(ISSN: 2602-4047)

Akkaya, G. & Akkaya, S. (2023). Predictive relationships between pre-service teachers' biophilia levels and multiple intelligence domains: a quantitative analysis, *international Journal of Eurasian Education and Culture, 8(23), 2772-2786.*

DOI: http://dx.doi.org/10.35826/ijoecc.806

Article Type (Makale Türü): Research article

PREDICTIVE RELATIONSHIPS BETWEEN PRE-SERVICE TEACHERS' BIOPHILIA LEVELS AND MULTIPLE INTELLIGENCE DOMAINS: A QUANTITATIVE ANALYSIS

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Received: 17.04.2023 *Accepted: 16.09.2023* *Published: 01.10.2023*

ABSTRACT

The aim of our study is to examine the predictive levels between pre-service teachers' intelligence domains and Biophilia levels in the theory of multiple intelligences. A quantitative approach has been adopted in the study and the model of the research is the relational screening model. The study group of this research consists of 574 (390 female, 184 male) pre-service teachers. The sampling method of our research is the convenient sampling method. The data collection tools of the research were "The Scale for Determining the Levels of Biophilia for Pre-service Teachers" developed by Sefali and Ozay Kose (2022) and the "Multiple Intelligence Inventory" developed by Ozden (2003). The study determined that Biophilia Levels 1, 2, and 4 are significant predictors of verbal intelligence domain. It was determined that Biophilia Level 1 and Biophilia Level 3 are significant predictors of Logical intelligence. It was determined that Biophilia Level 1 and Biophilia Level 4 are significant predictors of the visual intelligence domain. Biophilia Level 1 is a positive significant predictor of the musical intelligence domain; Biophilia Level 3 is a negative considerable predictor of ID. In addition, it was determined that Biophilia Level 2 has approximate significance in predicting ID. Biophilia Level 1 and Biophilia Level 2 were determined as significant predictors of the bodily intelligence domain. Only Biophilia Level 2 was determined as a significant predictor of the social intelligence domain. Biophilia Level 1 and Biophilia Level 2 were determined as significant predictors of the intrinsic intelligence domain. Biophilia Level 1, Biophilia Level 2, and Biophilia Level 3 were determined as significant predictors of the nature intelligence domain. Based on the findings obtained in our study, it can be said that different levels of Biophilia are predicted according to intelligence domains.

Keywords: Biophilia, multiple intelligence theory, preservice teachers.

INTRODUCTION

Intelligence is among the concepts that are frequently thought about from the past to the present. The definition of intelligence has been tried to be made since ancient times and it has found its place in many different fields. Therefore, many theories on intelligence have been put forward. The main starting points of these theories are; some social dynamics, personal experiences, beliefs and scientific studies (Sak, 2012). In this context, it is normal for the theory of intelligence to change in parallel with the person who changes over time. The change process of intelligence theories has also affected the evaluation dimension of intelligence and intelligence has changed from one-dimensional evaluation processes to multi-dimensional evaluation processes. Gardner's (1987) theory of multiple intelligences is one of the most striking among the theories that deal with multidimensional intelligence. According to Gardner (1987), there may be one or more types of intelligence in an individual, but some types of intelligence are more prominent in some individuals. These intelligence types are categoriIEd as "verbal-linguistic intelligence, visual-spatial intelligence, bodily-sensory intelligence, logical-mathematical intelligence, social intelligence, personal-internal intelligence, natural intelligence, musical-rhythmic intelligence" (Gardner, 2006). Gardner, the founder of the theory of multiple intelligences, who looked at intelligence with a pluralistic understanding, contrary to the traditional understanding of his time, stated that there could be other types of intelligence (Gardner, 1999). In this respect, the existence of the multidimensional structure of intelligence arouses curiosity about what might happen in the s where intelligence or intelligence types (from the perspective of multiple intelligence theory) are related. This has allowed studies to be conducted in s that are thought to be related to intelligence types or that are curious.

Mankind has adapted to nature with his intelligence and has been able to continue his generation by finding solutions to the problems he encounters thanks to his intelligence. In fact, this situation reveals the extent of the organic relationship between intelligence and nature. Considering the studies, it is seen that the positive relationships that people establish with nature help people to be healthier mentally and physically (Schultz, 2001; Thomashow, 1996). Of course, the dimensions of this positive relationship established between nature and humans actually change with the perspective of human beings towards nature. From this point of view, there is a personal dimension to the bond established with nature. In this context, there is a curiosity about what kind of a connection is established between the types of intelligence that are considered personal and the interest in nature.

The interest in nature and living things comes up with the concept of "Biophilia". Biophilia is called the desire to know nature with a genetic basis (Kellert, 2005; Tilbury, 1995). When we think of intelligence as an ability to adapt to nature, it can be mentioned that there is a relationship between the types of intelligence in the theory of multiple intelligences and Biophilia. The Biophilia was introduced as a hypothesis by Wilson in 1984 (Kellert, 2003). Subsequently, Kellert and Wilson (1993) collaborated to further refine and develop the theory. According to Wilson's (1984) theory, there exists an inherent and strong relationship between humans and other living beings, stemming from their shared evolutionary history (Kellert, 2003). It is stated that this relationship is

formed by shaping certain innate tendencies of humans by culture and experience (Kellert, 2003). Kellert (1996) examined the Biophilia theory in light of human responses and categorized these reactions under nine headings: "utilitarian, using nature to satisfy needs; negativistic value, aversion to nature; dominionistic value, control of nature; naturalistic value, satisfaction from close proximity; ecologistic-scientific value, study of nature; aesthetic value, pleasure derived from physical beauty; symbolic value, communication and expression; humanistic value, care of animals, and moralistic value, ethical concern." Some studies suggest that interactions with natural environments can enhance cognitive and emotional functions (Aristizabal et al., 2021; Joye, 2007), improve attention and satisfaction levels (Daly et al., 2010), reduce stress (Aristizabal et al., 2021; Park et al. 2009), and even foster creativity in students when integrated into educational settings (Orr, 2004). Given the numerous personal benefits of effective communication and connection with nature explained by Biophilia, it is crucial to determine the extent of Biophilia in individuals. Specifically, determining the levels of Biophilia in prospective teachers and predicting it based on multiple intelligence domains is essential. This is because teachers play a pivotal role in structuring learning environments, and the benefits of learning environments designed with the Biophilia theory in mind are well-known (Orr, 2004).

In this context, the aim of our study is to examine the relationship between pre-service teachers' intelligence s and Biophilia levels in the theory of multiple intelligences. For this purpose, answers were sought to the following questions.

In line with this objective, answers to the following questions were sought:
1. Are individuals' Biophilia levels significant predictors of intelligence domains?
i. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain A (linguistic)?
ii. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain B (logical-mathematical)?
iii. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain C (spatial)?
iv. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain D (musical)?
v. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain E (bodily-kinesthetic)?
vi. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain F (intrapersonal)?
vii. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain G (interpersonal)?
viii. Are Biophilia levels 1, 2, 3, and 4 significant predictors of intelligence domain H (naturalist)?

METHOD

A quantitative approach has been adopted in the study and the model of the research is the relational screening model. A relational survey model is a survey approach that aims to determine to what extent two or more variables change together (Karasar, 1998).

Study group

The study group of the research consists of 574 preservice teachers. For the research, data were collected from preservice teacher studying at Inonu University Faculty of Education in the 2022-2023 academic semesters. Since the evaluation will be made within the framework of the multiple intelligence approach, no branch distinction has been made. The sampling method of our research is the convenient sampling method. The reason for choosing this sampling method is that the participants are easy to access the researcher (Fraenkel & Wallen, 2003). Descriptive statistics of the participants are presented in Table 1.

Table 1. Distribution of Demographic Characteristics of the Preservice Teachers

Groups	Frequency(N)	Percentage (%)
Gender		
Female	390	67.9
Male	184	32.1
Class Level		
1	102	17.8
2	112	19.5
3	186	32.4
4	174	30.3
Department		
Mathematics Education	25	4.4
English Language Education	55	9.6
Elementary Science Education	41	7.1
Music Teacher Education	40	7
Department of Preschool Education	40	7
Primary School Teaching	113	19.7
Social Studies Education	26	4.5
Turkish Language Education	21	3.7
Department of Special Education	108	18.8
Art and Crafts Teacher Education	3	0.5
Department of Special Education	40	7
Physical Education and Sports Teaching	62	10.8

Data Collection Tools

The data collection tools of the research were “The Scale for Determining the Levels of Biophilia for Pre-service Teachers” developed by Sefali and Ozay Kose (2022). The scale developed by Sefali and Ozay Köse (2022) is of the 5-point Likert type and includes statements ranging from "Strongly Disagree" to "Strongly Agree". The scale consists of 25 items and has been found to have a 4-factor structure. The factors are named as Level 1, Level 2, Level 3, and Level 4. The overall Cronbach's Alpha value of the scale was found to be .88. The reliability coefficient values for the sub-dimensions are expressed as .64, .81, .85, and .64 for each level, respectively. In our study, the "Multiple Intelligence Inventory" by Özden (2003) was used for multiple intelligence levels. The Multiple Intelligence Inventory consists of 8 sections, and each section contains 10 characteristics related to each

intelligence domain. The scale, which has a total of 80 items, is of the 5-point Likert type and is expressed as "completely appropriate... not appropriate at all".

Data Analysis & Validity-reliability

574 data collected from preservice teachers in the research are sufficient for analysis. There are no outliers or missing values in the data set. There were no multivariate outliers (mahalanobis values>.001). Skewness and kurtosis values to express that the data is normally distributed given Table 2.

Table 2. Kurtosis and Skewness Values

	N	Av.	Ss	Median	Min.	Max.	Kurtosis	Skewness
Biophilia Level 1	574	3,2961	,72194	3,3000	1,00	5,00	-,019	-,134
Biophilia Level 2	574	3,2324	,65498	3,2500	1,00	5,00	,270	-,281
Biophilia Level 3	574	3,1516	,77699	3,0000	1,00	5,00	-,145	-,041
Biophilia Level 4	574	2,3602	,84405	2,2500	1,00	5,00	-,118	,445
IA	574	3,2707	,51384	3,3000	1,50	5,00	,624	,092
IB	574	3,5120	,55571	3,5000	1,50	4,80	,319	-,285
IC	574	3,4594	,57572	3,5000	1,40	5,00	,252	-,159
ID	574	3,3120	,70667	3,3000	1,30	5,00	-,141	-,050
IE	574	3,6577	,54944	3,7000	1,40	5,00	,301	-,292
IF	574	3,4190	,56732	3,5000	1,70	5,00	,194	-,320
IG	574	3,5676	,51724	3,5000	1,10	5,00	,914	-,265
IH	574	3,6347	,66042	3,7000	1,40	5,00	-,226	-,205

Regarding the data, Table 2 presents statistics on skewness and kurtosis values. Skewness values for Biophilia Level 1, Biophilia Level 2, Biophilia Level 3, Biophilia Level 4, IA, IB, IC, ID, IE, IF, IG and IH were -.134, respectively; -.281; -.041; .445; .092; -.285; -.159; -.050; -.292; -.320; It was calculated as -.265 and -.205. If these values are between -2 and +2, it means that the data set has a normal distribution (George & Mallery, 2010). Since the skewness values are within these limits, it can be said that all variables are suitable for normal distribution. Kurtosis values are -.019 for Biophilia Level 1, Biophilia Level 2, Biophilia Level 3, Biophilia Level 4, IA, IB, IC, ID, IE, IF, IG and IH, respectively; .270; -.145; -.118; .624; .319; .252; -.141; ,301; ,194; It was determined as .914 and -.226. The fact that kurtosis values are between -2 and +2 supports that the data shows normal distribution (George & Mallery, 2010). The fact that the given kurtosis values are within these limits confirms the normal distribution of the data. There is positive linearity between the variables. The correlational relationship between Biophilia levels and multiple intelligence domains is given in the Table 3 below.

Table 3. Correlation Analysis of Biophilia and Intelligence Domains

		IA	IB	IC	ID	IE	IF	IG	IH
Biophilia Level 1	r	,424**	,362**	,457**	,280**	,402**	,206**	,451**	,699**
	p	,000	,000	,000	,000	,000	,000	,000	,000
Biophilia Level 2	r	,419**	,316**	,386**	,303**	,423**	,220**	,443**	,655**
	p	,000	,000	,000	,000	,000	,000	,000	,000
Biophilia Level 3	r	,336**	,309**	,316**	,141**	,267**	,127**	,325**	,546**
	p	,000	,000	,000	,001	,000	,002	,000	,000
Biophilia Level 4	r	,379**	,201**	,354**	,215**	,243**	,123**	,275**	,421**
	p	,000	,000	,000	,000	,000	,003	,000	,000

*<0,05; **<0,01; Correlation Analysis

The table 3 show that pearson correlation coefficients between IA-IH for Biophilia Level 1 were .424, respectively; .362; .457; .280; ,402; ,206; It was found to be .451 and .699, and all these correlations are statistically significant (p <.05). This indicates moderate to highly positive relationships between Biophilia Level 1 and all variables from IA to IH. Pearson correlation coefficients between IA-IH of Biophilia Level 2 are .419, respectively; .316; .386; .303; .423; .220; are .443 and .655. These correlations are also statistically significant (p<.05). These results indicate that Biophilia Level 2 shows moderate to highly positive relationships between these variables. The correlation coefficients of Biophilia Level 3 from IA to IH are .336; .309; .316; ,141; .267; ,127; It was found to be .325 and .546. Weak to moderate positive correlations were found between Biophilia Level 3 and all variables. All these correlations are statistically significant (p<.05). The correlation coefficients for Biophilia Level 4 are .379, respectively; ,201; .354; .215; .243; ,123; .275 and .421. Biophilia Level 4 is weak among IB, ID, IF; It has moderate positive correlations with other variables. These correlations are also statistically significant (p<.05). The predictive variables of the study are Biophilia level 1, level 2, level 3 and level 4. The predicted variables are multiple intelligence levels A, B, C, D, E, F, G, H. After the hypotheses were tested, path analysis between the variables was tested. Model 1 was created as a result of the stated tests and analysis. Figure 1 and Table 4 shows the analysis results of model 1. According to the analysis results, non-significant (p>.05) relationships were removed from the analysis. Relationships with non-significant t values are given below. These paths were removed from the model and retested.

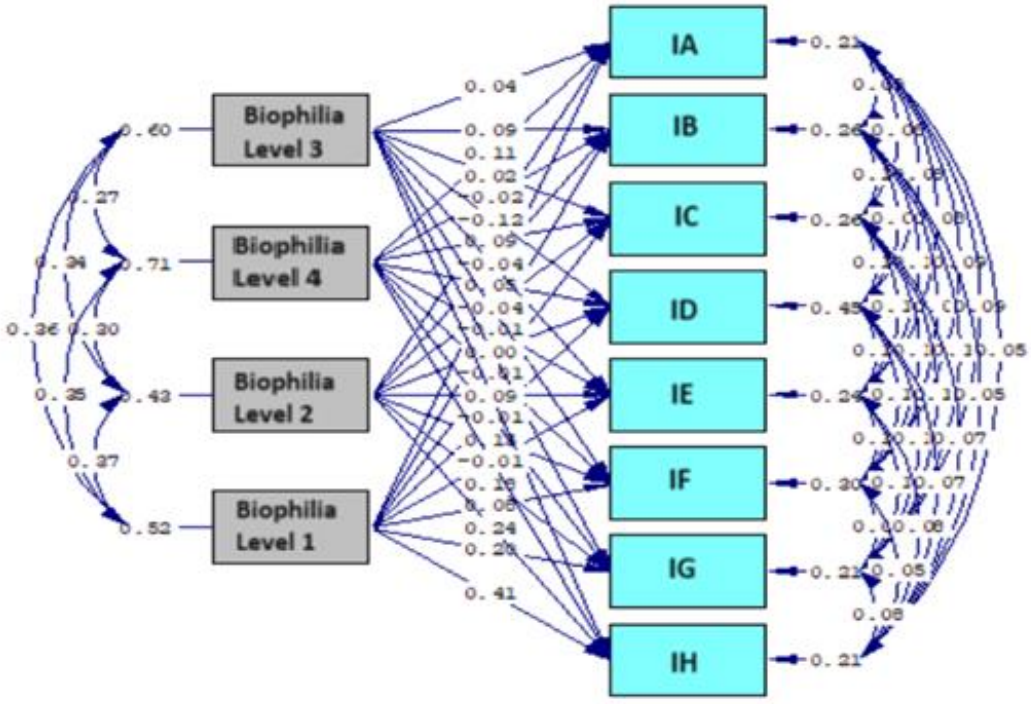

Figure 1. The Path Analysis of Model 1

Table 4. The Correlation Values of Model 1

Predicted variable	Predictor variable	p	t	Predicted variable	Predictor variable	p	t
IA	Biophilia Level 1	0.012	16.87	IE	Biophilia Level 1	0.014	16.87
	Biophilia Level 2	0.044	2.95		Biophilia Level 2	0.049	3.28
	Biophilia Level 3				Biophilia Level 3	0.034	-1.69
	Biophilia Level 4	0.028	3.85		Biophilia Level 4	0.055	4.88
IB	Biophilia Level 1	0.016	16.87	IF	Biophilia Level 1	0.018	16.87
	Biophilia Level 2	0.052	4.07		Biophilia Level 2	0.055	1.61
	Biophilia Level 3	0.035	2.11		Biophilia Level 3	0.038	-1.42
	Biophilia Level 4	0.057	0.67		Biophilia Level 4	0.061	2.64
IC	Biophilia Level 1	0.015	16.87	IG	Biophilia Level 1	0.012	16.87
	Biophilia Level 2	0.051	5.52		Biophilia Level 2	0.046	4.40
	Biophilia Level 3	0.035	0.089		Biophilia Level 3	0.030	-0.47
	Biophilia Level 4	0.056	0.50		Biophilia Level 4	0.050	3.77
ID	Biophilia Level 1	0.026	16.87	IH	Biophilia Level 1	0.012	16.87
	Biophilia Level 2	0.067	2.02		Biophilia Level 2	0.046	9.09
	Biophilia Level 3	0.048	-2.89		Biophilia Level 3	0.033	2.56
	Biophilia Level 4	0.074	3.82		Biophilia Level 4	0.051	4.72

The table 4 shows that the t-value for Biophilia Level 1 in predicting IA is found to be 16.87, and this predictability is statistically significant (t(572)=16.87, p=0.012, p<.05). The t-value for Biophilia Level 2 in predicting IA is found to be 2.95, and this predictability is statistically significant (t(572)=2.95, p=0.044, p<.05). The t-value for Biophilia Level 4 in predicting IA is found to be 3.85, and this predictability is statistically significant (t(572)=3.85, p=0.028 p<.05). No significant t-value was found for Biophilia Level 3 in predicting IA. The t-value for Biophilia Level 1 in predicting IB is found to be 16.87, and this predictability is statistically significant (t(572)=16.87, p=0.016, p<.05). The t-value for Biophilia Level 2 in predicting IB is found to be 4.07, and this predictability is not statistically significant (t(572)=4.07, p=0.052, p<.05). The t-value for Biophilia Level 3 in predicting IB is found to be 2.11, and this predictability is statistically significant (t(572)=2.11, p=0.035 p<.05). The t-value for Biophilia Level 4 in predicting IB is found to be 0.67, and this predictability is not statistically significant (t(572)=0.67, p=0.057 p<.05). The t-value for Biophilia Level 1 in predicting IC is found to be 16.87, and this predictability is statistically significant (t(572)=16.87, p=0.015, p<.05). The t-value for Biophilia Level 2 in predicting IC is found to be 5.52, and this predictability is not statistically significant (t(572)=5.52, p=0.051, p<.05). The t-value for Biophilia Level 3 in predicting IC is found to be 0.089, and this predictability is statistically significant (t(572)=0.089, p=0.035 p<.05). The t-value for Biophilia Level 4 in predicting IC is found to be 0.50, and this predictability is not statistically significant (t(572)=0.50, p=0.056 p<.05). The t-value for Biophilia Level 1 in predicting ID is found to be 16.87, and this predictability is statistically significant (t(572)=16.87,p=0.026, p<.05). The t-value for Biophilia Level 2 in predicting ID is found to be 2.02, and this predictability is not statistically significant (t(572)=2.02, p=0.067, p<.05). The t-value for Biophilia Level 3 in predicting ID is found to be -2.89, and this predictability is statistically significant (t(572)=-2.89, p=0.048 p<.05). The t-value for Biophilia Level 4 in predicting ID is found to be 3.82, and this predictability is not statistically significant (t(572)=3.82, p=0.074 p<.05). The t-value for Biophilia Level 1 in predicting IE is found to be 16.87, and this predictability is statistically significant (t(572)=16.87,p=0.014, p<.05). The t-value for Biophilia Level 2 in predicting IE is found to be 3.28, and this

predictability is not statistically significant (t(572)=3.28, p=0.049, p<.05). The t-value for Biophilia Level 3 in predicting IE is found to be -1.69, and this predictability is statistically significant (t(572)=-1.69, p=0.034 p<.05). The t-value for Biophilia Level 4 in predicting IE is found to be 4.88, and this predictability is not statistically significant (t(572)=4.88, p=0.055 p<.05). The t-value for Biophilia Level 1 in predicting IF is found to be 16.87, and this predictability is statistically significant (t(572)=16.87,p=0.018, p<.05). The t-value for Biophilia Level 2 in predicting IF is found to be 1.61, and this predictability is not statistically significant (t(572)=1.61, p=0.055, p<.05). The t-value for Biophilia Level 3 in predicting IF is found to be -1.42, and this predictability is statistically significant (t(572)=-1.42, p=0.038 p<.05). The t-value for Biophilia Level 4 in predicting IF is found to be 2.64, and this predictability is not statistically significant (t(572)=2.64, p=0.061 p<.05). The t-value for Biophilia Level 1 in predicting IG is found to be 16.87, and this predictability is statistically significant (t(572)=16.87,p=0.012, p<.05). The t-value for Biophilia Level 2 in predicting IG is found to be 4.40, and this predictability is not statistically significant (t(572)=4.40, p=0.046, p<.05). The t-value for Biophilia Level 3 in predicting IG is found to be -0.47, and this predictability is statistically significant (t(572)=-0.47, p=0.030 p<.05). The t-value for Biophilia Level 4 in predicting IG is found to be 3.77, and this predictability is not statistically significant (t(572)=3.77, p=0.050 p<.05). The t-value for Biophilia Level 1 in predicting IH is found to be 16.87, and this predictability is statistically significant (t(572)=16.87,p=0.012, p<.05). The t-value for Biophilia Level 2 in predicting IH is found to be 9.09, and this predictability is not statistically significant (t(572)=9.09, p=0.046, p<.05). The t-value for Biophilia Level 3 in predicting IH is found to be 2.56, and this predictability is statistically significant (t(572)=2.56, p=0.033 p<.05). The t-value for Biophilia Level 4 in predicting IH is found to be 4.72, and this predictability is not statistically significant (t(572)=4.72, p=0.051 p<.05). Model 2 was created by removing these paths from the model and retesting them (Figure 2).

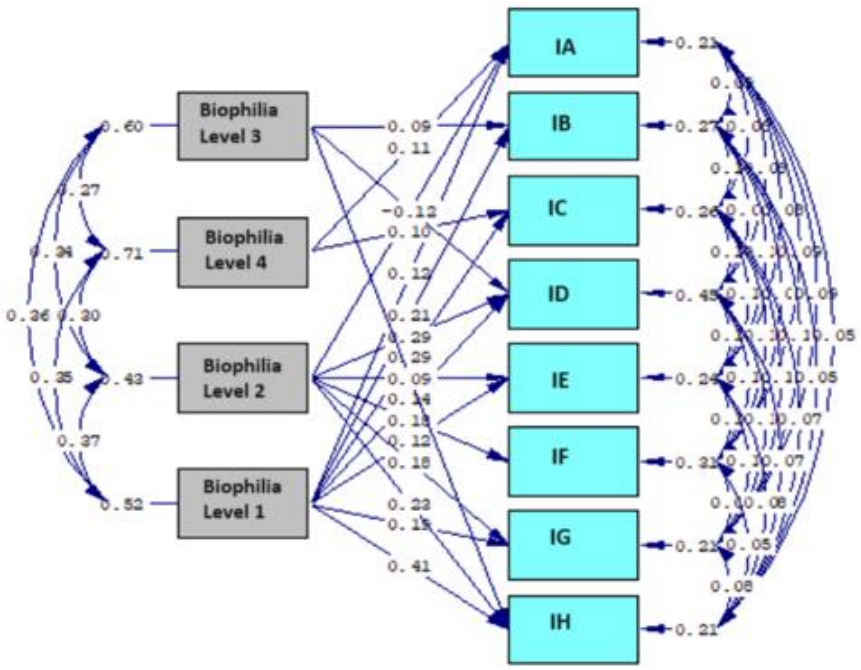

Figure 2. The path analysis of model 2

The findings on whether Biophilia is a significant predictor of Level 1, 2, 3 and 4 intelligence domains are given in table 5, table 6, table 7, table 8, table 9, table 10, table 11 and table 12.

Table 5. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain A

Predicted variable	Predictor variable	β	p	t	R^2
IA	Biophilia Level 1	0.12	0.012	16.87	0.21
	Biophilia Level 2	0.14	0.043	3.21	
	Biophilia Level 3				
	Biophilia Level 4	0.11	0.024	4.71	

The table 5 shows that the beta of Biophilia Level 1 in predicting IA was found to be 0.12, and this prediction was statistically significant (β=0.12, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.21. This means that 21% of the variance in the IA variable is explained by Biophilia Level 1. The beta of Biophilia Level 2 in predicting IA was found to be 0.14, and this prediction was statistically significant (β=0.14, t(572)=3.21, p<.05). No significant beta coefficient was found in predicting IA for Biophilia Level 3. This shows that Biophilia Level 3 does not significantly predict the IA variable. The beta of Biophilia Level 4 in predicting IA was found to be 0.11, and this prediction was statistically significant (β=0.11, t(572)=4.71, p<.05).

Table 6. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain B

Predicted variable	Predictor variable	β	p	t	R^2
IB	Biophilia Level 1	0.21	0.016	16.87	0.13
	Biophilia Level 2				
	Biophilia Level 3	0.088	0.029	3.06	
	Biophilia Level 4				

The table 6 shows that the beta of Biophilia Level 1 in predicting IZ was found to be 0.21, and this prediction was statistically significant (β=0.21, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.13. This means that 13% of the variance in the IB variable is explained by Biophilia Level 1. No significant beta coefficient was found for Biophilia Level 2 in predicting IQ. This shows that Biophilia Level 2 does not significantly predict the IB variable. The beta of Biophilia Level 3 in predicting IZ was found to be 0.088, and this prediction was statistically significant (β=0.088, t(572)=3.06, p<.05). No significant beta coefficient was found in predicting IQ for Biophilia Level 4. This shows that Biophilia Level 4 does not significantly predict the IB variable.

Table 7. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain C

Predicted variable	Predictor variable	β	p	t	R^2
IC	Biophilia Level 1	0.29	0.015	16.87	0.21
	Biophilia Level 2				
	Biophilia Level 3				
	Biophilia Level 4	0.10	0.023	4.30	

The table 7 shows that the beta of Biophilia Level 1 in predicting IC was found to be 0.29, and this prediction was statistically significant (β=0.29, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.21. This

means that 21% of the variance in the IC variable is explained by Biophilia Level 1. Biophilia Level 2 did not have a significant beta coefficient in predicting IC. This shows that Biophilia Level 2 does not significantly predict the IC variable. Biophilia Level 3 did not have a significant beta coefficient in predicting IC. This shows that Biophilia Level 3 does not significantly predict the IC variable. The beta of Biophilia Level 4 in predicting IC was found to be 0.10, and this prediction was statistically significant (β=0.10, t(572)=4.30, p<.05).

Table 8. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain D

Predicted variable	Predictor variable	β	p	t	R^2
ID	Biophilia Level 1	0.14	0.026	16.87	0.10
	Biophilia Level 2	0.29	0.061	2.26	
	Biophilia Level 3	- 0.12	0.045	-2.66	
	Biophilia Level 4				

The table 8 show that the beta of Biophilia Level 1 in predicting ID was found to be 0.14, and this prediction was statistically significant (β=0.14, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.10. This means that 10% of the variance in the ID variable is explained by Biophilia Level 1. The beta of Biophilia Level 2 in predicting ID was determined as 0.29. Since the p value was found to be 0.061, this predictor is not considered statistically significant at the 5% significance level, but it is approximately significant (β=0.29, t(572)=2.26, p>.05). The beta of Biophilia Level 3 in predicting ID is -0.12, and this negative prediction is statistically significant (β=-0.12, t(572)=-2.66, p<.05). This shows that Biophilia Level 3 has an inverse relationship with the ID variable. Biophilia Level 4 did not have a significant beta coefficient in predicting ID. This shows that Biophilia Level 4 does not significantly predict the ID variable.

Table 9. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain E

Predicted variable	Predictor variable	β	p	t	R^2
IE	Biophilia Level 1	0.12	0.014	16.87	0.18
	Biophilia Level 2	0.24	0.040	6.04	
	Biophilia Level 3				
	Biophilia Level 4				

The table 9 shows that the beta of Biophilia Level 1 in predicting IE was found to be 0.12, and this prediction was statistically significant (β=0.12, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.18. This means that 18% of the variance in the IE variable is explained by Biophilia Level 1. The beta of Biophilia Level 2 in predicting IE was found to be 0.24, and this prediction was statistically significant (β=0.24, t(572)=6.04, p<.05). No significant beta coefficient was found for Biophilia Level 3 and Biophilia Level 4 in predicting IE. This shows that Biophilia Level 3 and Biophilia Level 4 do not significantly predict the IE variable.

Table 10. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain F

Predicted variable	Predictor variable	β	p	t	R^2
IF	Biophilia Level 1				0.044
	Biophilia Level 2	0.18	0.034	5.29	
	Biophilia Level 3				
	Biophilia Level 4				

The table 10 shows that the no significant beta coefficient was found for Biophilia Level 1 in predicting IF. This shows that Biophilia Level 1 does not significantly predict the IF variable. The beta of Biophilia Level 2 in predicting IF was found to be 0.18, and this prediction was statistically significant (β=0.18, t(572)=5.29, p<.05). No significant beta coefficient was found for Biophilia Level 3 and Biophilia Level 4 in predicting IF. This shows that Biophilia Level 3 and Biophilia Level 4 do not significantly predict the IF variable.

Table 11. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain G

Predicted variable	Predictor variable	β	p	t	R^2
IG	Biophilia Level 1	0.19	0.012	16.87	0.21
	Biophilia Level 2	0.18	0.040	4.42	
	Biophilia Level 3				
	Biophilia Level 4				

The table 11 shows that the beta of Biophilia Level 1 in predicting IG was found to be 0.19, and this prediction was statistically significant (β=0.19, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.21. This means that 21% of the variance in the IG variable is explained by Biophilia Level 1. The beta of Biophilia Level 2 in predicting IG was found to be 0.18, and this prediction was statistically significant (β=0.18, t(572)=4.42, p<.05). No significant beta coefficient was found for Biophilia Level 3 and Biophilia Level 4 in predicting IG. This shows that Biophilia Level 3 and Biophilia Level 4 do not significantly predict the IG variable.

Table 12. Findings on Whether Biophilia is a Significant Predictor of Level 1, 2, 3 and 4 Intelligence Domain H

Predicted variable	Predictor variable	β	p	t	R^2
IH	Biophilia Level 1	0.41	0.012	16.87	0.52
	Biophilia Level 2	0.23	0.042	9.61	
	Biophilia Level 3	0.094	0.030	3.12	
	Biophilia Level 4				

The table 12 shows that the beta of Biophilia Level 1 in predicting IH was found to be 0.41, and this prediction was statistically significant (β=0.41, t(572)=16.87, p<.05). The variance ratio explained by this model is R^2=0.52. This means that 52% of the variance in the IH variable is explained by Biophilia Level 1. The beta of Biophilia Level 2 in predicting IH was found to be 0.23, and this prediction was statistically significant (β=0.23, t(572)=9.61, p<.05). The beta of Biophilia Level 3 in predicting IH was found to be 0.094, and this prediction was statistically significant (β=0.094, t(572)=3.12, p<.05). Biophilia Level 4 did not have a significant beta coefficient in predicting IH. This shows that Biophilia Level 4 does not significantly predict the IH variable.

When the goodness of fit indices of the model are examined, it is seen that the model fits the data quite well. The chi-square statistic was found to be 10.70, with a non-significant p value indicating that the model had a good fit ($\chi^2(14) = 10.70$, p = .71). The RMSEA value was set at 0.0, indicating an excellent fit of the model, which is lower than the .06 recommended by Browne and Cudeck (1993) (RMSEA = .00; 90% CI [.00, .031]). Other fit indices such as NFI, NNFI, CFI, and IFI all have a value of 1.00, indicating that the model has a perfect fit (NFI =

1.00, NNFI = 1.00, CFI = 1.00, IFI = 1.00). These values are above the critical values determined by Bentler and Bonett (1980). These results show that the model is valid and reliable in the studied sample.

CONCLUSION and DISCUSSION

The study determined that Biophilia Levels 1, 2, and 4 are significant predictors of verbal intelligence domain (IA). It was found that these variables explain 21% of the total variance in the IA variable (R^2=0.21). It was determined that Biophilia Level 1 and Biophilia Level 3 are significant predictors of Logical intelligence (IB). These variables were found to explain 13% of the total variance in the IB variable (R^2=0.13). It was determined that Biophilia Level 1 and Biophilia Level 4 are significant predictors of the visual intelligence domain. These variables explain 21% of the total variance in the IC variable (R^2=0.21). Biophilia Level 1 is a positive significant predictor of the musical intelligence domain (ID); Biophilia Level 3 is a negative considerable predictor of ID. In addition, it was determined that Biophilia Level 2 has approximate significance in predicting ID. These variables explain 10% of the total variance in the ZD variable (R^2=0.10). Biophilia Level 1 and Biophilia Level 2 were determined as significant predictors of the bodily intelligence domain (IE). These variables were found to explain 18% of the total variance in the IE variable (R^2=0.18). Only Biophilia Level 2 was determined as a significant predictor of the social intelligence domain (IF). This variable was found to explain 4.4% of the total variance in the IF variable (R^2=0.044). Biophilia Level 1 and Biophilia Level 2 were determined as significant predictors of the intrinsic intelligence domain (IG). These variables were found to explain 21% of the total variance in the IG variable (R^2=0.21). Biophilia Level 1, Biophilia Level 2, and Biophilia Level 3 were determined as significant predictors of the nature intelligence domain (IH). These variables were found to explain 52% of the total variance in the IH variable (R^2=0.52).

In the literature, studies are conducted with preservice teacher related to the theory of multiple intelligences. Yalmancı (2011), in his study with 191 preservice teachers, stated a significant difference exists between the types of logical-mathematical intelligence, visual-spatial intelligence, and social intelligence of preservice teachers and the departments they are studying in. Şen Bayındır and Şahin Zeteroğlu (2023), in their study with 489 preschool teachers, indicated that there is a positive relationship between types of multiple intelligences and creativity. Yenice and Aktamış (2010), in their study with 561 prospective classroom teachers, stated that students have a homogeneous distribution described as "moderately developed" in all intelligence domains. In their research, Akkaya and Memnun (2015) expressed that primary school mathematics preservice teachers have developed logical-mathematical, interpersonal-social, and intrapersonal-introverted intelligence domains, while other intelligence domains are moderately developed. Güneş and Gökçek (2010), in their study with 290 graduate students from different fields, stated that the distribution of types of intelligence varies according to the fields. This situation in the literature indicates a change in preservice teachers' intelligence domains according to their departments.

Generally, when looking at the literature, studies related to natural intelligence naturally emerge in studies with Biophilia. However, it is possible to encounter studies on different intelligence fields in the literature. Barbiero and Berto (2018) presented a theoretical model for environmental education to establish a strong bond between Biophilia and nature intelligence. Barbiero (2021) stated that outdoor environments increase biophilic quality and improve nature intelligence. Sefali and Köse (2021) stated in their study with 62 science teachers that nature education and in-class activities effectively increase Biophilia levels. Morawski and Dunnigton (2021) used stories selected from daily life to explain Biophilia to visual arts teachers. Burton (2022) mentioned that biophilic classroom design improves students' performance in higher education. In Gerofsky's (2016) study with 315 adults from 54 countries, it was proposed that based on the Biophilia hypothesis, the relationship with nature and the trait of emotional intelligence might be related to well-being and to each other. Anderson (2015) suggested in his study that children's natural inclination to explore nature or Biophilia could be researched as a factor that promotes both cognitive engagement and language development. Barbiero et al. (2016) indicate that preferring learning environments with biophilic design is not only perceived as more restorative but is also more effective in supporting students' attention performance compared to traditional learning environments, and over time strengthens the sense of connection to nature. Almusaed et al. (2022) suggested in their study that schools with biophilic designs would increase efficiency in education.

Consequently, studies found in the literature generally indicate that the intelligence fields of preservice teacher vary (Yalmancı, 2011) according to the departments they receive education in. Despite the relationship between Biophilia and naturalistic intelligence (Orr, 2004), it has been observed that biophilic designs contribute to individuals' development in various ways (Almusaed et al., 2022; Anderson, 2015; Barbiero, 2021; Barbiero & Berto, 2018; Barbiero et al.,2016; Burton, 2022; Gerofsky, 2016; Morawski & Dunnigton, 2021; Sefali & Köse, 2021). Based on the findings obtained in our study, it can be said that different levels of Biophilia are predicted according to intelligence domains.

RECOMMENDATIONS

The fact that our study was conducted only with preservice teachers at İnönü University is a limitation in terms of experiencing different learning environments. The study could be extended to include preservice teachers from different universities. Additionally, in our study, only quantitative data were provided for Biophilia levels, and using qualitative data could support the determination of Biophilia levels. This study was conducted only with preservice teachers, and the current situation of teachers can also be included in the study.

ETHICAL TEXT

In this article, journal writing rules, publication principles, research and publication ethics rules, journal ethics rules were followed. The author is responsible for any violations that may arise in relation to the article. Ethics committee permission was obtained for the research with the decision of the Scientific Research Ethics Committee of Inonu University dated 15/12/2022 and protocol 32 numbered.

Author(s) Contribution Rate: In this research, first author's contribution rate to the article is 50%; second author's contribution rate to the article is 50%.

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