Exploring the Impact of School Attachment on Academic Performance in Learning Environments

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Abstract: Students' emotional connection to their learning environment, often described as a "second home," plays a critical role in shaping their academic and behavioural outcomes. This study examines the impact of school attachment on students' academic performance in educational settings. Addressing the gap in research on how school design affects emotional and cognitive outcomes, the study evaluates the physical, social, and cognitive needs related to educational efficiency. A quantitative survey was conducted with 326 students from three international schools in Erbil, Iraq. The methodology incorporated a checklist and validated questionnaires, and data analysis was performed using SPSS software, including multiple regression and chi-square tests. Results reveal a significant correlation between school attachment and academic success, with male students focusing on physical activities and female students prioritising social and emotional aspects of space. The findings emphasise the importance of designing emotionally supportive school environments to enhance students' attachment and academic outcomes.

Keywords: Educational Efficiency, School Attachment, Learning Spaces, Psychological Needs, Physical Needs.

1. Introduction

Educational settings are among the most significant environments in children's lives (Fillol et al., 2024). School design plays a vital role in shaping children's futures, laying the foundation for their personality, education, and skill development (Oruikor et al., 2023). According to Lawson, regarded as one of the leading thinkers in the field of architecture, "of all architectural projects requiring design, none holds greater significance than the design of educational settings, as it involves an extensive number of critical social and educational activities" (Bryan, 2005). Educational environments can directly affect behaviour and personality formation (Soheili et al., 2020). To achieve excellence in educational design, architects must prioritise not only functionality but also students' emotional well-being and their sense of attachment to the school environment (Shiran, 2019). Cultivating this emotional bond within learning spaces fosters school attachment, which in turn strengthens classroom engagement and enhances academic experience (Mehrabian et al., 2019).

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When physical needs are unmet, students struggle to concentrate (King, 2021), and educators recognise that fundamental needs must be addressed for learning to occur effectively (Borzooeian, 2014). Students lacking physical or psychological support are unlikely to be motivated or creative (Urban et al., 2024). Such needs are foundational to self-actualisation; students who feel safe, valued, and comfortable become more engaged and motivated to learn (Borzooeian, 2014). High school students' academic performance, emotional development, and smooth transition into adolescence depend on their emotional connection to their school environment (Anderman, 2002; Sari, 2012; O'Connor et al., 2011). Prior studies have shown that feelings of school belonging significantly impact effort, motivation, and academic outcomes (Sánchez et al., 2005), with positive attitudes linked to academic self-efficacy (Battistich et al., 1995; Roeser et al., 1996). Despite growing awareness of emotional and physical needs in learning spaces, there is limited empirical research on how school design fosters attachment and how this, in turn, affects students' academic performance, particularly in the context of developing cities like Erbil. While the physical and psychological needs of students are widely acknowledged as crucial to effective learning (Borzooeian, 2014; Cheryan et al., 2014), an equally important but often overlooked factor is the emotional bond students form with their school environment. This emotional connection — known as school attachment — goes beyond functional needs, encompassing students' sense of belonging, identity, and emotional comfort within the school setting (Scannell & Gifford, 2010). Understanding how design elements of learning environments contribute to place attachment can offer deeper insight into fostering academic engagement and long-term educational success (Allen et al., 2021; Ebrahimzadeh et al., 2020). This research examines the key elements that foster students' emotional connection to school through a theoretical analysis and empirical study involving 326 students across three international schools in Erbil, Iraq. Accordingly, this study addresses the following research question: What are the key factors that shape students' sense of place attachment within school environments, and how does this attachment influence their academic performance?

2. Literature Review

To understand how students form emotional bonds with school environments and how these bonds affect academic performance, this section reviews definitions of place attachment, key motivations, psychological theories, and the influence of school design on students' engagement and well-being.

2.1 Defining Place Attachment in School Contexts

Several terms, such as "school connectedness," "school bonding," "school identification," "school attachment," and "school belonging," are used by researchers to define the concept of place attachment to school. These terms all refer to the same concept in various ways (Osterman, 2000). The commonly quoted description of school belonging means that students feel welcomed, respected, part of, and supported by colleagues in the learning setting (Anderman, 2002; Knifsend & Graham, 2012; Ma, 2003; Nichols, 2006; Dost & Mazzoli Smith, 2023). Belonging to school is often related to and regarded as a factor of academic motivation research (Sonsteng-Person et al., 2023; Ryan et al., 2016). Glasser's control theory suggests that students' academic difficulties often stem from unmet psychological needs, particularly those related to a sense of belonging and attachment (Major & Anderson, 1987). When schools foster these needs, students become more motivated and engaged (Allen, Kern, & Vella-Brodrick, 2021).

2.2 Emotional and Social Needs in Learning Environments

Many research investigations examine how productive students are in the classroom. While some of these studies focus on the physical requirements of students, others examine their emotional and social needs (Baafi, 2020). Those who satisfy their physical and psychological needs should be engaged in school activities and firmly committed to their school (Curran & Standage, 2017; Higgins et al., 2005). According to Allen et al. (2021), students who are emotionally attached to their school experience three key benefits: (1) enhanced academic performance (Anderman, 2002), (2) enhanced psychological well-being (Nutbrown & Clough, 2009), and (3) increased prosocial behavior (Lonczak et al., 2002). Similarly, Koller and Farley explored the development of children's attachment to places, drawing on Chawla's theory (Koller & Farley, 2019). This method distinguishes three kinds of fulfilment: security and belonging, social attachment, and creative inquiry. According to research by Bouchard and Berg, involvement in extracurricular and school-related activities, peer bonds, and student-teacher interactions all contribute to a sense of belonging (Bouchard & Berg, 2017). Borzooeian, whose primary area of interest is "place attachment" through design, sought ways to help students and their learning environment develop and foster this emotional bond (Borzooeian, 2014). A lack of essential physiological requirements reduces a student's mental capacity for learning. Teachers, administrators, and educators understand that the fundamental needs of students must be met for learning, which is needed for self-actualisation (Borzooeian, 2014). Physically healthy students, on the other hand, feel appreciated, cherished, and safe. They will be more eager to quench their curiosity and more open-minded (Cheryan et al., 2014). Specific attributes are needed in educational contexts to help students. Building responsive surroundings that optimise user options is essential to architectural design.

2.3 Physical and Spatial Aspects of School Design

Cheryan et al. (2014) identified two primary ways that physical learning spaces influence student performance. Two critical discoveries are: first, the building's structural characteristics have a significant impact on learning. Inadequate heating, noise, bad lighting, and poor air quality in the classroom are all linked to worse student success. Second, studies show that the unexpected contribution of symbolic elements in a school—such as objects and wall art—to improving student learning and performance in that setting (Cheryan et al., 2014). Symbols influence students' educational choices and performance by conveying whether they are valued students and belong in the classroom (Cheryan et al., 2014). von P. Barrett (2015) expanded on this by demonstrating that spatial features, such as daylight, material finishes, and flexible layouts, influence student satisfaction and psychological well-being.

2.4 Natural Spaces and Environmental Affordances

Ebrahimzadeh et al. (2020) identified five dimensions that influence student attachment to school outdoor spaces: interactive, individual, physical, social-group, and active variables. These elements promote comfort and support students' physical, mental, and emotional development. The research indicates that 17 variables and five primary aspects are crucial to increasing students' commitment to school open spaces. (Interactive variables, Individual factors, Physical factors, Social-group elements, and Active factors) are among the primary factors. Furthermore, Mozaffar and Mirmoradi focused on how natural settings affect children's growth and development, encompassing their "cognitive," "social and physical" progress, as

well as their "emotional" development (Mozaffar & Mirmoradi, 2012). Schools should provide natural environments that address the requirements of their students on three different levels: academic, social, physical, and emotional development (Ebrahimzadeh et al., 2020). The quality of learning is enhanced in schools by the presence of nature. Numerous studies have demonstrated that being in a green setting can enhance self-discipline (Taylor et al., 2002), focus (Grahn & Stigsdotter, 2003), and attention (Barrett et al., 2017). Chawla's theory of place fulfilment emphasises that children form attachments to spaces that offer security, social interaction, and creative exploration (Chawla, 1992; Koller & Farley, 2019). Natural school environments support emotional regulation and personal development. Van Dijk-Wesselius et al. (2020) confirmed that green schoolyards offer cognitive and emotional benefits, primarily when supported by teacher engagement and planning.

Collectively, the reviewed studies highlight the significant impact of both physical and social dimensions of school environments on students' emotional attachment to their school, which subsequently affects their academic performance. Nevertheless, the majority of existing research is grounded in Western or broadly generalized contexts, with limited attention given to region-specific dynamics. A clear gap remains in the literature regarding how architectural and spatial elements shape place attachment and educational outcomes within rapidly urbanizing cities, such as Erbil. This study seeks to address this gap by offering a context-sensitive investigation into the relationship between school design and students' academic experiences.

3. Theoretical Framework

The researcher investigates the various implications of school characteristics on students' capacity to be more attached to their learning environment and how this influences their academic progress. At this point, it is essential to note that a positive school environment impacts not only children but also influences teacher behaviour and training. This positive effect can directly impact children's intellectual growth while fostering school attachment.

According to the research's central premise, students' feelings of school connection have a favourable impact on their educational efficiency, which is an independent variable in the study. The subsequent section of this research endeavours to showcase its success in achieving the dependent variable: educational efficiency.

Hence, it becomes evident that physical and psychological requirements (including social and cognitive aspects) are closely intertwined. These, in conjunction with environmental affordances, collectively shape and modify the dynamics of interactions and the development of attachment to a place. All three of these elements serve as stages in influencing students physically, socially, and academically, as shown in Figure 1.

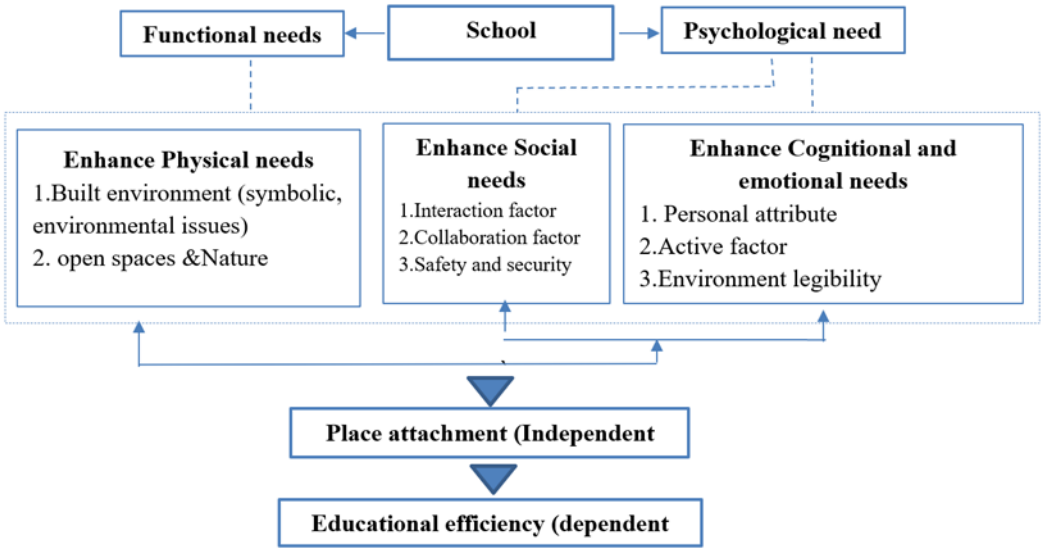

Figure 1: Theoretical Framework (Researcher)

Instituting a requirement for students to fulfil their basic needs while at school will likely result in enhanced behaviour and a conducive learning environment. When educational requirements are fulfilled in a setting that supports students' mental, physical, social, and emotional well-being, they may complete assignments more effectively and gain more from the experience (Paul & Kumari, 2017). The term "school's physical environment " denotes all the school is on- and off-campus structures. These facilities must be accessible to all staff members and students in a secure, pleasant, and healthy way (Cheryan et al., 2014). The interior climate, lighting, noise levels, furniture, and other amenities should all be considered while evaluating the school's physical setting. A physically safe and intellectually challenging setting benefits a child's educational development. Performance in educational settings depends on various elements, including the school environment, instructors' attitudes, and student qualities (Baafi, 2020). There is a substantial link between classroom atmosphere and student accomplishment in various learning outcomes. The classroom's physical, emotional, and artistic attributes have a favourable impact on students' attitudes toward learning (Hartikainen et al., 2021). The phrase "physical environment" refers to the collection of elements and buildings in a school setting that turn the outdoor setting into dynamic, engaging, diverse learning places and activities (Fjørtoft & Gundersen, 2007). According to Gibson's affordance theory, a person's environment can serve as a context for learning and behaviour (Gibson, 2014). Prior research has shown that students derive pleasure from interacting with their natural surroundings, a phenomenon known as "engagement in the active environment." The third teacher term encompasses school layout, surroundings, and landscapes, as well as open areas, classroom layouts, and class decorations (Soheili et al., 2020). Children have always considered nature as a vital aspect of design. Chawla's theory supports children's desire to create their activities in outdoor play settings while assuring some form of social interaction (Chawla, 1992).

The interconnectedness between environments and individuals is underscored through children's narratives. Fleet and Britt aptly state, 'Places mould relationships, and relationships mould places' (Fleet

& Britt, 2011). For many children, friendship was the cornerstone of their upbringing (Jansson, 2015; Rogers & Fewell, 2012). Social interaction occurs when individuals are connected in an interpersonal and interdependent manner, thereby making sense of their sense of belonging. Social connection reveals how pleased and connected someone feels when engaging with others (Anderman, 2002). It refers to acknowledging and appreciating one's most significant traits, rather than ignoring or enduring them. Social interaction is essential for the learning and well-being of the brain's interconnected cognitive and emotional functions (Wei et al., 2024; Huang & Lajoie, 2023; Costa-Cordella et al., 2021). Some "believers" of Vygotsky argued that students can learn via social interaction. "We learn by engagement with others," he continues, "and in doing so, we create something qualitatively different from what we began with" (Doolittle, 1997).

Spatial design influences how people connect and their capacity to fully engage in activities (Fouad, 2021). Therefore, educational settings should encourage collaboration (Loes, 2022). Collaboration occurs when students work together to accomplish a task (Scager et al., 2016). According to Boud et al. (2017), students develop a positive sense of dependency when they work on shared assignments in a collaborative learning environment in higher education (Boud et al., 2017). Students' intellectual and social abilities are fostered in this setting by emphasising student responsibility for learning. Better learning outcomes and more excellent engagement result from such settings, which feature autonomy with less oversight (Scager et al., 2016). According to Chawla, a child's perception of a place is linked to their relationships with cherished family members at home (Anderman, 2002). A child's inquisitive system is activated when caregivers establish a safe and secure setting that is isolated from potential threats, which makes it feasible to evaluate inspirational situations (Scannell & Gifford, 2010).

A place's cognitive value is based on the knowledge, experiences, and meaning that people bring to it (Scannell & Gifford, 2010). When someone becomes emotionally attached to a place, cognitive processes take place that lead to the development of a mental representation of the place, which includes a mental map of the place and route knowledge of its arrangement (Sternberg & Grigorenko, 1997), along with additional details, such as a history of the area and particular place affordances. Cognitive associations with a location are not limited to mental representations of its symbolic and structural attributes. These associations include memories of that place, its inhabitants, and what transpired (Sternberg & Grigorenko, 1997).

Everyone feels a unique degree of attachment to a particular place. Individuals make intentional choices and form attachments to places depending on their attributes and qualities (Hernández et al., 2020; Dalavong et al., 2024). This is based on how individuals connect with places. Physical and social interactions encompass cognitive, behavioural, emotional, and semantic components, leading to a profound attachment to one's surroundings, where individuals become dependent on them (Hernández et al., 2020; Dalavong et al., 2024). The activity type takes meaning from the environmental setting (Rees et al., 2009).

In his book, Kevin Lynch addresses the topic of environmental legibility. He explores the elements that support it, focusing on the feeling of place connection as one of the most potent aspects of design (Lynch, 1977). When we have a strong sense of connection or belonging, we occasionally say, "I belong to it," which gives us a deeper understanding of the place (Layder, 1993).

4. Methodology

A study of educational setting research that encompasses psychological and architectural studies provides essential definitions, ideas, checklists, and surveys. Assessing the elements that affect students' connection to their school is crucial. Moreover, it is essential to explore how a school's setting impacts students' learning abilities. To achieve this, factors influencing students' school attachment were identified. Based on the study's objectives and the current literature, a survey was conducted, and questionnaires were distributed to 326 students.

The structured questionnaire was divided into two main sections: (1) place attachment indicators (23 items) across physical, social, and cognitive domains, and (2) perceived academic efficiency (5 items). All items used a 5-point Likert scale. The instrument was piloted with 15 students to ensure clarity and reliability before its full deployment. Sampling was purposive, targeting students in grades 9–11 who were considered developmentally mature and capable of reflecting on place attachment (Hidalgo & Hernández, 2001).

The questionnaire developed by Aslan and Kosir (2021) was used to assess students' attachment (Aslan & Kosir, 2021). Three groups of students were assigned the questionnaire, categorised by their educational attainment—high, moderate, and low—to investigate the connection between academic success and a strong feeling of school attachment. The indicators included in the checklist were derived from a comprehensive literature review that identified recurring themes across physical, social, and cognitive domains influencing attachment in school environments (e.g., Cheryan et al., 2014; Scannell & Gifford, 2010). Each item was validated by comparing it to existing theoretical frameworks and applied studies in school design. Furthermore, a checklist comprising 46 items is employed, drawing on the items identified in prior research and the theoretical framework of the current study. These items are considered influential in shaping students' attachment to their schools. The assessment is conducted across all schools, and the results are contrasted with tables created by other statistical analyses using SPSS. Additionally, a checklist from the theoretical framework is utilised to analyse case studies, as illustrated in Figure 2.

Private international mixed-gender schools were selected purposively due to their relative provision of physical and psychological support services, which are often lacking in public schools in Erbil. Furthermore, public schools often operate on double or triple shifts, which limit the time for student-school interaction, a critical component in developing a sense of place attachment. Mixed-gender schools were chosen to enable gender-based comparisons.

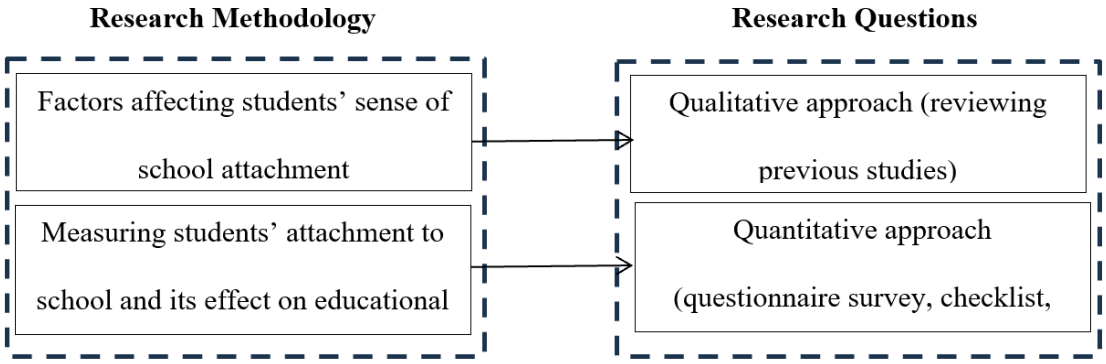

Figure 2: General Research Methodology. (Researcher).

To ensure optimal findings, the validity and reliability of the survey employed in this research were assessed through input from architectural professors and high school teachers. The reliability of the questionnaire and the correlation between questions addressing standard components, totalling 44 items, were assessed using Cronbach's alpha test in SPSS software. Values exceeding 0.965 were deemed satisfactory post-application of the Cronbach's alpha test (see Table 1), which underscores the stability and consistency of the questionnaires.

Table 1: Cronbach's alpha value.

Reliability			
Items	Cronbach's Alpha	No of Items	Result
Place attachment	.907	10	Reliable
Physical requirements	.862	11	Reliable
Social requirements	.879	9	Reliable
Cognitive requirements	.912	14	Reliable
Total	.965	44	Reliable

The following discussion addresses the three core research questions that guided this study. Each subsection interprets key findings from the existing literature and highlights their implications for educational design, emphasizing how emotionally supportive school environments can enhance school attachment and ultimately contribute to improved academic performance.

- **RQ1**: What are the key factors that shape students' sense of attachment within school environments?
- **RQ2**: How does students' level of school attachment relate to their self-reported academic performance?
- **RQ3**: Are there gender-based differences in students' perceptions of school attachment?

The outcomes of this survey will illuminate essential aspects of architecture school that have been demonstrated to foster a sense of belonging and school pride in students, ultimately enhancing their academic performance.

4.1 Ethical Considerations

Prior to conducting the study, official permissions were obtained from the administrations of the three selected private international high schools in Erbil. Each school granted written approval allowing the distribution of questionnaires and the collection of observational data. Students were informed about the purpose of the research and their right to participate or withdraw at any point without penalty. No personal identifiers were collected, ensuring complete anonymity and confidentiality of the responses. The study adhered to ethical research practices involving minors, including compliance with institutional and academic guidelines for data privacy, informed consent, and participant protection.

5. Results and Discussion

The data is scrutinised utilising a suitable methodology aligned with the formulated hypotheses. A discerning approach is used to validate or invalidate these hypotheses. Descriptive data is visualised through numerous tables and percentages, while inferential data is interpreted using various analytical tests, such as the chi-square test, multiple regression, and Spearman correlation test. To ensure precision, each hypothesis analysis includes cross-tabulation tables. Data import procedures were executed using SPSS software for validation.

5.1 Descriptive Statistics

School A, situated on a 75,000-square-meter campus, features 70 classrooms accommodating 1,200 students. B schools, for 2500 students. C International School spans 52,000 square meters, comprising 55 classrooms that accommodate 1,000 students.

This study focuses on three international high schools in Erbil City, Iraq, as listed in Table 2. All selected schools are private, offering a relatively homogeneous spatial quality, which enables broader generalisations and the collection of pertinent information. These schools were selected due to their efforts to address the physical and psychological needs of their students. However, most public schools struggle to fulfill these requirements, posing challenges in studying student attachment to such schools. Given the significance of gender in place attachment, the selected schools are all mixed-gender, allowing for comparisons between males and females and their perceptions of school attachment. Students across various educational standings—high, moderate, and low—are compared to investigate the relationship between place attachment and academic performance.

This research focuses on high school students because they provide more reliable responses. Attachment holds greater significance during middle adolescence (ages 14-17) compared to early adolescence (ages 10-13), as children in this age group are less mobile and less independent. During this phase, teenagers develop intricate patterns of reasoning and a stronger sense of self, becoming more interested in shaping their identities and forming meaningful bonds with people and places beyond their immediate surroundings. However, the transition into 7th and 8th grades can be challenging for many children,

marked by new emotions, the desire to establish new social connections, and a growing sense of responsibility and independence. Consequently, their responses may be influenced by their emotional state during this transitional phase, which could potentially impact their reliability.

Table 2: Number of Students in Various Schools by Grade Average, Academic Level, and Gender.

				Gender.											
				Female.						Male.					
				Academic level.						Academic level.					
				Grade 9.		Grade 10.		Grade 11		Grade 9.		Grade 10.		Grade 11.	
				N	%	N	%	N	%	N	%	N	%	N	%
School	B	Grade	High.	11	40.7%	12	40.0%	10	31.3%	10	43.5%	7	35.0%	7	29.2%
			Medium.	10	37.0%	12	40.0%	13	40.6%	7	30.4%	8	40.0%	11	45.8%
			Low.	6	22.2%	6	20.0%	9	28.1%	6	26.1%	5	25.0%	6	25.0%
	A	Grade	High.	7	58.3%	8	53.3%	9	34.6%	4	33.3%	6	31.6%	9	47.4%
			Medium.	4	33.3%	4	26.7%	13	50.0%	3	25.0%	8	42.1%	5	26.3%
			Low.	1	8.3%	3	20.0%	4	15.4%	5	41.7%	5	26.3%	5	26.3%
	C	Grade	High.	4	33.3%	5	50.0%	3	42.9%	8	33.3%	3	37.5%	2	33.3%
			Medium.	4	33.3%	3	30.0%	3	42.9%	9	37.5%	3	37.5%	2	33.3%
			Low.	4	33.3%	2	20.0%	1	14.3%	7	29.2%	2	25.0%	2	33.3%

Correlation is significant at the 0.01 level (2-tailed).

5.2 Testing First Hypothesis: Predictors of Place Attachment

To address the research question, "What are the key factors that shape students' sense of attachment within school environments?" this study employed multiple regression analysis to develop an assessment model that predicts students' level of school attachment. This model assesses the strength and direction of the relationship between school attachment and its contributing factors, providing a deeper understanding of which variables play the most significant role in shaping students' school attachment to their learning environment. The purpose of regression analysis was to transform the measurement of variance in attachment into a mathematical formula that measures aspects of school attachment. Hence, three parameters of school attachment were identified as independent variables, and students' sense of attachment was set as the dependent variable. The predicted model was achieved by determining the collective effect of the independent variables, which included physical, social, and cognitive dimensions of place attachment. As a result, a regression model was generated to display the relationships between research variables, as shown below:

Place Attachment = (0. 487) β + (-0.079) β 1 physical dimension+ (0.246) β 2 social dimension+ (0.297) β 3cognitive dimension…

Eq. 5. 1 Equation of Multiple regression (place attachment)

Where;

Attachment = Students' sense of place attachment β = constant

The model summary table 3 indicates that these three factors account for 70.7% of the variation in school attachment (cognitive, emotional, physical, and social needs). There is no issue with autocorrelation between independent variables, as the Durbin-Watson statistic is 1.792, which is approximately equal to 2. Furthermore, since all VIFs are less than 5, there is no issue with collinearity between independent variables, VIF of (physical dimension: 2.685, social dimension: 3.436, cognitive dimension: 2.920). Additionally, the p-value is less than 0.05, indicating that the model as a whole is statistically significant and reliable.

Table 3: Multiple regression analysis of school attachment factors

Model Summary							
Model	R	R Square	Adjusted R-squared	Durbin-Watson	Std. Error of the Estimate		
	0.843[a]	0.710	0.707	1.792	0.465561		
ANOVA							
	Sum of squares	df	Mean square	F	Sig.		
Regression	170.936	3	56.979	262.881	.000b		
Residual	69.793	322	.217				
Total	240.729	325					
Coefficients							
	Unstandardised Coefficients		Standardised Coefficients			Collinearity Statistics	
(Constant)	B	Std. Error	Beta	t	Sig.	Tolerance	VIF
Physical needs	-.079-	.143		-.555-	-.555-	.580	
Social needs	.246	.060	.202	4.103	4.103	.000	.372
Cognitive needs	.297	.062	.268	4.813	4.813	.000	.291
(Constant)	.487	.056	.444	8.657	8.657	.000	.342

5.3 Testing the Second Hypothesis. There is a positive correlation between students' level of place attachment and their self-reported academic performance.

To explore the second research question — *"How does students' level of school attachment relate to their self-reported academic performance?"* — the study applied a Chi-squared test to compare observed and predicted data. This statistical test was chosen to evaluate whether the variations between students' reported academic performance and their measured levels of school attachment were statistically significant or merely due to chance.

5.3.1 Respondents' Perceptions Towards Students' Ability to Learn about Sense of School Attachment

The primary hypothesis examined the impact of school attachment on a student's academic performance. Table 4 presents the results of the Chi-square test used for this analysis. At the same time, the relationship between academic performance and school attachment is highly significant, with a p-value less than 0.05. Specifically, 69.6% of students with high academic scores also exhibit a strong sense of school attachment, compared to 10.4% who have a low sense of attachment. However, this has dropped among low-scoring students; 32.9% have a high sense of school attachment, and 30.3% have a low sense of attachment to their school. It is evident that school attachment is not the sole determinant of educational outcomes; however, fostering an emotional atmosphere can enhance students' interest in school and learning.

Table 4: illustrates the cross-tabulation of school Attachment and Grade.

			Score Average.		
			High (85-100)	Medium (70-84)	Low (55-69)
school Attachment	Low	Count	13	11	24
		%	10.4%	9.01%	30.3%
	Moderate	Count	25	19	29
		%	20%	15.5%	36.7%
	High	Count	87	92	26
		%	69.6%	75.4%	32.9%
Total		Count	125	122	79
		%	100%	100%	100%
Pearson Chi-Square		Value		Asymptotic Significance (2-sided)**.**	
		42.747[a]		0.000**	

**significant at level (p <0.01)

5.3.2 Respondents' perceptions of their school as a secondary residence and a space for learning and personal development correlate with improved educational efficacy.

The chi-square test results are presented in Table 5, indicating a significant relationship between educational efficacy and the perception of school as a second home, with a significance value below 0.05. Analysis reveals that 73.4% of students with lower scores are less inclined to consider their school a second home. In contrast, 67.2% of students with higher scores are more likely to view their school as a nurturing and secure environment akin to their home. This perception enhances their motivation for learning and personal development.

Table 5: Crosstabulation of Grade Average and Perceiving School as Second Home.

Mark average and Second Home Crosstabulation.				
			Second home**.**	
			yes	no
Grad	High (85-100)	Count**.**	84**.**	41**.**
		%	67.2%	32.8%
	Moderate (70-84)	Count	80	42

		%	65.6%	35.4%
	Low (55-69)	Count	21	58
		%	26.6%	73.4%
Total		Count	185	141
		%	56.7%	43.3%
Pearson Chi-Square.		Value**.**	Asymptotic Significance (2-sided)**.**	
		38.724[a]	0.000**	

**significant at level (p <0.01)

5.3.3 Respondents' Perceptions Towards different Degrees of Student Attachment in each school.

This research aims to compare case studies to determine the level of attachment students have to their respective schools. The chi-square test is used to make this comparison. Students exhibit varying levels of school attachment at each institution, as each school may fulfil different aspects of their physical and psychological requirements. Table 6 presents the diverse levels of attachment among students at each school. Notably, 41.8% of high-scoring students at School C show attachment to their school, contrasting with 71.2% of high-scoring students at School B and 64.1% at School A.

Table 6: Variability in Student Attachment Across Schools.

Attachment degree in each school.						
			Schools			**.**
			B**.**	A**.**	C	
School Attachment	Low**.**	Count**.**	17	10	21	48
		%	10.9%	9.7%	31.3%	14.7%
	Medium	Count	28	27	18	73
		%	17.9%	26.2%	26.9%	22.4%
	High	Count	111	66	28	205
		%	71.2%	64.1%	41.8%	62.9%
Total		Count	156	103	67	326
		%	100.0%	100.0%	100.0%	100.0%
Pearson Chi-Square.			Value	Asymptotic Significance (2-sided)**.**		
			24.986[a]	0.000**		

**significant at level (p <0.01).

In the subsequent tables, which focus on the checklists used in each school, we can observe the elements that influenced students' attachment levels to these institutions. Students at School C report unmet physical needs, which impact their social and cognitive needs, resulting in disengagement. Conversely, A and B School students express high satisfaction with their physical needs, aligning with checklist items crucial for fostering school attachment. As a result, these students exhibit higher levels of attachment. Table 7 displays the availability of each checklist indicator in the respective schools for further details.

Table 7: Checklist Indicators Frequency by School

School attachment dimensions indicators availability.								
Schools	Physical Indicators	%	Social Indicators	%	Cognitive Indicators	%	n	%
B	15	71.42 %	9	69.23 %	7	63.63 %	31	68.88 %
A	18	85.71 %	12	92.31 %	5	45.45 %	35	77.78 %
C	7	33.33 %	5	38.46 %	2	18.18 %	14	31.11 %

5.4 Testing Third Hypothesis: Male and female students may value different dimensions of attachment—such as physical vs. emotional or social factors—based on past studies and developmental theory

To address the third research question — *"Are there gender-based differences in students' perceptions of school attachment?"* — a Chi-square test was conducted to compare the responses of male and female students to four key questionnaire items. Table 8 presents the initial assessment of the association between gender and school attachment, yielding a p-value of 0.055. Although the difference is insignificant, 67.8% of female students expressed a strong attachment to their school, contrasting with 57.4% of male students. Despite the lack of significance, factors influencing attachment and space evaluations varied by gender, as discussed in the following tables.

Table 8: School Attachment & Gender Association.

The association between place attachment and gender						
			Place Attachment.			
			Low.	Moderate.	High.	Total.
Gender.	Female.	Count.	18	37	116	171
		%	10.5%	21.6%	67.8 %	100%
	Male.	Count.	30	36	89	155
		%	19.3%	23.2%	57.4%	100%
Total.		Count.	48	73	205	326
		%	14.7%	22.4%	62.9%	100.0%
Pearson Chi-Square.			Value.	Asymptotic Significance (2-sided).		
			5.798[a]	.055		

5.4.1 Do you believe the strong connection between teachers and students and among students has strengthened your attachment to this school?

This question, included in the questionnaire, aims to understand the influence of social relationships on the perspectives of students of different genders. The Chi-square test reveals a significant correlation between gender and social relations (value: 12.634a, Asymptotic Significance (2-sided): 0.013). Findings

show that more female than male students experience strong social bonds that impact their attachment to the school. Refer to Figure 3.

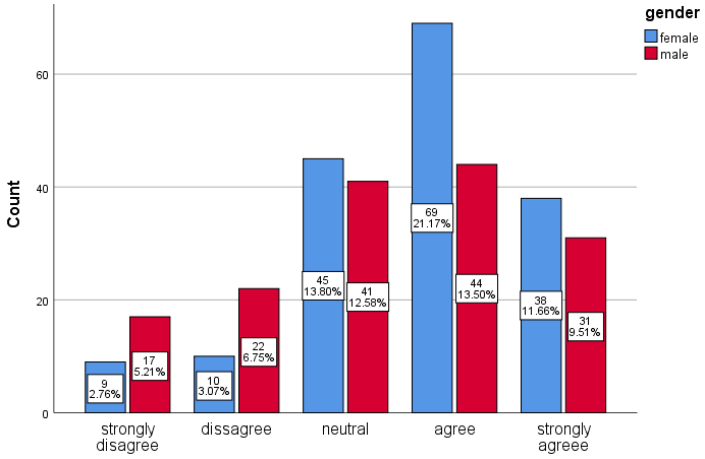

Figure 3: Sub-Hypothesis Frequencies

5.4.2 Do the school's extracurricular activities and well-designed outdoor sports facilities strengthen your attachment to it?

This question in the questionnaire examines the impact of activities on gender roles and attachment to a particular place, as shown in Figure 4. The correlation between gender and activity types in a place is significant, as indicated by the Chi-square test (value: 68.63, Asymptotic Significance (2-sided): 0.000). The findings reveal that male students are more drawn to places offering diverse activities, both during and beyond regular school hours, compared to girls.

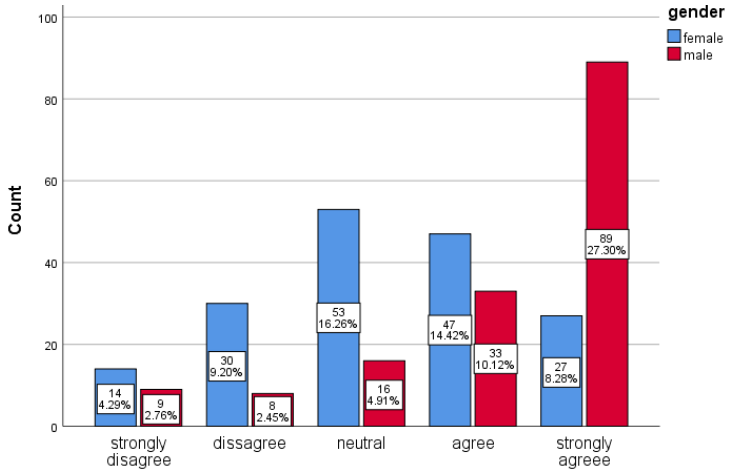

Figure 4: Sub-Hypothesis Frequencies

5.4.3 Do you feel a sense of ownership when you contribute to designing your classroom's decorations, posters, and project displays?

This question in the questionnaire aimed to explore which gender expresses feelings and identity more through classroom design. The correlation between gender and participation in class design was not statistically significant based on the Pearson Chi-square test (value: 68.63, Asymptotic Significance (2-sided): 0.280), refer to Figure 5. Hence, the data indicate that female students decorate their classrooms more often with posters, creating a personalized space. Refer to Figure 5 for details.

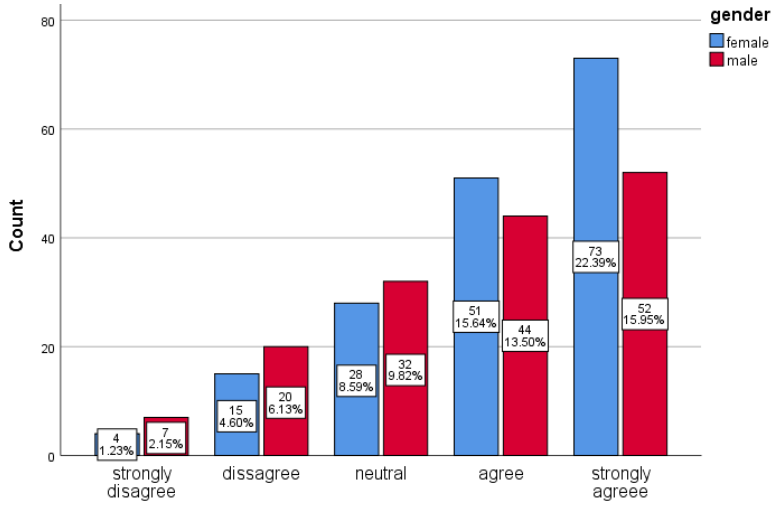

Figure 5: Sub-Hypothesis Frequencies

5.4.4 Do you feel that a comfortable nook and outdoor spot for studying or personal activities outside the classroom would enhance your happiness and sense of belonging to your school?

This question in the survey aimed to explore the correlation between gender and personal spaces within the school. The Chi-square test revealed a significant relationship (value: 29.724, with Asymptotic Significance (2-sided): 0.000). The findings from Figure 6 indicate that female gender tend to be involved in personal spaces more often than male students. This could be attributed to female students' higher likelihood of emotional exhaustion, which is frequently utilised for brainstorming. Refer to Figure 6.

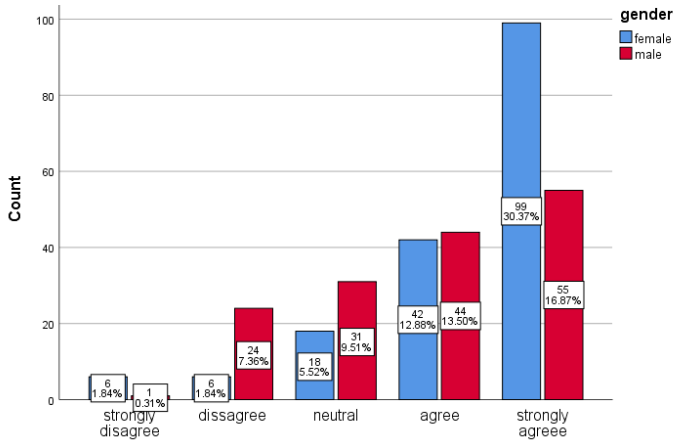

Figure 6: Sub-Hypothesis Frequencies

5.5 Gender-Based Differences in School Attachment and Space Evaluation

While the overall attachment to school environments was not significantly different between genders ($p = 0.055$), the underlying drivers of attachment varied across genders. Female students reported stronger social bonds and emotional connections with peers and teachers, aligning with existing literature that highlights the importance of social belonging for adolescent girls. The significant association between gender and social relationships ($p = 0.013$) suggests that socially rich environments — such as collaborative classrooms, peer zones, or mentoring spaces — may enhance place attachment for female students.

In contrast, male students showed a preference for spaces with high activity potential ($p = 0.000$), emphasising the role of physical interaction and dynamic spaces in fostering their sense of attachment. This may imply that outdoor areas, sports facilities, and multi-purpose zones are critical in engaging boys and reinforcing their emotional ties to the school.

These findings suggest that while overall attachment levels may be similar across genders, school design and programming should address the different spatial priorities of each. Gender-sensitive design strategies that incorporate both social and activity-oriented spaces can contribute to inclusive learning environments and foster stronger place attachment among all students.

6. Conclusion

The study emphasises the pivotal role of schools as crucial social settings in individuals' lives. Moreover, as children in their formative school-aged years are at a critical stage of development, instilling a sense of attachment can profoundly impact facets of their identities. The study revealed that a student's attachment directly influences their learning effectiveness. Students who forge a strong emotional bond with their school, considering it as their second home, experience greater feelings of safety and security. This heightened sense of belonging boosts their learning motivation, ultimately enhancing educational effectiveness.

The study's theoretical framework emphasizes the essential characteristics of cultivating school attachment. It considers the environment's capacity to fulfill cognitive, emotional, physical, and social needs as a pivotal factor in achieving this objective. Hence, it serves as a guiding principle for designers to apply in their design processes.

The study findings suggest that school attachment is not influenced by gender. Nevertheless, notable gender-specific disparities emerge in the factors influencing attachment feelings and the distinct perspectives of different genders on spatial perception. As a result, architects should consider the particular needs of both genders when designing schools. This approach can help students foster and strengthen their sense of school belonging.

7. Author's Contribution

Faeza Bakr: Conceptualised, conducted research, assessed the outcomes, and wrote the original manuscript. Conducted research, evaluated the results, and wrote the original draft. Hussein Ali: Review editing and visualisation of the manuscript.

8. Data Availability

The corresponding author can provide data created or analysed during this study upon reasonable request.

9. Limitation

Previous studies on the relationship between students' attachment and learning abilities have been limited. Given that schools encompass multidisciplinary environments, the present study primarily investigates how the school environment influences students' sense of attachment and learning capacity. Recognising that students' attachment and learning abilities are also shaped by the educational staff, teachers, and pedagogical approaches in place is crucial. Measuring the extent of a student's attachment to a school poses challenges, as attachment is not a tangible entity.

The study is limited to three private, international, mixed-gender schools in Erbil, which may not accurately represent the broader population of students in public or single-gender schools. Consequently, the findings may not be generalizable to all educational settings in the region.

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