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The Effect of Forest Experience on School Life Satisfaction of Korean Boarding Middle School Students

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Abstract

We surveyed to assess the impact of the mood states and sentiments resulting from forest experience on the school life satisfaction of Korean boarding middle school students (n=90). The average mood state score was 2.32 on a scale of 1-5, with the subscale of vigor scoring the highest (3.19). The average sentiment score was 3.08, with the subscale of subjective happiness scoring the highest (3.08). The average school life satisfaction score was 3.66, with the subscale of interpersonal relationships scoring the highest (3.91). The mood states resulting from forest experience explained 39.6% of the variance in school life satisfaction, and the regression model showed a significant fit (F=9.077, p<0.001). Similarly, sentiments resulting from forest experience explained 47.4% of school life satisfaction, with the regression model showing a significant fit (F=10.569, p<0.001). It can be concluded that forest experience positively impacts the school life satisfaction of Korean boarding middle school students.

Key Words: forest experience, school life, satisfaction, mood, emotion

Introduction

People's perception of forests has changed significantly over the past few decades. Before the 1960s, forests were primarily viewed as spaces that served as sources of firewood, food, and timber; and contributed to the protection of ecology by performing the functions of soil erosion prevention, landslide mitigation, and protection against heavy rains and floods. However, in the 1960s, the term "urban forestry" was introduced from the United States to Europe, shifting the focus to forests in and around cities (Konijnendijk 2003; Konijnendijk et al. 2006). Bell (1997) emphasized the importance of locating open spaces near residential areas to encourage their use for recreational activities.

Similarly, Bonnes et al. (2004)—in a study on Rome—identified accessibility, location, and distance as critical factors influencing the utilization of urban and peri-urban areas. In Korea, forests have become highly favored for relaxation, recreation, healing, and education. The demand for utilizing forests for these purposes continues to grow with the increasing national income, leisure time, and the prioritization of quality of life.

Forests serve as ecological learning spaces where various organisms coexist, offering opportunities to explore biodiversity. They also contribute to people's well-being by providing sensory stimulation and acting as healing spaces for stress relief (National Institute of Forest Science 2013). In particular, forest have been demonstrated to positively affect ado-

lescents who require emotional and behavioral support. Forest experiences have been found to reduce stress and enhance self-esteem in children attending local childcare centers (Kim et al. 2015). They also aid in reducing depression and improving social development in children from low-income families (Cho et al. 2011), promoting character development in elementary school students (Kim and Choi 2018), and assisting the management of behavior in children and adolescents with attention-deficit/hyperactivity disorder (Hong et al. 2016). Previous studies on changes in perception of forests, environmental awareness, development of environmental sensitivity, and changes in environmental attitudes and pro-environmental behaviors support the finding that forest experiences positively influence character development, respect for life, and environmental awareness and sensitivity among adolescents (Kim et al. 2015). A previous study measured physiological parameters before and after forest experiences among urban middle school students. It provided evidence of stress reduction and prevention of problem behaviors such as school violence and antisocial behavior resulting from excessive stress after the forest experience (Kwon et al. 2014). Forest experience has also been associated with increased school life satisfaction, decreased negative thinking, and addressing problematic behaviors like aggression as well as feelings of depression and anxiety (Kim and Lee 2006; Son et al. 2013; Eom et al. 2015; Kim and Koo 2019). However, existing research on forest experience primarily focuses on urban students. Despite evidence indicating emotional instability and anxiety related to collective living among boarding school students (Lee 2017), as well as reported challenges associated with maladaptation in boarding school life (Lee and Cho 2018), there has so far been a lack of research investigating the effects of forest experience on boarding school students in terms of dormitory and school life satisfaction.

This study aimed to examine the influence of forest experience on the mood states and sentiments of boarding middle school students. The primary objective was to gather fundamental data that could improv peer relationships, career counseling, life guidance, and overall satisfaction with school life.

Materials and Methods

Participants

The general characteristics of the study participants are presented in Table 1. A total of 90 students were recruited in the Gyeongnam region of Korea. Of these, 35 students (38.9%) were in the 7th grade, 27 students (30.0%) were in the 8th grade, and 28 students (31.1%) were in the 9th grade. The gender distribution was balanced, with 45 male participants (50.0%) and 45 female participants (50.0%).

Survey period

The survey was conducted using pre-prepared questionnaires from September 19 to October 21, 2022. A total of 100 questionnaires were distributed during this period to collect data.

Survey method

The survey was conducted between 6 pm and 8 pm after completing their daily routine activities to minimize disruption to students' school life. On weekdays, students were surveyed according to their grade level during their free time. Care was taken to avoid large gatherings of students due to the risk of COVID-19 infection. The researcher explained the purpose and significance of the study to the counseling teachers in the selected school's counseling room. Subsequently, the questionnaires were distributed to the students, who were given approximately 20 minutes to complete the survey. The collected questionnaires were used as the basis for data analysis, and frequencies (n) and percentages (%) of general characteristics of the study participants were calculated.

Table 1. General characteristics of participants

Group		N	%
Year at school	Year 1	35	38.9
	Year 2	27	30.0
	Year 3	28	31.1
Gender	Male (M)	45	50.0
	Female (F)	45	50.0
Total		90	100.0

Analysis items

Mood states resulting from forest experience

To measure the mood states of boarding middle school students following a forest experience, we used the Korean version of the Profile of Mood States-Brief (K-POMS-B), which was adapted by Kim et al. (2003) from the original POMS (McNair and Lorr 1964). The POMS was initially developed by McNair and Lorr in 1964 to meet the clinical need for a quick and easy assessment of the transient affective states of patients. It has been widely used to evaluate mood states and affect in various contexts. The K-POMS-B consists of 30 items rated on a 5-point Likert scale. It comprises six mood subscales: tension, depression, anger, vigor, fatigue, and confusion. The scores from each subscale are combined to calculate the Total Mood Disturbance (TMD).

In this study, the internal consistency of the K-POMS-B was assessed using Cronbach's α coefficient. The TMD showed a high level of internal consistency, with a Cronbach's α coefficient of 0.930. At the subscale level, Cronbach's α was 0.846 for tension, 0.787 for anger, 0.809 for depression, 0.847 for fatigue, 0.682 for confusion, and 0.818 for vigor. All of these values exceeded the threshold of 0.6 which indicates satisfactory internal consistency of the measurement data (Table 2).

Sentiments resulting from forest experience

Sentiments resulting from forest experience were measured using a forest experience sentiment scale based on Kang (2020)'s study on perceived stress, attention restoration theory, subjective vitality, and subjective happiness. The scale consists of seven subscales: perceived stress, per-

ceived restoration environment, physical health, emotional stability, attention restoration, subjective vitality, and subjective happiness.

In the present study, the overall Cronbach's α coefficient for sentiments resulting from forest experience was 0.949, indicating high internal consistency. At the subscale level, Cronbach's α was 0.859 for perceived stress, 0.853 for perceived restoration environment, 0.809 for physical health, 0.842 for emotional stability, 0.916 for attention restoration, 0.889 for subjective vitality, and 0.848 for subjective happiness, indicating high internal consistency for all items (Table 3).

School life satisfaction

School life satisfaction was measured utilizing Kim (2009)'s School Satisfaction Scale, which consists of six subscales: overall school life, interpersonal relationships, classes and learning activities, educational environment, school rules and special activities, and social support. Each item is rated on a 5-point Likert scale (1＝Not at all, 5＝Very much), where higher scores indicate higher levels of school life satisfaction.

In this study, the overall Cronbach's α coefficient for school satisfaction was 0.945, indicating high internal consistency. At the subscale level, Cronbach's α was 0.826 for overall school life, 0.791 for interpersonal relationships, 0.799 for classes and learning activities, 0.732 for the educational environment, 0.805 for school rules and special activities, and 0.852 for social support, indicating high in-

Table 2. Content and reliability of the profile of mood states

Sub-category	Item no.	Total number of items	Cronbach's α
Tension	1, 6, 12, 16, 20	5	0.864
Anger	2, 9, 14, 25, 28	5	0.787
Depression	7, 11, 15, 17, 21	5	0.809
Fatigue	3, 13, 19, 22, 23	5	0.847
Confusion	5, 18, 24, 26, 29	5	0.682
Vigour	4, 8, 10, 27, 30	5	0.818
Total	1-30	30	0.930

Table 3. Content and reliability of the forest experience sentiment

Sub-category	Item no.	Total number of items	Cronbach's α
Perceived stress	PS1−PS7	7	0.859
Perceived restorativeness	EP1−EP5	5	0.853
Physical health	PR1−PR5	5	0.809
Emotional stability	MR1−MR6	6	0.842
Attention restoration	ATR1−ATR5	5	0.916
Subjective vitality	VR1−VR6	6	0.889
Subjective well-being	HAP1−HAP8	8	0.848
Total		42	0.949

ternal consistency for all items (Table 4).

Research hypotheses

The purpose of this study was to investigate the impact of mood states and sentiments resulting from forest experiences on school life satisfaction. To achieve these objectives, the following research hypotheses were formulated (Fig. 1).

Data analysis

Data analysis was performed using the statistical software SPSS 28.0 (IBM, Armonk, NY, USA). Descriptive statistics were used to examine the overall mood states, sentiments, and school life satisfaction as changed through forest experience. Multiple regression analyses examined the effects of mood states and sentiments resulting from forest experience on school life satisfaction.

Table 4. Content and reliability of the school life satisfaction

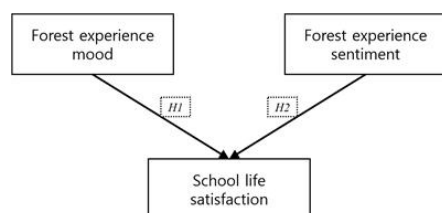| Sub-category	Item no.	Total number of items	Cronbach's α
Overall school life	1, 2, 3, 6	4	0.826
Interpersonal relationships	4, 5, 20, 25	4	0.791
Academic and class activities	8, 9, 10, 11, 12	5	0.799
Educational environment	13, 14, 15, 21	4	0.732
School rules and special activities	16, 17, 18, 19	4	0.805
Social support	7, 22, 23, 24	4	0.852
Total	1-25	25	0.945

Fig. 1. Research hypothesis. H1, Boarding middle school students' moods resulting from forest experience will significantly affect school life satisfaction; H2, Boarding middle school students' sentiments resulting from forest experience will significantly affect school life satisfaction.

Results and Discussion

Mood states

Mood states resulting from forest experience
Mood states resulting from forest experience were assessed on a 5-point Likert scale (1＝not at all, 5＝very much), where higher scores indicate higher levels of corresponding mood state. The overall mean score for mood states was 2.32. Among the subscales, vigor had the highest mean score of 3.19, followed by confusion (2.50), fatigue (2.46), depression (2.18), tension (2.12), and anger (1.85) (Table 5).

Sentiments resulting from forest experience
Sentiments resulting from forest experience were assessed on a 5-point Likert scale (1＝not at all, 5＝very much), where higher scores indicate higher levels of corresponding sentiment. The overall mean score was 3.08. Among the subscales, the highest mean score was achieved by subjective happiness (3.08), followed by subjective vitality (3.07), attention restoration (3.03), physical health (3.02), perceived restoration environment (2.95), emotional

Table 5. Overall level of the profile of mood states

Category	N	M	SD
Tension	90	2.12	0.89
Anger	90	1.85	0.72
Depression	90	2.18	0.85
Fatigue	90	2.46	1.00
Confusion	90	2.50	0.83
Vigour	90	3.19	0.92
Average	90	2.32	0.67

Table 6. Overall level of the forest experience sentiment

Category	N	M	SD
Perceived stress	90	2.57	0.86
Perceived restorativeness	90	2.95	0.90
Physical health	90	3.02	0.83
Emotional stability	90	2.89	0.86
Attention restoration	90	3.03	1.00
Subjective vitality	90	3.07	0.91
Subjective well-being	90	3.08	0.80
Average	90	3.08	0.65

stability (2.89), and perceived stress (2.57) (Table 6).

School life satisfaction

School life satisfaction was assessed on a 5-point Likert scale (1=not at all, 5=very much), with higher scores indicating higher satisfaction levels satisfaction with the corresponding aspects of school life. The overall mean score was 3.66, with the highest mean score achieved by interpersonal relationships (3.91), followed by social support (3.74), overall school life (3.69), school rules and special activities (3.69), classes and learning activities (3.51), and educational environment (3.44) (Table 7).

Results of hypothesis testing

Effects of mood states resulting from forest experience on school life satisfaction

Multiple regression analysis was performed to investigate the impact of middle school students' mood states obtained through forest experience on their school life satisfaction. The results are outlined in Table 8. Before analysis, independent variables were checked for multicollinearity. Variance inflation factor (VIF) values ranged from 1.265 to 3.489, suggesting an absence of problematic multicollinearity among variables. A Durbin-Watson test for autocorrelation further showed values from 1.725 to 2.005, with values close to 2 indicating a lack of correlations between the residuals.

The explanatory power of middle school students' mood states resulting from forest experience for overall satisfaction with school life was calculated at 43.7%. Among the subscales of the profile of mood states, anger (β= -0.417, p<0.01) had a significant negative impact, while vigor (β=0.320, p<0.01) had a significant positive effect

on overall satisfaction with school life. The regression model for this variable was substantial (F=10.738, p<0.001), as was the case for all other mood state variables.

Explanatory power for satisfaction with interpersonal relationships was 19.2% (F=3.282, p <0.01). None of the subscales of the profile of mood states had a significant impact on interpersonal relationship satisfaction.

Explanatory power for satisfaction with classes and learning activities was 41.8% (F=9.926, p<0.001). Among the subscales of the profile of mood states, vigor (β=0.372, p<0.001) had a significant positive impact on satisfaction with classes and learning activities.

Explanatory power for satisfaction with the educational environment was 27.6% (F=5.262, p<0.001). Among the subscales of the profile of mood states, fatigue (β=-0.383, p<0.05) had significantly impacted satisfaction with the educational environment.

Explanatory power for satisfaction with the school rules and special activities was 32.7% (F=6.707, p<0.001). Among the subscales of the profile of mood states, fatigue (β=-0.376, p<0.05) had a significant negative. In impact, (β=0.277, p<0.01) had significantly impacted satisfaction with school rules and special activities.

Explanatory power for satisfaction with social support was 15.9% (F=2.614, p<0.05). None of the subscales of the mood states profile significantly impacted satisfaction with social support.

Finally, the explanatory power for school life satisfaction was 39.6% (F=9.077, p<0.001). Among the subscales of the profile of mood states, anger (β=-0.313, p<0.05) had a significant negative impact, while vigor (β=0.297, p<0.01) had a significant positive effect on school life satisfaction.

Effects of sentiments resulting from forest experience on school life satisfaction

VIF values for the sentiment variables ranged from 1.298 to 5.435, suggesting an absence of problematic multicollinearity among variables. A Durbin-Watson test for autocorrelation further showed values from 1.706 to 2.170, with values close to 2 indicating a lack of correlations between residuals.

The explanatory power of middle school students' sentiments resulting from forest experience for their overall satisfaction with school life was calculated at 47.4%. Among

Table 7. Overall level of the school life satisfaction

Category	N	M	SD
Overall school life	90	3.69	0.89
Interpersonal relationships	90	3.91	0.78
Academic and class activities	90	3.51	0.79
Educational environment	90	3.44	0.77
School rules and special activities	90	3.69	0.86
Social support	90	3.74	0.85
Average	90	3.66	0.69

Table 8. Effects of mood state through forest experience on school life satisfaction

Dependent variable	Independent variable	B	SE	β	t	p	Statistical value
Overall school life	(k)	4.097	0.391		10.488	0.001	$R^2=0.437$,
	Tension	0.164	0.135	0.163	1.221	0.226	Adjusted $R^2=0.396$,
	Anger	-0.516	0.157	-0.417	-3.284**	0.001	F=10.738, p=0.001,
	Depression	-0.178	0.150	-0.170	-1.189	0.238	D/W=1.832
	Fatigue	0.015	0.132	0.017	0.118	0.907	
	Confusion	-0.177	0.166	-0.165	-1.071	0.287	
	Vigour	0.311	0.090	0.320	3.455**	0.001	
Inter-personal relation-ships	(k)	4.310	0.411		10.500	0.001	$R^2=0.192$,
	Tension	0.015	0.141	0.017	0.104	0.917	Adjusted $R^2=0.133$,
	Anger	-0.277	0.165	-0.255	-1.678	0.097	F=3.282, p=0.006,
	Depression	-0.046	0.157	-0.050	-0.294	0.769	D/W=1.829
	Fatigue	-0.053	0.139	-0.068	-0.382	0.703	
	Confusion	-0.061	0.174	-0.064	-0.349	0.728	
	Vigour	0.144	0.094	0.169	1.525	0.131	
Academic and class activities	(k)	3.639	0.350		10.395	0.001	$R^2=0.418$,
	Tension	0.032	0.121	0.037	0.269	0.789	Adjusted $R^2=0.376$,
	Anger	-0.270	0.141	-0.248	-1.919	0.058	F=9.926, p=0.001,
	Depression	-0.015	0.134	-0.016	-0.109	0.913	D/W=1.978
	Fatigue	-0.114	0.118	-0.145	-0.962	0.339	
	Confusion	-0.159	0.149	-0.167	-1.069	0.288	
	Vigour	0.318	0.081	0.372	3.948***	0.001	
Educational environment	(k)	4.121	0.380		10.832	0.001	$R^2=0.276$,
	Tension	0.048	0.131	0.055	0.364	0.716	Adjusted $R^2=0.223$,
	Anger	-0.251	0.153	-0.237	-1.643	0.104	F=5.262, p=0.001,
	Depression	0.051	0.146	0.056	0.347	0.729	D/W=2.005
	Fatigue	-0.293	0.128	-0.383	-2.286*	0.025	
	Confusion	0.000	0.161	0.000	0.002	0.998	
	Vigour	0.092	0.088	0.110	1.050	0.297	
School rules and special activities	(k)	3.901	0.410		9.511	0.001	R=0.327, Adjusted R=0.278,
	Tension	0.038	0.141	0.040	0.272	0.787	F=6.707, p=0.001,
	Anger	-0.208	0.165	-0.175	-1.260	0.211	D/W=1.917
	Depression	0.173	0.157	0.172	1.100	0.275	
	Fatigue	-0.322	0.138	-0.376	-2.326*	0.022	
	Confusion	-0.124	0.174	-0.120	-0.713	0.478	
	Vigour	0.258	0.094	0.277	2.734**	0.008	
Social support	(k)	3.876	0.456		8.501	0.001	R=0.159, Adjusted R=0.098,
	Tension	-0.165	0.157	-0.171	-1.048	0.298	F=2.614, p=0.023,
	Anger	-0.273	0.183	-0.231	-1.489	0.140	D/W=1.725
	Depression	0.115	0.175	0.115	0.657	0.513	
	Fatigue	-0.020	0.154	-0.024	-0.131	0.896	
	Confusion	-0.027	0.193	-0.026	-0.138	0.890	
	Vigour	0.184	0.105	0.198	1.753	0.083	
SLS	(k)	3.977	0.312		12.756	0.001	R=0.396, Adjusted R=0.353,
	Tension	0.023	0.107	0.029	0.210	0.834	F=9.077, p=0.001,
	Anger	-0.298	0.125	-0.313	-2.377*	0.020	D/W=1.796
	Depression	0.015	0.120	0.019	0.128	0.898	
	Fatigue	-0.130	0.105	-0.190	-1.240	0.219	
	Confusion	-0.094	0.132	-0.113	-0.710	0.479	
	Vigour	0.222	0.072	0.297	3.091**	0.003	

*p<0.05, **p<0.01, ***p<0.001.

the subscales of the sentiment scale, perceived stress had a significant negative impact (β=-0.292, p<0.01). In contrast physical health (β=0.267, p<0.05) and subjective happiness (β=0.267, p<0.05) had a significant positive impact on the overall satisfaction with school life. The re-

gression model for this variable was substantial (F= 10.569, p<0.001), and this was also the case for all other sentiment variables.

The explanatory power for satisfaction with interpersonal relationships was 45.8% (F=9.881, p<0.001). Among the

Table 9. Effects of sentiment through forest experience on school life satisfaction

Dependent variable	Independent variable	B	SE	β	t	p	Statistical value
Overall school life	(k)	2.375	0.530		4.484	0.000	R^2=0.474,
	Perceived stress	-0.304	0.095	-0.292	-3.196**	0.002	Adjusted R^2=0.429,
	Perceived restorativeness	0.030	0.130	0.031	0.233	0.817	F=10.569, p=0.001,
	Physical health	0.285	0.130	0.267	2.191*	0.031	D/W=1.706
	Emotional stability	0.158	0.132	0.152	1.194	0.236	
	Attention restoration	-0.164	0.167	-0.183	-0.981	0.329	
	Subjective vitality	0.087	0.173	0.089	0.501	0.618	
	Subjective well-being	0.297	0.116	0.267	2.558*	0.012	
Inter-personal relation-ships	(k)	2.494	0.472		5.285	0.000	R^2=0.458,
	Perceived stress	-0.189	0.085	-0.207	-2.233*	0.028	Adjusted R^2=0.411,
	Perceived restorativeness	-0.034	0.115	-0.040	-0.298	0.766	F=9.881, p=0.001,
	Physical health	0.451	0.116	0.481	3.887***	0.000	D/W=1.896
	Emotional stability	0.157	0.118	0.171	1.327	0.188	
	Attention restoration	-0.175	0.149	-0.222	-1.173	0.244	
	Subjective vitality	0.044	0.154	0.051	0.286	0.776	
	Subjective well-being	0.187	0.103	0.192	1.811	0.074	
Academic and class activities	(k)	2.171	0.468		4.642	0.000	R^2=0.472,
	Perceived stress	-0.224	0.084	-0.244	-2.665**	0.009	Adjusted R^2=0.427,
	Perceived restorativeness	0.065	0.114	0.075	0.567	0.572	F=10.465, p=0.001,
	Physical health	0.178	0.115	0.189	1.552	0.125	D/W=2.170
	Emotional stability	0.117	0.117	0.127	0.998	0.321	
	Attention restoration	-0.181	0.148	-0.229	-1.226	0.224	
	Subjective vitality	0.333	0.153	0.386	2.176*	0.032	
	Subjective well-being	0.121	0.102	0.123	1.178	0.242	
Educational environment	(k)	2.277	0.488		4.662	0.000	R^2=0.393,
	Perceived stress	-0.218	0.088	-0.243	-2.484*	0.015	Adjusted R^2=0.342,
	Perceived restorativeness	0.156	0.119	0.184	1.302	0.197	F=7.596, p=0.001,
	Physical health	0.171	0.120	0.186	1.422	0.159	D/W=1.951
	Emotional stability	0.070	0.122	0.079	0.575	0.567	
	Attention restoration	-0.133	0.154	-0.173	-0.862	0.391	
	Subjective vitality	0.017	0.160	0.020	0.105	0.917	
	Subjective well-being	0.290	0.107	0.303	2.708**	0.008	
School rules and special activities	(k)	2.821	0.506		5.570	0.000	R^2=0.479,
	Perceived stress	-0.355	0.091	-0.355	-3.904***	0.000	Adjusted R^2=0.434,
	Perceived restorativeness	-0.006	0.124	-0.007	-0.051	0.960	F=10.749, p=0.001,
	Physical health	0.435	0.124	0.423	3.491**	0.001	D/W=1.921
	Emotional stability	-0.081	0.127	-0.081	-0.643	0.522	
	Attention restoration	-0.029	0.160	-0.034	-0.181	0.857	
	Subjective vitality	0.129	0.166	0.137	0.777	0.439	
	Subjective well-being	0.135	0.111	0.126	1.215	0.228	

Table 9. Continued

Dependent variable	Independent variable	B	SE	β	t	p	Statistical value
Social support	(k)	2.373	0.520		4.566	0.000	R^2=0.445,
	Perceived stress	-0.189	0.093	-0.190	-2.022*	0.046	Adjusted R^2=0.398,
	Perceived restorativeness	-0.181	0.127	-0.192	-1.420	0.159	F=9.392, p=0.001,
	Physical health	0.521	0.128	0.510	4.074***	0.000	D/W=1.895
	Emotional stability	-0.046	0.130	-0.046	-0.355	0.724	
	Attention restoration	-0.359	0.164	-0.419	-2.187*	0.032	
	Subjective vitality	0.458	0.170	0.490	2.695**	0.009	
	Subjective well-being	0.203	0.114	0.191	1.781	0.079	
SLS	(k)	2.409	0.353		6.817	0.000	R^2=0.606,
	Perceived stress	-0.245	0.063	-0.306	-3.870***	0.000	Adjusted R^2=0.572,
	Perceived restorativeness	0.007	0.086	0.010	0.084	0.933	F=18.017, p=0.001,
	Physical health	0.334	0.087	0.405	3.840***	0.000	D/W=1.960
	Emotional stability	0.065	0.088	0.080	0.731	0.467	
	Attention restoration	-0.174	0.112	-0.252	-1.557	0.123	
	Subjective vitality	0.184	0.116	0.244	1.593	0.115	
	Subjective well-being	0.202	0.077	0.235	2.609*	0.011	

*p<0.05, **p<0.01, ***p<0.001.

subscales of the sentiment scale, perceived stress (β= -0.207, p<0.05) had a significant negative impact, while physical health (β=0.481, p<0.001) had a significant positive effect on satisfaction with interpersonal relationships.

The explanatory power for satisfaction with classes and learning activities was 47.2% (F=10.465, p<0.001). Among the subscales of the sentiment scale, perceived stress (β=-0.244, p<0.01) had a significant negative impact. In contrast, subjective vitality (β=0.386, p<0.05) significantly impacted satisfaction with classes and learning activities.

The explanatory power for satisfaction with the educational environment was 39.3% (F=7.596, p<0.001). Among the subscales of the sentiment scale, perceived stress (β= 0.243, p<0.05) had a significant negative impact. In contrast, subjective happiness (β=0.303, p<0.01) significantly impacted satisfaction with the educational environment.

The explanatory power for satisfaction with school rules and special activities was 47.9% (F=10.749, p<0.001). Among the subscales of the sentiment scale, perceived stress (β=-0.355, p<0.001) had a significant negative impact. In contrast, physical health (β=0.423, p<0.01) significantly impacted satisfaction with school rules and special activities.

The explanatory power for satisfaction with social sup-

port was 44.5% (F=9.392, p<0.001). Among the subscales of the sentiment scale, perceived stress (β=-0.190, p<0.05) and attention restoration (β=-0.419, p<0.05) had a significant negative impact. In contrast, physical health (β=0.510, p<0.001) and subjective vitality (β= 0490, p<0.01) had a significant positive effect on satisfaction with social support.

Finally, the explanatory power for school life satisfaction was 60.6% (F=18.017, p<0.001). Among the subscales of the sentiment scale, perceived stress (β=-0.306, p<0.001) had a significant negative impact. In contrast, physical health (β=0.405, p<0.001) and subjective happiness (β= 0.235, p<0.05) had a significant positive effect on school life satisfaction (Table 9).

Conclusions

This study examined the effects of mood states and sentiments resulting from forest experience on peer relationships, career counseling, life guidance, and school life satisfaction among Korean boarding middle school students. Students' mood states resulting from forest experience were assessed using a 5-point Likert scale ranging from "not at all" (1) to "very much" (5), with higher scores indicating

higher levels of the corresponding mood states. The overall score was 2.32, and among the subscales, vigor had the highest score (3.19), followed by confusion (2.50), fatigue (2.46), depression (2.18), tension (2.12), and anger (1.85). Based on prior research findings on the effects of forest and urban landscapes on human emotions (Eom 2016) and on a report indicating that humans perceive 87% of external stimuli through vision, 7% through hearing, 3.5% through smell, 1.5% through touch, and 1% through taste (Correy 1983), it can be inferred that forest experience has a positive impact on vigor through the sensory perception of the entire body.

Similarly, students' sentiments resulting from forest experience were assessed using the same 5-point Likert scale. The overall score was 3.08; among the subscales, subjective happiness (3.08) scored the highest. This aligns with a previous study (Kwon et al. 2014) that compared pre- and post-intervention measurements of physiological parameters and found that forest experience reduced stress and could help prevent antisocial behaviors such as school violence due to excessive stress. These findings suggest that higher sentiments resulting from forest experience may actively reduce stress, thus preventing school violence and improving school life satisfaction.

Finally, school life satisfaction was also assessed on the same scale. The overall mean score was 3.66, among the subscales, interpersonal relationships (3.91) scored the highest. This implies that forest experience positive impact interpersonal relationships and social skills in students, consistent with the results of a previous study (Jeong et al. 2021) that highlighted the transformative effects of forest education on middle school students' social skills. These results strongly suggest that forest experience contributes to enhanced school-life satisfaction.

Students' mood states resulting from forest experience correlate significantly with overall satisfaction with school life (F=10.738, p<0.001), explaining 43.7% of the variation. Among the subscales of the profile of mood states, anger (β =-0.417, p<0.01) had a significant negative impact, while vigor (β=0.320, p<0.01) had a significant positive effect on overall satisfaction with school life. Similarly, sentiments resulting from forest experience were significantly correlated with overall satisfaction with school life (F=10.569, p<0.001), explaining 47.4% of the variation. Among the

subscales of the sentiment scale, perceived stress had a significant negative impact (β=-0.292, p<0.01). In contrast, physical health (β=0.267, p<0.05) and subjective happiness (β=0.267, p<0.05) had a significant positive impact on the overall satisfaction with school life. These findings align with research conducted by Park et al. (2010), which emphasized the broader societal implications of forest experience-based education and its significant influence on individuals' overall quality of life. They also underscore the detrimental effects of negative mood states among middle school students on their school life satisfaction and overall quality of life, as well as the positive impact of high levels of vigor in their mood states on enhancing school life satisfaction and quality of life.

The study was subject to some limitations. First, the limited sample size and focus on boarding middle school students in the Gyeongnam region of Korea restrict the diversity and generalizability of the findings. Extrapolation of the results to wider groups should be performed with caution. Future research should include a broader range of adolescent groups, such as high school students and out-of-school youth, to enhance the representativeness and applicability of the findings.

Second, using only mood states and sentiments resulting from forest experience provides a limited understanding of overall school life satisfaction. Noteworthily, the results of the variables in this study are not intended to differentiate between positive and negative aspects of mood states and sentiments resulting from forest experience or their direct impact on school life satisfaction, but rather to serve as data for personal growth and development.

Third, future research should utilize diverse approaches, including qualitative research, to understand the dynamics within learning environments, which our study did not address. Comparing the characteristics of mood states between teachers and middle school students may provide deeper insights for guiding students toward healthy physical, mental, and social development.

Fourth, due to the large number of survey items, some students experienced fatigue. This issue can be addressed by allocating more time for completing the survey or by dividing the survey into separate sections.

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