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Original Article

Factors promoting sense of coherence among university students in urban areas of Japan: individual-level social capital, self-efficacy, and mental health

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Abstract:

Objective: Sense of Coherence (SOC) is a concept that helps to explain the relation between personal intentionality as psychosocial factors and health-related behaviors. Thus, it is essential to enhance SOC when encouraging a healthy lifestyle. However, the factors that promote SOC have not been fully investigated among university students. The objective of this study was to clarify the general resistance resources (GRRs) that may promote the development of the SOC among university students. Therefore, we examined the relationship between SOC and social capital (SC), self-efficacy, and mental health.

Methods: Participants included 443 students from nine academic departments at eight universities in the Kanto or Kinki metropolitan areas of Japan. Participants completed an anonymous questionnaire. Individual-level cognitive and structural SC, generalized self-efficacy, mental health inventory (from SF-36v2), and SOC were measured. Confirmatory factor analysis using structural equation modeling was conducted to verify the factor structure of the SOC-13 scale. Stepwise multiple regression analysis and two-way layout analysis of variance were performed with SOC as the dependent variable.

Results: The factor structure of SOC indicated the optimal model fit in the second-order three-factor model of the 12 items. SOC was predicted by five variables: age, cognitive SC, structural SC, mental health, and self-efficacy. For students from urban areas, SOC was predicted by the interaction between cognitive and structural SC.

Conclusion: SOC was significantly related to cognitive SC, structural SC, and self-efficacy as well as mental health in university students from urban areas. Furthermore, the combination of higher-level cognitive SC and higher-level structural SC exerted an

inhibitory influence on SOC among students who previously and currently live in urban areas. Therefore, the findings indicated that both cognitive and structural SC as well as self-efficacy may act as GRRs that promote the development of SOC, and similarly, good mental health may promote a strong SOC.

Keywords: sense of coherence, general resistance resources, social capital, psychosocial factors, university students, urban areas

Introduction

Since the 20th century, non-communicable diseases (NCDs) such as malignant neoplasms, heart disease, diabetes, and hypertensive disease have become predominant causes of death in Japan. Thus, the prevention of NCDs is now a high priority (1). Globally, approximately 38 million people (approximately 68% of the total number of deaths) die from NCDs each year (2). In particular, the number of middle-aged and elderly NCD patients is rapidly increasing, and is expected to continue to rise until 2030 (3). One strategy to reduce the onset of NCDs later in life involves encouraging individuals to adopt healthy lifestyle behaviors from an early age. Such support may be especially effective if it is promoted during late adolescence, particularly during years spent as university students.

Antonovsky (4) postulated that people with a strong SOC successfully and consistently utilize the various general resistance resources (GRRs) that are accessible. In short, they are prepared to face challenges in a realistic manner, and more maintain in daily healthy lifestyle behaviors (4). Among university students, perceived social support have been proposed as GRRs that influence SOC (5). However, the specific factors promoting the function of SOC, including GRRs, have yet to be fully investigated.

By taking advantage of various resources and options, people with strong SOC may be more likely to deal with problems in a flexible and realistic manner, and may be better at coping with stress and receiving support from others (4). In other words, in their usual environment, these people appear to have an abundance of ‘human relationship’ capital, which can function as a GRR. Human relationship capital is a type of social capital (SC) that represents the ability to establish human networks and maintain a basic sense of trust

in interpersonal relationships. SOC may be promoted by good mental health. However, the relationship between these 3 factors at a individual-level among university students has not been clarified.

Furthermore, self-efficacy is considered to be a personal resource that is distinct from the concept of SOC, which refers to one's outlook on and views about life. Previous studies have indicated that there is a relationship between SOC and self-efficacy among elderly people, teenagers, and patients with specific diseases (6-8). However, no studies have investigated this relationship among university students.

SOC is reported to develop throughout life (9), and in university students during late adolescence, SOC is still in the formation process (4). From the viewpoint of developmental stages, individuals generally re-develop their relationships with other people and with society during adolescence (10). In other words, university students are in the process of social development, and susceptible to their social environment. As SOC greatly depends on external resources, such as interactions with individuals and with general society (4), psychosocial perspectives are useful when discussing SOC development and the influence of GRRs among university students.

Against this background, and on the basis of salutogenesis, we aimed to clarify GRRs that promote the development of SOC among university students. Specifically, we analyzed the relationships between SC, self-efficacy, and mental health (SOC promoters).

Methods

Participants and Procedures

We contacted faculty at universities included in the 2013 Listing of Universities Across Japan (Association of Education), with the aim of securing more than 600 study

participants from universities in the Kanto and Kinki Metropolitan areas. Specifically, we contacted a representative of faculty at each university and requested their cooperation in the study. The study participants comprised 614 third- or fourth-year students (including postgraduate students who had recently finished their undergraduate program) from nine faculties at the eight universities which agreed to participate in the study. Ultimately, 517 responses were received (response rate: 84.2%), among which, 443 were considered valid (effective response rate: 85.7%). Participants were permitted to withdraw from the study at any time and were assured of their anonymity. We provided the university contact persons with consent forms and questionnaires, and asked them to distribute the forms to the participants. We then collected the self-completed anonymous questionnaires from the contact person by post after a set length of time. This study was conducted between May and October 2014.

Measurements

Cognitive social capital

We employed the same SC scale used by Hanibuchi *et al*. (11) to assess "generalized trust" and "norms of reciprocity", which are components of cognitive SC (12,13).

The "generalized trust" item included the following statement: "Generally speaking, would you say that most people can be trusted?" The "norms of reciprocity" item included the statement: "Would you say that most of the time people try to be helpful?" Participants responded on a 5-point scale ranging from "Strongly agree" to "Strongly disagree". The scores for these 2 items are summed (2 to 10 points), with higher scores indicating higher levels of cognitive SC.

Structural social capital

On the basis of the scaling of structural SC, the reliability and validity of which have been verified (14,15), a pre-survey was conducted with 10 university students and 10 activity fields (networks) were reconstituted to align the content with the actual connections university students in Japan have with groups and organizations. The contents, including union meeting and private party, were excluded, and university activities, event activities in the community, were included.

Participants were asked about groups with which they were connected, and chose the fields of activity in which they had been involved during the previous year. Each positive response equaled 1 point, and the total score (1 to 10 points) was calculated, with higher scores indicating higher levels of structural SC.

Self-efficacy

We used the generalized self-efficacy scale, which was developed by Sherer *et al*. (16) and translated into Japanese by Narita *et al*. (17). The scale comprises 23 items, each of which has 5 possible responses ranging from “Strongly agree” to ”Strongly disagree”. The total score (23 to 115 points) is calculated, with higher scores indicating higher levels of self-efficacy. The reliability and validity of the scale have been sufficiently verified (17). Cronbach’s alpha in this sample was $\alpha = 0.86$.

Mental health

Among the subscales of the SF-36v2 Japanese version of the health-related quality of life scale, we used the subscale “Mental Health Inventory (MHI)”, which has verified reliability and validity (18,19). The subscale, which comprises 5 items, measures an individual’s mental state during the previous month. Each question has 5 possible

responses ranging from “Always” to “Not at all”, and the total score is converted into a subscale score ranging from 0 to 100 points. A higher subscale score indicates a more favorable state of mental health. Cronbach’s alpha in this sample was $\alpha = 0.82$.

Sense of coherence

We used the short version of the SOC scale, which was developed by Antonovsky (4) and translated into Japanese by Yamazaki (20). The scale comprises 13 items, each of which has 7 possible responses ranging from “Very frequent” to “Not at all”, and the total score ranges from 13 to 91 points. Although various previous studies have examined the reliability, validity, and factor structure of the 13-item seven-point version of the SOC scale (SOC-13 scale), consensus regarding the factor model of this scale has not been reached, and some relevant issues have been identified (21-23). Therefore, in the present study, we conducted confirmatory factor analysis. To investigate between-factor relationships, we calculated the total score using the factor model, which resulted in the optimal evaluation index.

Demographic variables

We considered the age, gender, major, family constitution, siblings, number of years lived at current location, living situation, and home region of the participants.

Statistical analysis

We performed a descriptive analysis of participant attributes, cognitive and structural SC, self-efficacy, mental health, and SOC. To consider the number of years in college as well as personal history of moving addresses, we divided the participants into three

groups based on the number of years of residence at their current location: ≤4 years, 5–19 years, or ≥20 years. Participants were divided into two groups based on home region: within the two metropolitan areas in which the participating universities were located or other regions of Japan.

We used Cronbach's α values and structural equation modeling to conduct a confirmatory factor analysis of the factor structure of the SOC-13 scale.

We analyzed the relationships between participant demographics and cognitive SC, structural SC, self-efficacy, mental health, and SOC via Student's t-test, one-way layout analysis of variance, Welch's test, the Tukey–Kramer multiple comparison test, and Games–Howell multiple comparison test, respectively. In addition, we used Pearson's correlation coefficient to analyze the relationships between individual SOC scores and cognitive and structural SC, self-efficacy, and mental health. We also performed stepwise (forward-backward stepwise selection) multiple regression analysis with SOC as the dependent variable.

Because environment may influence the SC and SOC scores obtained by university students, we investigated the relationships between SOC and cognitive/structural SC scores according to home region. We divided the participants into two groups according to their cognitive and structural SC scores. The low score group included people who obtained the average or lower than average score, and the high score group consisted of people who obtained a higher than average score. We used a two-way layout analysis of variance to analyze the relationships between participant SOC and cognitive/structural SC scores according to home region.

We used SPSS ver. 22.0 for Windows (Amos ver. 22.0) for all analyses. The level of significance was set at 0.05.

Ethics approval

This study was conducted with the approval of the Kanazawa University Medical Ethics Committee (April 28, 2014; No. 511).

Results

Participant characteristics

The mean age of the participants was 21.06 years (*SD* = 1.18, range: 20–27). The average SOC scores for males and females were 50.51 (*SD* = 10.07) and 50.42 (*SD* = 8.90) points, respectively, and we found no significant difference between the genders. Table 1 shows additional results.

Factor structure of SOC

As per previous studies (21-23), we performed confirmatory factor analysis using the one-factor and second-order three-factor models of SOC (Table 2). We obtained the optimal model fit, with Cronbach's α, CMIN/DF, GFI, AGFI, CFI, RMSEA, and AIC values of 0.76, 2.532, 0.953, 0.931, 0.910, 0.059, 184.186, respectively, in the second-order three-factor model. This model comprised 12 items after excluding one item (Q2) that showed a markedly low item-total correlation coefficient in a non-modified model.

Factors related to SOC

Relationships between participant demographics and cognitive SC, structural SC, self-efficacy, mental health, and SOC

When assessing the relationships between participant demographics and cognitive SC, we found that average cognitive SC scores were significantly higher for those not living with their families (M = 7.19, SD = 1.36) compared with those living with their families (M = 6.76, SD = 1.52, p = 0.002). We also found a significant difference in cognitive SC scores when we divided the participants into 3 groups according to the number of years they had lived at their current location (p = 0.015). Multiple comparisons revealed a significantly higher score for those with ≤4 years (M = 7.18, SD = 1.38) compared with those with ≥20 years (M = 6.72, SD = 1.57, p = 0.015). Regarding the home region of the participants, cognitive SC scores were significantly lower for those whose home region was either of the 2 metropolitan areas in which the participating universities were located (M = 6.88, SD = 1.51), compared with those whose home region was in another area (M = 7.27, SD = 1.25, p = 0.016).

When assessing the relationships between participant demographics and structural SC, we found significant differences in structural SC scores when we divided the participants into 3 groups according to their major (p = 0.004). Multiple comparisons revealed that humanities students obtained significantly higher scores (M = 4.38, SD = 2.02) than science (M = 3.86, SD = 1.74) and medical (M = 3.60, SD = 1.67) students (p = 0.020, p = 0.009).

Participant demographics were not associated with self-efficacy, mental health, or SOC.

Relationships between SOC and cognitive SC, structural SC, self-efficacy, and mental health

We found mild, moderate, and moderate significant correlations between individual levels of SOC and cognitive SC (r = 0.40, p < 0.001), self-efficacy (r = 0.54, p < 0.001),

and mental health ($r = 0.51$, $p < 0.001$), respectively. We also found a mildly significant positive correlation between self-efficacy and structural SC ($r = 0.24$, $p < 0.001$).

Analysis of SOC-related factors

We conducted multiple regression analysis using a stepwise method (forward-backward stepwise selection) with SOC as the dependent variable (Table 3). Independent variables included age, gender, and factors that were significantly correlated with SOC or cognitive SC, structural SC, self-efficacy and mental health based on univariate analysis. We found that participant SOC could be explained by age ($\beta = 0.10$, $p = 0.004$), cognitive SC ($\beta = 0.22$, $p < 0.001$), structural SC ($\beta = -0.08$, $p = 0.033$), mental health ($\beta = 0.35$, $p < 0.001$), and self-efficacy ($\beta = 0.40$, $p < 0.001$) ($p < 0.001$, $R^2 = 0.485$, adjusted $R^2 = 0.479$).

Relationship between participant SOC and SC according to home region

We conducted a two-way layout analysis of variance to assess the relationship between SOC and cognitive/structural SC (Figures 1) among 340 participants whose home region was either of the two metropolitan areas in which the participating universities were located, as well as 103 participants whose home region was in another area. As the average cognitive SC score was 6.97 points, we divided the participants into two groups based on whether they had scores of ≤7 points (low group) or ≥8 points (high group). Similarly, as the average structural SC score was 4.04 points, we divided the participants into two groups depending on whether they obtained scores of ≤4 points (low group) or ≥5 points (high group). Our analyses revealed an interaction between SOC and SC among participants whose home region was in either of the two metropolitan areas in which the participating universities were located ($p = 0.024$, $\eta_p^2 = 0.02$).

Discussion

SOC among university students

In the present study population, the mean overall SOC score was 50.5 points. In previous studies of university students in urban areas of Japan, mean SOC scores were reported to be 48.7 points (23) and 50.3 points (24). Our results are therefore similar to those reported in the abovementioned studies.

Furthermore, previous studies in the United States (22) and Turkey (5) reported mean SOC scores of 44.0 and 56.9 points, respectively. These results suggest that SOC among university students varies according to country. However, more data are necessary to allow a comparison of SOC values between countries.

SOC-related factors among university students

Cognitive and structural SC

Our findings indicate that individual-level cognitive and structural SC are factors related to SOC. Previous studies have reported that the strength of social support networks, which is a factor similar to structural SC, was related to SOC (5). However, no previous studies have investigated the relationship between structural SC and SOC in university students. In the present study, we identified a relationship between SOC and structural SC, which represents an individual's broad group networks, including supportive connections. The results of this study indicate that trust and mutual benefits (cooperative relationships) resulting from human-to-human connections positively influence an individual's orientation and views regarding their life. People with strong SOC are thought to cope with stressful stimuli by occasionally depending on various

physical and human resources around them. As these individuals are largely thought to be trustworthy, this coping is generally achieved in a balanced manner, consistent with the idea of "salutogenesis" proposed by Antonovsky (4). Thus, improving an individual's SC may be one approach to developing their SOC.

To the best of our knowledge, the present study is the first to investigate the relationship between SOC and cognitive and structural SC in university students grouped according to their home region. The present study found that among students for whom both their home region and current location were in an urban area, those with higher cognitive and structural SC scores had a tendency towards lower SOC scores compared with those with a higher cognitive SC score and a lower structural SC score. A previous study demonstrated that people living in an urban area were more susceptible to social stress than those living in a non-urban area, and that this tendency was stronger among people living in a larger area as well as those who had lived in an urban area for a longer period in infancy (25). In urban areas, which often feature a large amount of information and numerous resources, people are more likely to be subjected to stress due to broad networks. Therefore, it is possible that the participants with higher cognitive and structural SC in the present study had relatively low SOC scores because these two factors were more stressful for them. These results are consistent with those obtained by Lederbogen *et al*. (25). Based on this tendency, there is a need to discuss individualized measures for developing SOC according to living environment and social background.

Self-efficacy

The present study found self-efficacy to be the strongest factor influencing SOC in university students. A previous study uncovered a relationship between self-efficacy and

SOC among elderly people (7). In another previous study, which reported a relationship between self-efficacy and SOC among children aged 16 and 19 years, these two factors were investigated as an equivalent of resilience to daily challenges associated with mental health problems (6). However, SOC and self-efficacy have different relationships with respect to adolescent substance use (e.g., tobacco, alcohol) (26). In other words, self-efficacy is a concept that should be considered as separate from SOC. Based on the present study, self-efficacy in university students seems to be as strongly associated with SOC as GRRs are associated with SOC. The successful experiences form self-efficacy (27). Therefore, it is likely that successful experiences and supportive relationships leading to higher self-efficacy contribute to increased SOC in university students.

Mental health

The present study found a relationship between mental health and SOC among university students. Indeed, a number of domestic and foreign studies have reported a relationship between SOC and mental health (28,29). In many of these studies, researchers considered the SOC of an individual to be a contributing factor to mental health. Conversely, emotional health, which is conceptually similar to mental health, may influence SOC among university students in the United States (30). Only a small percentage of studies aimed to clarify the factors influencing SOC in a relationship between mental health and SOC. In the present study, we hypothesized that a greater feeling of wellbeing, which is generally expressed as a positive aspect of mental health, would be one of the factors promoting SOC, and analyzed our data accordingly. The findings suggested a mutual relationship between SOC and mental health. Based on this thought, to consider stability of mental health of university students may leads to good

circulation to SOC. However, hypothesis of present study should be confirmed according to future longitudinal studies.

Proposal regarding health promotion in university students, and study limitations

In the present study, we hypothesized that cognitive/structural SC and self-efficacy act as GRRs to promote SOC, and that mental health promotes SOC. The findings indicated that SOC was related to cognitive SC, structural SC, self-efficacy, and mental health. On this basis, it will be useful for the promotion of their healthy lifestyle that psychosocial factors are considered to enhance SOC of university students. In other words, it is important to adjust the overall student environment as well as examine individual support while considering psychosocial factors, such as trust and cooperative relationships resulting from human-to-human connections, broad networks, self-efficacy as a personal characteristic, and mental health. These concepts may become the basis for a broad range of health-promotion measures, including student health management policies and guidelines.

The present study was conducted with the participation of partial universities in two metropolitan areas; hence, the results of this study have a limit to be generalized due to possible sampling bias. As the study was implemented in a cross-sectional manner, the causal relationships between SOC and the investigated factors were not clarified. There is a need to conduct longitudinal studies to determine the causal associations between SOC and the related factors. In addition, it is necessary to compare the results with those of studies investigating students from other areas.

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Table 1. Demographic characteristics of the sample population.

	n	*(%)*	*Mean*	*(SD)*
Age			21.06	(1.18)
Gender $n=443$				
Male	259	(58.5)		
Female	184	(41.5)		
Major $n=443$				
Science	196	(44.2)		
Humanities	184	(41.5)		
Medical	63	(14.2)		
Family constitution $n=434$				
Two-generation	327	(75.3)		
Three-generation	88	(20.3)		
Others	19	(4.4)		
Number of siblings $n=443$				
None	56	(12.6)		
One	229	(51.7)		
Two	125	(28.2)		
Three or more	33	(7.4)		
Living with family members $n=442$				
Yes	233	(52.7)		
No	209	(47.3)		
Number of years lived at current location $n=443$				
4 years or less	205	(46.3)		
5–19 years	110	(24.8)		
20 years or more	128	(28.9)		
Home region $n=443$				
Two metropolitan areas	340	(76.7)		
Other areas	103	(23.3)		
SOC (13–91)			50.48	(9.59)
Comprehensibility			18.59	(4.29)
Manageability			15.52	(3.69)
Meaningfuiness			16.37	(4.04)
Cognitive SC (2–10)			6.97	(1.46)
Structural SC[a] (0–10)			4.04	(1.87)
Self-efficacy (23–115)			68.63	(12.03)
Mental health (0–100)			61.09	(19.88)

[a] Ten areas of activity (network) in structural SC: 1) club/group activities within the university; 2) the operations and support for school festivals; 3) participation in self-governing activities within the university; 4) support for community events; 5) activities of sports clubs and groups outside the university; 6) social activities such as volunteer work; 7) participation in family gatherings; 8) socializing with neighbors; 9) doing part-time work; and 10) interaction via social networking services (SNS), through which users show their profiles to one another.
SD: standard deviation.

Table 2. Goodness-of-fit statistics for comparative models of the SOC-13 scale (*n* =443).

	CMIN/DF	*GFI*	*AGFI*	*CFI*	*PMSEA*	*AIC*	*α*
one-factor model							
non-modified (13-item)	4.656	0.897	0.856	0.750	0.091	351.986	0.747
included the covariance[a]	3.970	0.911	0.873	0.800	0.082	308.076	0.747
excluded one item[b] (12-item)	4.413	0.909	0.868	0.795	0.088	286.314	0.761
second-order three-factor model							
non-modified (13-item)	3.109	0.936	0.909	0.858	0.069	252.974	0.747
included the covariance[a]	2.383	0.952	0.930	0.908	0.056	206.116	0.747
excluded one item[b] (12-item)	2.532	0.953	0.931	0.910	0.059	184.186	0.761

[a] included the covariance between the residual variance of the observed variables Q2 (comprehensibility item) and Q3 (manageability item).

[b] excluded one item (Q2) that showed a markedly low item-total correlation coefficient (not statistically significant) in a non-modified model.

CMIN/DF: ratio of chi-square to degrees of freedom; GFI: goodness of fit index; AGFI: adjusted goodness of fit index; CFI: comparative fit index; RMSEA: root mean square error of approximation; AIC: Akaike's information criterion; α: cronbach's α.

Table 3. Multiple regression analysis using a stepwise method, with SOC as the dependent variable (n = 443).

	B	*β*	*p-value*	*95%CI*
Age	0.80	0.10	0.004	0.25 to 1.34
Cognitive SC	1.41	0.22	< 0.001	0.96 to 1.87
Structural SC	−0.38	−0.08	0.033	−0.74 to −0.03
Mental health	0.16	0.35	< 0.001	0.13 to 0.20
Self-efficacy	0.31	0.40	< 0.001	0.25 to 0.37
R^2		0.485		
adjusted R^2		0.479	< 0.001	

Input variables: attributes (age, gender, major, living situation, number of years lived at current location, home region), cognitive SC, structural SC, mental health, self-efficacy.
β: standardized partial regression coefficient; CI: confidence intervals.

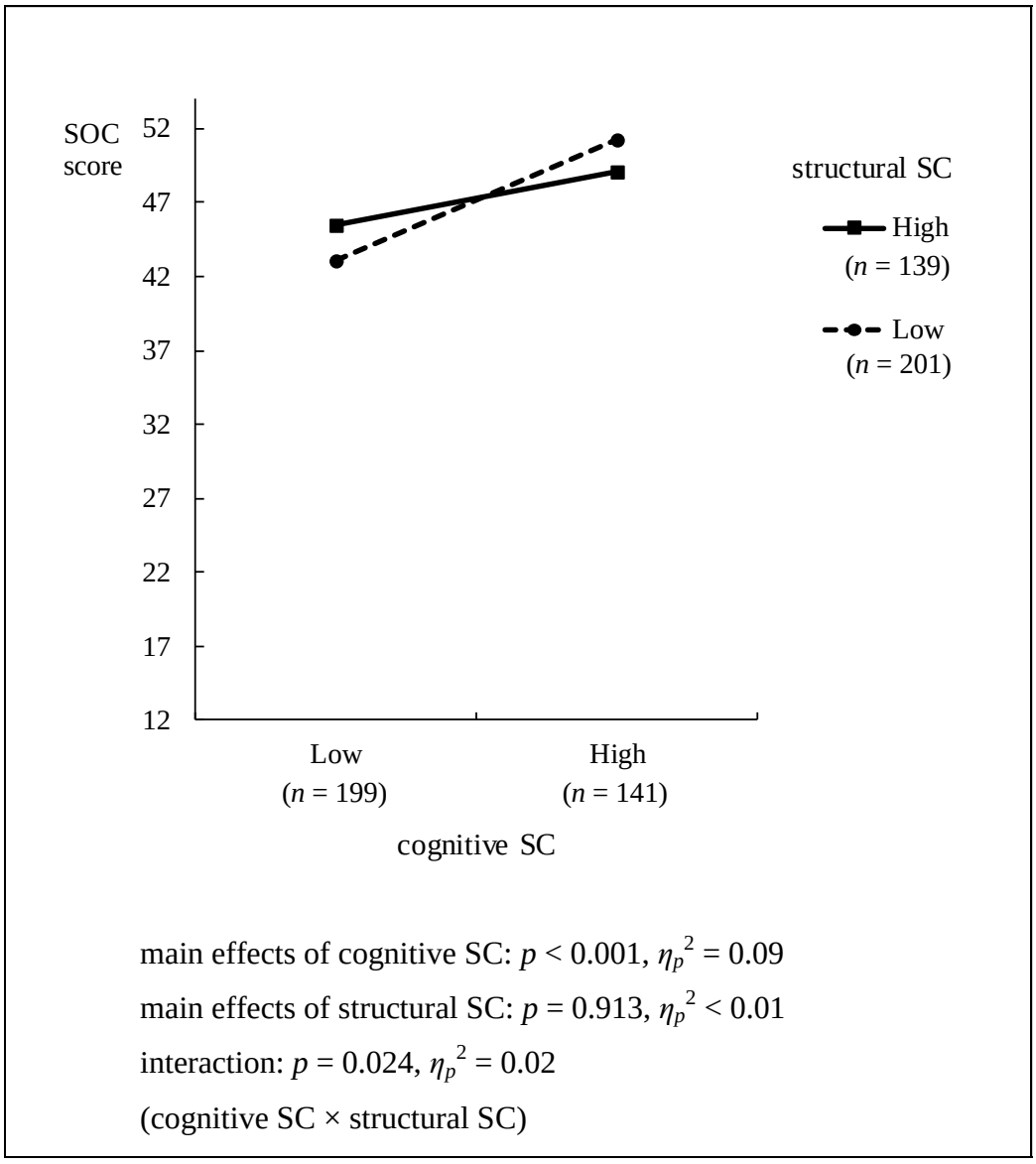

Figure 1. Relationships between SOC and cognitive/structural SC among students whose home region was within the metropolitan areas of focus (n = 340).