeung, 1996). The psychological changes accompanying sports activities are likely to function as factors for managing stress and may enhance SOC.

SOC, a concept central to Antonovsky’s Salutogenic Theory, is a learned sense that is formed and reinforced within individuals through life experiences of success and failure in stress coping. As such, it has demonstrated effects in the capacity to manage stress and maintain health. SOC is greatly influenced by the existence of General Resistance Resources (GRRs), which SOC mobilizes in stress coping (Yamazaki, 2008). The previously mentioned states of mind and emotions accompanying sports activities were both related to GRRs and thus might enhance SOC among athletes.

Kristensson and Ohlund (2005) reported that the relationship between SOC and the grade of physical education had significant positive correlation. Kup pelomaki and Uttriainen (2003) also reported that subjects with the higher daily physical activities had higher SOC than those with less physical activities. However, it is unclear whether participation in sports activities itself affects SOC. Thus, the present study examined whether sports activities were associated with SOC. The results revealed significant differences in the SOC and meaningfulness scores among the three groups categorized by current sports activities and multiple comparison testing showed significant differences between the SOC scores for the HFS, MFS and LNS groups with the several sex differences. Additionally, it was suggested that HFS including athletes had higher SOC than those of the MFS and LNS groups. The results showed the possibility that sports activities related to SOC, and athletes possessed higher SOC than that of non-athletes.

4.1.2. Duration of successive sports play and SOC

The influence of economic status on SOC has been recognized: the higher the SOC, the better one’s economic status (Antonovsky, 1979). Generally a certain level of economic stability is required to continue sports activities. Specifically, the costs of specialized sporting goods and transportation expenses for away games and practices are not low, and time that might otherwise have been devoted to a part-time job is limited because of sports activities. The rather high economic status that enables continued participation in sports may work as one aspect of GRRs which can enhance SOC.

Additionally, childhood living environment has been cited as a factor that influences SOC. Individuals who are active in sports activities are likely to have received long support from parents since childhood, given that parental understanding is essential for the continuation of sports activities in children. Therefore, there was a possibility that successive years of sports were related to SOC. In the present study, the scores of SOC, meaningfulness, and comprehensibility were different among the four groups categorized by successive years of sports. The results of multiple comparisons might show that the greater the number of successive years of sports, the more enhanced the scores of SOC and sub-concepts. These findings suggested that experience of successive years of sport activities enhanced SOC.

In the Salutogenic Model suggested by Antonovsky (1979), SOC is reinforced when individuals lose GRRs and mobilizing the remaining GRRs. Kanou
et al. (2011) reported that the most college athletes overcame difficulties caused by sports activities. Endo et al. (2010b) also reported the possibility that individuals with a low level of SOC had not yet overcome such difficulties while individuals with a high level of SOC had already overcome them. Therefore, individuals who had continued sports activities over the long term might have developed a higher SOC. In the present study, no significant difference in the manageability scores was observed among the four groups. These results support those of previous studies in which some athletes had not overcome their difficulties (Endo et al., 2010b; Nakagomi, 1987; Nakagomi and Okuda, 1993). In such cases, they had not experienced the “underload-overload balance” which is related to manageability.

4.2. Sub-concepts of SOC and sports activities

4.2.1. Sense of meaningfulness and sports activities

Sense of meaningfulness, a concept of SOC, is the degree to which one finds one’s life meaningful; that is, considering some of the obstacles and demands of life to be challenges rather than burdens that one would be better off without and, at the very least, believing that some of life’s obstacles and demands are worth the involvement and invested energy. Individuals with higher levels of this component do not happily accept misfortunes. Rather, they actively accept the challenges imposed on them by unfortunate experiences, resolve to find meaning in them, and do their best to overcome them with dignity (Antonovsky, 1987).

In short, a sense of meaningfulness is the feeling that one should perceive daily events as having meaning, and accept them as challenges, rather than burdens, that are meant to be welcomed (Takayama et al., 1999). As indicated above, day-to-day life for athletes is, in a way, a succession of challenges. These experiences may enhance their sense of meaningfulness. Additionally, participation in shaping outcome is important to enhancing a sense of meaningfulness (Antonovsky, 1987). The role of “autonomy and participation decision making” is considered to be important in this case. In sports activities, this role is also an essential factor for athletes. These perspectives on a sense of meaningfulness may share similar points with views on the purpose in life and meaning of life found in Logotherapy proposed by Frankl. Indeed, Endo et al. (2009) found in their research on athletes that PIL Test scores, which indicate the extent to which one believes that one’s life is worth living, were high among those who had many successive years of play, and that those who were involved in some kind of sports had higher PIL scores than those who did not (Endo et al., 2010a).

4.2.2. Sense of comprehensibility and sports activities

Sense of comprehensibility, which is central to the concept of SOC, demonstrates the extent to which one perceives a variety of life circumstances as something understandable. In other words, it is the extent to which one perceives an event as clear and structured and which is ordered and consistent, rather than as chaotic, random, accidental, and unexplainable. Accordingly, to enhance the sense of comprehensibility, experience of consistency is important (Antonovsky, 1987).

In fact, the rules and discipline required in order to participate are clear and consistent in sports activities; moreover, the locus of responsibility for the rules is clear. As stated above, athletes tend to learn many lessons by overcoming a variety of difficulties. When they reflect on the past, they tend to feel that the present self is an accumulation of their past experiences, irrespective of whether or not they considered those experiences desirable at the time they occurred (Kanou et al., 2011). A consistent perspective such as this may be a foundation for enhanced SOC. However, there was not a significant relation between sports activity and comprehensibility in this study. From this result, the athletes might experience events which feel meaningfulness but not consistency. In other words, they might not feel consistency in experiences concerning sports activities.

4.2.3. Sense of manageability and sports activities

Sense of manageability, which is also central to SOC, is the perception that one has adequate resources that can be triggered from within and which can be used freely. Individuals with higher levels of this sense tend to view life events as manageable and as challenges capable of being met. To enhance a sense of manageability, the “underload-overload balance” in one’s experience is important (Antonovsky, 1987).

As previously mentioned, athletes are expected to be confident that, to some extent, they are equipped to cope with difficulties. It may be said that such
conﬁdence is an asset for exceptional sports athletes. Athletes additionally learn from a variety of experiences during the course of training and sports activities. For example, they are expected to overcome a multitude of ordeals such as injury, interpersonal problems, a slump in performance, or danger of burnout, all coupled with a tough training schedule. To that effect, there are reports that athletes are likely to have personal experience overcoming failure and setbacks (Kanou et al., 2011), and they have deep and intimate interactions with their coaches and teammates in general (Takenouchi et al., 2006). Therefore, there is a possibility that individuals who engage in sports activities increase their sense of manageability and SOC. However, similar to the case of comprehensibility, there was not a significant relation between sports activity and manageability in this study. High level of meaningfulness and comprehensibility are needed to enhance manageability (Antonovsky, 1987). Since the sub-concepts of SOC are complicatedly related each other, further investigations are needed to understand the relationships to sports activity.

4.3. Differences of results between males and females

A previous study suggested that the scores of SOC between males and females were similar (Takayama et al., 1999), though the functions of SOC were different by sex. However, in the present study the SOC and sub-concepts scores between males and females were different. Namely, the scores of SOC and comprehensibility for males were higher than those for females, and the scores of manageability for males were lower than those for females. Additionally, males with high frequency of sports activity had higher SOC, whereas this relation was not shown for females. Lena et al. (2005) reported that SOC scores for males in adolescence were higher than those for females. Our results concur with this study and suggest that sports activates in males may influence their SOC scores, whereas those in females may not. Moreover, the females’ SOC and sub-concepts scores might not be influenced by past sports activities. A psychological study for sports participants showed that females had a tendency to be “dependent” (Esashi, 1981). In general, SOC is thought to be autonomous sense (Antonovsky, 1987) which is opposite to “dependent”. It was suggested that this psychological difference influenced our results.

4.4. Further tasks and implications

The present study with college students compared the SOC scores in terms of current and past sports activities. Although with the several sex differences, our results showed that students who responded that they were currently engaged in a sport had higher SOC scores than those who were not. Considering the application of the results to the Salutogenic Model (Antonovsky, 1979, 1987), the specificities of athletes may be pointed out as follows. First, to continue sports activities, the athletes were usually raised in a good environment (i.e., with plenty of GRRs) from the outset. Such an environment might provide high-quality life experiences, serving to enhance their SOC. Second, there is a possibility that those athletes with higher SOC enhance their SOC further by making use of their plentiful GRRs. In either case, our results show the close relationship between sports activities and SOC.

Various capabilities such as physical strength and the will to continue athletic activities also come into play when engaging in sports. In team sports especially, life skills such as communication skills need to be fully utilized. Thus, psychological measures for life skills, as well as those related to quality of life (QOL), such as self-efficacy and self-esteem, may need to be investigated in future studies of SOC. Additionally, a few individuals who engage in sports do not have higher levels of SOC. In the future, the relationship between sports activities and SOC should be examined through more comprehensive data collection including qualitative data. The increase in SOC from sports activities may possibly lead to enhanced QOL, as a result of a heightened purpose in life as well as an improvement in communication skills and immunity. In the future, reconsideration of measurement methodology would enable an examination based on more accurate data.

5. Conclusion

The purpose of this study was to compare the level of SOC in athletes to that of non-athletes in a college population by using the Japanese version of the SOC-13. The results showed the possibility that
sports activities related to SOC, and athletes possessed higher SOC than that of non-athletes. The findings suggested that experience of successive years of sport activities enhanced SOC.

References


