Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19591 - 19608

Received 20 July 2021; Accepted 05 August 2021

Correlations between the Sensory Processing Profiles, Resilience, and Quality of Life of College Students

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ABSTRACT

This study investigated the sensory processing profiles, resilience, and quality of life of 102 college students. Their sensory processing profiles were determined using the Adolescent/Adult Sensory Profile(AASP); their resilience, with the Korean Resilience Quotient Test-53(KRQ-53); and their quality of life, with the Korean version of the World Health Organization Quality of Life-BREF(WHOQOL-BREF). The data were processed using descriptive statistics and Pearson correlation analysis. For the sensory processing profiles, low registration and sensory sensitivity showed negative correlations with all the subdomains of resilience and quality of life except with the social relationships domain, and sensory seeking showed positive correlations with the self-regulation skills, the total score for resilience, and the subdomains of quality of life except physical health, the environment, and the overall domains. Finally, sensory avoiding showed negative correlations with all the subdomains except self-regulation skills and the interpersonal skills of resilience, social relationships, the environment, and the overall domains of quality of life. The results of this study showed that if the resilience and quality of life of college students are improved through appropriate interventions according to their individual sensory processing profiles, it will be possible to provide a foothold for their high-quality social participation as they transition to adulthood and full integration in society.

Key words: Sensory processing profile, Resilience, Quality of life, College student

1. Introduction

Sensory processing refers to processing of sensory inputs by interpreting them and crafting more efficient responses to them[1]. Sensory processing ability acts as a bridge between individuals and the environment. Therefore, it is an essential function for living

Received 20 July 2021; Accepted 05 August 2021

effectively[2].

However, as individuals grow, they develop different ways of processing sensory inputs[4]. Their ensuing responses to such inputs are related to their adaptive behavior and emotions[13], which are related to their quality of life[10,11]. Since sensory processing ability affects behavior, emotions, cognition, and physiological responses[17], people with sensory processing problems have difficulty adapting to daily life[5,33].

In Korea, many studies have been conducted to investigate the relationship between the sensory processing profile and various problems of college students [14,23,26,40,41]. A study on the correlation between the sensory processing profile of Korean college students and their experience of depression and anxiety found statistically significant differences in their degree of depression and anxiety according to their sensory processing profile, and that sensory processing ability was negatively correlated with depression and anxiety[14]. In a study on the correlation between the sensory processing profile and interpersonal problems of college students, the passive sensory processing profile showed correlations with all interpersonal problems, and the active profile, with different interpersonal problems[23,40]. In addition, studies on the relationship between the sensory processing profile of college students and psychosocial factors such as adult attachment, self-esteem, and college life adaptation confirmed such relationship and showed that the college students' problems differed from those of the other college students depending on their sensory processing profile[26,40,41].

These results show that the problems of college students according to their sensory processing profile persist until adulthood and make it difficult for them to adapt in various areas such as interpersonal relationships, cognition, problem-solving, and social life[28].

On the other hand, resilience is the ability to transform adversity into mature experiences by effectively utilizing not only internal and external resources but also mental immunity to external stimuli, stress, and adversity [31,34]. Resilience is not merely a characteristic of some people but is a universal adaptation mechanism based on which

Received 20 July 2021; Accepted 05 August 2021

ordinary people can cope with and adapt to difficult environments or stressful situations[19]. However, resilience is like a muscle, whose ability to carry a weight varies from person to person[25]. People with high resilience have low symptoms of depression even after experiencing a disaster, as seen after the September 11th terrorist attack in the United States[12]. On the other hand, people with low resilience lack adaptation flexibility in stressful situations and are more sensitive, thereby having more difficulty coping with such situations[37]. These mean that even when different individuals experience the same stress, the impact of such stress on their quality of life differs depending on the level of their individual resilience [15].

Various studies have been conducted to prove the psychosocial effects of resilience on college students[6,7,16,20,22,27,30,32]. Many studies on the relationship between resilience in college students and negative emotions such as stress, depression, and anxiety have shown that resilience is negatively correlated with stress and positively correlated with overcoming depression and anxiety[7,16,20,27,32]. Thus, the resilience of college students is positively correlated with their happiness and self-esteem. This means that as resilience increases, quality of life improves[6,22,30].

Studies have shown that the emotional problems of college students differ depending on how they process sensory inputs and how resilient they are. It was further reported that emotional problems adversely affect the quality of life of college students, primarily due to stress[18,30,39]. Korean college students experience various changes in interpersonal relationships, conflicts, and psychological stress, due to which mental disorders such as depressive disorder and anxiety disorder are more prevalent among them than in other age groups[35,36]. This highlights the necessity of interventions for improving sensory processing and increasing resilience in college students.

A study reported a correlation between the sensory processing profile and resilience[3]. However, the study involved adults and the elderly in Portugal, and compared differences in their sensory processing profiles according to the types of drugs they were taking. In Korea,

Received 20 July 2021; Accepted 05 August 2021

there is no research yet on the relationship between the sensory processing profile and the resilience of college students. Such research is needed because many Korean college students are unstable and prone to confusion as they belong to the transitional period between adolescence and adulthood[21].

Therefore, this study investigated the correlations between the sensory processing profile, resilience, and quality of life of Korean college students.

2. Study Method

2.1 Study Subjects and Period

This study was conducted with 102 college students in Korea who did not have prior professional knowledge of the assessment tools, including the scoring system. Data were collected from November 12 to 27, 2020.

2.2 Study Tool

2.2.1 Adolescent/Adult Sensory Profile (AASP)

The AASP, developed by Brown and Dunn[4]. based on the sensory processing theory and translated into Korean by Park and Kim[29], was used as a tool for assessing the sensory processing profiles of adolescents and adults. AASP enables self-evaluation of a person's sensory processing response in daily life. It consists of 60 questions divided into six subcategories: taste/smell processing, movement processing, visual processing, touch processing, activity level, and auditory processing. Dunn's model has four sensory processing behavioral response profiles: low registration, sensory seeking, sensory sensitivity, and sensory avoiding. The degree to which each profile is exhibited is scored according to the following five-point Likert scale: "much less than," "less than," "similar to," "more than," and "much more than" most people. Then the scores for each profile are totaled and evaluated (Table 1)[8,9,29].

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19591 - 19608

Received 20 July 2021; Accepted 05 August 2021

Table 1. Quadrant Summary Chart of AASP (Adolescents/Adults Sensory Profile)

Categories (Raw score)	Much less than most people	Less than most people	Similar to most people	More than most people	Much more than most people
Low registration (75)	15-18	19-26	27-40	41-51	52-75
Sensory seeking (75)	15-27	28-41	42-58	59-65	66-75
Sensory sensitivity (75)	15-19	20-25	26-40	41-48	49-75
Sensory avoiding (75)	15-18	19-25	26-40	41-48	49-75

2.2.2 Korean Resilience Quotient Test-53 (KRQ-53)

The Korean Resilience Quotient Test-53 (KRQ-53), which is the Korean translation of the Resilience Quotient Test (RQT) that Reivich and Shatte[31] developed for adults, was used[34]. The resilience quotient test consists of 53 questions and is divided into three subdomains: self-regulation skills, interpersonal skills, and positive tendencies. The self-regulation skills are subdivided into emotional regulation skill, impulse control skill, and cause analysis skill; the interpersonal skills, into communication skill, empathy skill, and self-expansion skill; and the positive tendencies, into self-optimism, life satisfaction, and gratitude[34]. The higher the score for each item is, the stronger the characteristics of each domain of resilience are. The result is interpreted according to the score distribution for the category (Table 2)[21].

Table 2. Summary Chart of KRQ-53 (Korean Resilience Quotient Test-53)

Categories	Very low	Low	Normal	High	Very high
Self-regulation skills	18-54	55-62	63-70	71-75	76-90

Received 20 July 2021; Accepted 05 August 2021

Interpersonal skills	18-61	62-66	67-74	75-80	81-90
Positive tendencies	17-55	56-63	64-70	71-75	76-85
Total score	≥170	171-194	195-211	212-219	220-265

2.2.3 The World Health Organization Quality of Life-BREF: WHOQOL-BREF)

The quality of life was measured using a brief tool (WHOQOL-BREF) made by translating the World Health Organization Quality of Life Scale[38] into Korean and confirming its validity. The quality of life scale contains a total of 24 questions divided into four domains: physical health, psychological health, social relationships, and environment. Additionally, one overall domain that consists of two questions on overall quality of life and general health perception is included. Each domain is scored by multiplying by 4 the average scores for all items under the domain. The sum of the scores for all four domains is the total score. The higher the total score is, the higher the quality of life[24].

2.3 Study Method

The study was conducted for about two weeks, from November 12 to 27, 2020. The subjects, who were enrolled in Korean universities, were surveyed through a social networking service (SNS) by asking them to fill out an evaluation sheet using Google Forms. The subjects were informed that their collected personal information would never be used for any purpose other than this research and that their personal confidentiality would be guaranteed. The procedure for answering the questionnaire was sufficiently explained to them beforehand, and the accomplished questionnaires were immediately collected. Of the 106 submitted questionnaire files, 102 were analyzed and four were excluded due to incomplete answers.

2.4 Analysis Method

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19591 - 19608

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The collected data were analyzed using IBM SPSS Statistics 25. Descriptive statistics were used for the general characteristics of the subjects, and the mean and standard deviation were obtained for the sensory processing profile, resilience, and quality of life. Pearson correlation analysis was used to investigate the correlations between the sensory processing profile, resilience, and quality of life. The significance level of all the statistics was set at $\alpha = 0.05$.

3. Results

3.1 General Characteristics of the Subjects

Of the total of 102 subjects, 62 (60.8%) were female and 40 (39.2%) were male. Most of the subjects (26 persons or 25.5%) were 24 years old and in second year college (37 persons or 36.3%). Thirty-eight persons (37.3%) had the highest grade of 3.5-3.99 in the previous semester. Seventy persons (68.6%) lived with their parents. The majority had no siblings. Sixty-eight subjects (66.7%) had 1-5 same-sex friends and 72 subjects (70.6%) had 1-5 opposite-sex friends (Table 3).

Table 3. General Characteristics of the Subjects (n = 102)

Variables	Categories	n	%	Variables	Categories	n	%
Gender	Male	40	39.2	Brother (older)	None	85	83.3
	Female	62	60.8		1	17	16.7
Age (year)	19	2	2	Sister (older)	None	70	68.6
	20	15	14.7		1	30	29.4
	21	23	22.5		2	2	2
	22	11	10.8	Brother (younger)	None	72	70.6
	23	15	14.7		1	28	27.5
	24	26	25.5		2	2	2
	≥25	10	9.8	Sister (younger)	None	76	74.5
School year	1	17	16.7		1	22	21.6
	2	37	36.3		2	4	3.9

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19591 - 19608

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	3	32	31.4		None	4	3.9
	4	16	15.7		1~5	68	66.7
Grade	≤2.9	2	2	Same-sex friend	6~10	26	25.5
	3.0~3.49	13	12.7		11~15	2	2.0
	3.50~3.99	38	37.3		16~20	2	2.0
	4.00~4.49	37	36.3	Opposite-sex friend	None	28	27.5
	4.5	12	11.8		1~5	72	70.6
Living with parents	No	32	31.4		6~10	2	2
	Yes	70	68.6				

3.2 Subjects' Sensory Processing Profiles and Degrees of Resilience and Quality of Life

First, on the sensory processing profiles of the subjects, all the profiles were rated "similar to most people" except the sensory seeking profile, which was rated "less than most people" with 35.93±7.40 points. On resilience, the total score and the domain scores were all below the average: self-regulation skills was scored 59.71±9.10 points; interpersonal skills, 65.68±7.48 points; and positive tendencies, 59.65±7.24 points; and the total score for resilience was 185.03±19.23 points. Finally, on quality of life, the physical health domain was scored 14.54±2.40 points, the psychological health domain, 13.52±2.67 points; the social relationships domain, 15.00±2.63 points; the environment domain, 14.61±2.24 points; and the overall domain, 13.59±3.21 points; and the total score was 71.01±10.43 points (Table 4).

Table 4. Levels of the Sensory Processing Profiles, Resilience, and Quality of Life

Variables	Categories	Mean±SD	Result
AASP	Low registration	30.33±7.19	Similar to most people
	Sensory seeking	35.93±7.40	Less than most people
	Sensory sensitivity	35.55±8.51	Similar to most people
	Sensory avoiding	36.64±8.39	Similar to most people
KRQ-53	Self-regulation skills	59.71±9.10	Low
	Interpersonal skills	65.68±7.48	Low
	Positive tendencies	59.65±7.24	Low

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	Total score	185.03±19.23	Low
WHOQOL-BREF	Physical health domain	14.54±2.40	
	Psychological health domain	13.52±2.67	
	Social relationships domain	15.00±2.63	
	Environment domain	14.61±2.24	
	Overall	13.59±3.21	
	Total score	71.01±10.43	

Abbreviations: AASP, Adolescents/Adults Sensory Profile; KRQ-53, Korean Resilience Quotient Test-53; WHOQOL-BREF, The World Health Organization Quality of Life-BREF.

3.3 Correlations between the Sensory Processing Profile, Resilience, and Quality of Life

First, the results of the correlation analysis between the sensory processing profiles and resilience showed that low registration had significant negative correlations with the total score (r = -0.363), interpersonal skills (r = -0.341), positive tendencies (r = -0.274), and self-regulation skills (r = -0.268); sensory seeking had significant positive correlations with positive tendencies (r = 0.257) and interpersonal skills (r = 0.202), and had insignificant correlations with the other domains; sensory sensitivity had significant negative correlations with the total score (r = -0.308), positive tendencies (r = -0.301), self-regulation skills (r = -0.227), and interpersonal skills (r = -0.225); and sensory avoiding had significant negative correlations with positive tendencies (r = -0.387) and the total score (r = -0.201) and had insignificant correlations with the other domains.

Next, the correlation analysis between the sensory processing profiles and quality of life showed that low registration had significant negative correlations with the physical health domain (r = -0.500), the total score (r = -0.455), the psychological health domain (r = -0.406), the overall domain (r = -0.389), and the environment domain (r = -0.343); sensory seeking had significant positive correlations with the psychological health domain (r = 0.278), the social relationships domain (r = 0.249), and the total score (r = 0.248) and had insignificant

Annals of R.S.C.B., ISSN: 1583-6258, Vol. 25, Issue 6, 2021, Pages. 19591 - 19608

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correlations with the other domains; sensory sensitivity had significant negative correlations with the physical health domain (r = -0.439), the psychological health domain (r = -0.352), the total score (r = -0.346), the overall domain (r = -0.27), and the environment domain (r = -0. 264) and had insignificant correlations with the other domains; and sensory avoiding had significant negative correlations with the physical health domain (r = -0.364), the psychological health domain (r = -0.280), and the total score (r = -0.267) and had insignificant correlations with the other domains (Table 5).

Table 5. Correlations of the Sensory Process Profiles, Resilience, and Quality of Life

Variables	Categories	AASP			
		Low registration	Sensory seeking	Sensory sensitivity	Sensory avoiding
KRQ-53	Self-regulation skills	-0.268**	-0.081	-0.227*	0.035
	Interpersonal skills	-0.341**	0.202*	-0.225*	-0.185
	Positive tendencies	-0.274**	0.257**	-0.301**	-0.387**
	Total score	-0.363**	0.137	-0.308**	-0.201*
WHOQOL-BREF	Physical health domain	-0.500**	0.171	-0.439**	-0.364**
	Psychological health domain	-0.406**	0.278**	-0.352**	-0.280**
	Social relationships domain	-0.169	0.249*	-0.105	-0.187
	Environment domain	-0.343**	0.145	-0.264**	-0.098
	Overall	-0.389**	0.14	-0.27**	-0.152
	Total score	-0.455**	0.248*	-0.346**	-0.267**

Abbreviations: AASP, Adolescents/Adults Sensory Profile; KRQ-53, Korean Resilience Quotient Test-53; WHOQOL-BREF, The World Health Organization Quality of Life-BREF.

Received 20 July 2021; Accepted 05 August 2021

*p<0.05, **p<0.01

4. Discussion

Interventions for sensory processing have been implemented in the field of occupational therapy for a long time. However, since the targets are children, interventions for adult sensory processing are insufficient[4]. As a person lives, he encounters many sensory stimuli and reacts to these stimuli. Most people have a threshold level that responds to sensory stimuli within a certain range. However, some people under-respond or over-respond to sensory stimuli. These people have difficulties in social activities [14,29,40].

College students are physically already adults, but socially and emotionally belong to the transitional period between adolescence and adulthood, which is unstable and prone to confusion[23]. Therefore, this study investigated the relationships between the sensory processing profiles, resilience, and quality of life of college students and suggested interventions for improving their sensory processing ability.

The results of this study showed that among the four sensory processing profiles of college students, only sensory seeking was indicated as exhibited “less than most people”; all the other profiles were indicated as exhibited to a degree that was “similar to most people.” These are consistent with the results of domestic research on AASP[14,23,26,40,41].

In the resilience quotient test of the college students, self-regulation skills, interpersonal skills, positive tendencies, and the resilience total score were all below average. Resilience is the ability to overcome negative emotions such as stress [31,34]. Below-average resilience means that emotional problems are highly likely to adversely affect the quality of life of college students, mainly due to stress[18,30,39]. This is based on the statistical results that showed that the prevalence of mental disorders such as depressive disorder and anxiety disorder is higher in college students than in other age, as college students in Korea experience various changes due to psychological stress, etc[35,36].

On the other hand, on the correlation between the subjects’ sensory processing profiles

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and resilience, both low registration and sensory sensitivity, which are passive sensory processing profiles, were negatively correlated with all domains of resilience and showed the highest correlation with the total score. Low registration has a high threshold level and a high passive behavioral response, so a person with this profile has difficulty responding quickly and accurately to stimuli, and thus has difficulty coping adequately with negative emotions such as stress[13,23]. Persons with the sensory sensitivity profile are over-sensitive to stimuli such as stress and cannot cope well with them[4,29]. Next, on the sensory seeking and sensory avoiding profiles, which are active sensory processing profiles, sensory seeking showed positive correlations with positive tendencies and interpersonal skills and seemed to have positive correlations with positive tendencies and interpersonal skills because it has a high threshold and is an active behavioral response that actively acts on everything even with only a small stimulus. On the other hand, sensory avoiding showed negative correlations with positive tendencies and with the total score for resilience, but was highly correlated with positive tendencies, seemingly due to the tendency people with this profile to avoid appropriately coping with anxious situations because of their low threshold[23,26,40].

Next, the analysis of the correlation between the sensory processing profiles and quality of life showed that both low registration and sensory sensitivity were negatively correlated with all domains of quality of life except the social relationships domain and were highly negatively correlated with the physical health domain. People with a low-registration sensory processing profile cannot properly express their desires or intentions and instead, tend to be too obedient[23,40]. People who exhibit sensory sensitivity have difficulty maintaining a healthy mind and body because they cannot cope well with small discomforts or complaints[14,40]. Sensory seeking showed positive correlations with the psychological domain, the social relationships domain, and the total score in the quality of life assessment. This may be due to the positive correlations of sensory seeking with positive tendencies and interpersonal skills, which are subdomains of resilience. This means that the trait of sensory seeking, which has a high threshold and shows active behavioral responses, affects positive

Received 20 July 2021; Accepted 05 August 2021

tendencies and interpersonal skills, which, in turn, can affect the psychological health and social relationships domains[40,41]. Sensory avoiding showed negative correlations with the physical health domain, the psychological health domain, and the total score, and a highly negative correlation with the physical health domain. This seems to be because sensory avoiding has a low threshold and is sensitive to small stimuli, which lead to greater physical or psychological discomfort[14,29].

Lee and Kim[21] posited that Korean college students are unstable and prone to confusion because they are still trying to adapt to the new environment of college in the process of which they experience psychological fluctuations. This study confirmed that the lower-than- average resilience of the subject college students was related to their sensory processing profile, which therefore affected their quality of life[5,10,11,33]. Thus, to improve the quality of life of Korean college students, their resilience must be increased by improving their sensory processing ability. This intervention will increase their opportunities for effective social participation and will be particularly timely during this coronavirus disease 2019 (COVID-19) pandemic, when all students need to cope with extraordinary difficulties. The results of this study are also expected to be used as basic data for adult sensory integration interventions. Finally, this study can be significant in that it is the first study to investigate the relationships between sensory processing profiles, resilience, and quality of life of college students.

This study had some limitations. First, due to the COVID-19 pandemic, the self-reported questionnaire was distributed and collected through an SNS, so we were concerned that it would not be possible for us to accurately measure the characteristics we intended to measure. To reduce errors, we explained to the subjects several times how they should answer the questionnaire. Second, this study only identified the relationships between sensory processing profiles, resilience, and quality of life, but did not provide specific alternatives for college students, so further research on this is needed.

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5. Conclusion

This study investigated whether the sensory processing profiles, resilience, and quality of life of college students are interrelated. The study results showed that the passive sensory processing profiles, i.e., low registration and sensory sensitivity, are negatively correlated with all subdomains of resilience and quality of life except the social relationships domain. As for the active sensory processing profiles, i.e., sensory seeking and sensory avoiding, sensory seeking showed positive correlations with positive tendencies and interpersonal skills in the resilience domain, and positive correlations with the psychological health domain, the social relationships domain, and the total score in the quality-of-life assessment. On the other hand, sensory avoiding showed negative correlations with positive tendencies and the total score in the resilience domain, and negative correlations with the physical health domain, the psychological health domain, and the total score in the quality-of-life assessment. Low registration and sensory sensitivity showed the highest correlation with the physical health domain in the quality of life assessment, whereas sensory seeking showed the highest correlation with the psychological health domain in the quality of life assessment, and sensory avoiding showed the highest correlation with the positive tendencies in the resilience quotient test. These results suggest that children and adults need different sensory processing interventions according to their sensory processing profiles. If these interventions succeed in increasing the resilience and therefore, in improving the quality of life, of college students, it will be possible to provide a foothold for the high-quality social participation of college students as they become adults and become fully integrated into society.

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