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THE ROLE OF ENVIRONMENTAL INFRASTRUCTURE IN ENHANCING PLACE AFFECTION AND QUALITY OF LIFE: EVIDENCE FROM A MOUNTAINOUS TOURISM DESTINATION IN LENGER TOWN OF KAZAKHSTAN

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Abstract: This study examines the role of environmental infrastructure in enhancing place affection and residents' quality of life (QOL) in Lenger, a mountainous tourism destination in southern Kazakhstan. Rooted in Social Exchange Theory, the research investigates how eco-friendly infrastructure, such as green spaces, parks, and sustainable waste management, shapes emotional connections to place and promotes physical and mental well-being, aligning with Sustainable Development Goal 3 (Good Health and Well-being). A structured survey involving 417 residents was conducted, and Structural Equation Modeling (SEM) was employed to analyze the direct and indirect relationships among environmental infrastructure, place affection, and QOL. The findings reveal that environmental infrastructure positively influences both QOL and place affection, with place affection acting as a partial mediator in this relationship. This indicates that infrastructure investments not only improve physical conditions but also foster emotional attachment, which in turn enhances overall well-being. The study emphasizes that emotionally resonant infrastructure is essential for sustainable tourism planning and public health promotion. By focusing on the case of Lenger, the research contributes to a growing body of literature highlighting the psychosocial dimensions of tourism development. It offers practical recommendations for policymakers and urban planners to incorporate community-oriented and ecologically sensitive infrastructure in tourism regions. The findings suggest that infrastructure designed to engage residents emotionally and support their environmental values can lead to stronger community bonds, healthier lifestyles, and more sustainable tourism outcomes. By highlighting the psychosocial pathways linking infrastructure development and community well-being, this research offers valuable insights for policymakers, urban planners, and tourism developers aiming to balance ecological sustainability with socio-emotional needs in emerging tourist destinations like Lenger.

Keywords: environmental infrastructure, place affection, quality of life, sustainable tourism, good health and Well-being, Lenger town, Kazakhstan

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INTRODUCTION

Modern society is increasingly focused on achieving a sustainable future through initiatives such as the United Nations' Sustainable Development Goals (SDGs). Each country is striving toward these objectives to meet the needs of its citizens and improve their overall living conditions (Sakhatbekovna et al., 2024). According to the UNWTO, the 17 SDGs present a global framework to eliminate inequality and injustice, reduce poverty, improve health and well-being, and combat climate change by 2030. Tourism has been identified as a key driver capable of supporting the achievement of many of these goals. The 2030 Agenda emphasizes sustainable tourism, recognizing its capacity to generate employment, tax revenues, and income. Achieving these goals requires investments in infrastructure, innovation, technology, and human capital, along with a clear implementation strategy and sufficient funding. In this context, the multi-sectoral Belt and Road Initiative (BRI) is seen as a potential catalyst in advancing the 2030 Agenda (Li & Zhu, 2019).

As a continuation of the historic Silk Road, the BRI in Kazakhstan primarily focuses on tourism infrastructure, encompassing transportation, social, and environmental components (Abbas et al., 2024; Mamirkulova et al., 2020). The tourism departments of countries along the Silk Roads can collaborate to enhance tourism infrastructure to meet the expectations of increasingly discerning travelers (Akbar et al., 2024). This study employs Social Exchange Theory (SET) to

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examine the effects of environmental infrastructure, an essential yet often overlooked dimension of tourism infrastructure. The research aims to offer valuable insights for policymakers to address the persistent challenges associated with the expansion of both international and domestic tourism (Daye et al., 2020). Multi-sectoral infrastructural development, particularly through tourism initiatives, plays a pivotal role in socio-economic advancement. It contributes to improvements in healthcare systems, transportation networks, trade, commerce, and employment generation (Abbas et al., 2024). However, such development often comes at a significant ecological cost, placing pressure on natural resources and leading to environmental degradation (Nazneen et al., 2021). For instance, Nazneen et al. (2021) highlight that while infrastructure development has helped reduce poverty, it has also exacerbated ecological pollution, underscoring the imbalance that can arise when one pillar of sustainable development, such as ecology or economy, becomes unstable.

Contradictory findings also exist in the literature. Kanwal et al. (2020) report strong community support for infrastructure due to perceived benefits, and they did not observe significant environmental drawbacks. They speculated that these results might be influenced by the developmental stage, time, and the emergence of positive outcomes such as the establishment of modern national parks and wildlife conservation efforts. However, these assumptions were not empirically tested. Other studies (e.g., Abbas et al., 2024; Mamirkulova et al., 2020) have demonstrated that mega-infrastructure projects, when aligned with sustainable development goals, can significantly enhance quality of life (QOL). Despite increasing recognition of the importance of environmental infrastructure, its influence on fostering residents' emotional bonds with place and its implications for health outcomes remain underexplored (Sun et al., 2018).

Environmental infrastructure improvements, such as expanding green spaces, promoting sustainable transportation, enhancing waste management systems, and controlling pollution, are critical to ecological sustainability and public well-being (Mamirkulova et al., 2020; Nathanson, 2019, March 20). Clean air and water, along with the preservation of natural ecosystems, are among the top concerns of local communities.

According to Social Exchange Theory, place attachment refers to the emotional bonds individuals form with natural environments, which in turn contribute to mental health and positive attitudes toward tourism development (Kang & Lee, 2018; Ramkissoon & Mavondo, 2015). Place attachment has been widely used to understand residents' perceptions and attitudes; however, one of its key dimensions—place affection—has often been overlooked in the context of environmental infrastructure (Kang & Lee, 2018).

Place affection represents the emotional and cognitive connections individuals develop with specific places, and it is crucial to investigate its mediating role between perceived impacts of environmental infrastructure and the achievement of Sustainable Development Goal 3 (Good Health and Well-being), especially in mountainous tourism regions.

This study addresses a significant gap in the literature by pursuing the following objectives: (1) to empirically examine how environmental infrastructure influences residents' perceptions of place attachment and SDG 3 outcomes, and (2) to test the mediating role of place affection in this relationship. The present research offers a novel contribution to tourism studies by being among the first to explore the connections between environmental infrastructure development, place-based emotional responses, and health-related outcomes. Through the lens of SET, this study also introduces a unique mediating factor - place affection - to better understand the psychosocial dynamics underlying tourism infrastructure and sustainable well-being.

Environmental Infrastructure and Tourism Destination

The primary purpose of environmental infrastructure is to enhance urban and rural environments through the development of green and open spaces, the promotion of electric vehicles and sustainable transportation systems, and the provision of essential services such as water supply, energy, waste management, and pollution control (Nathanson, 2019). This infrastructure also fosters environmental responsibility within local communities, ensuring environmental protection, improved public health, and a higher quality of life (Mamirkulova et al., 2020). Despite its importance, environmental infrastructure has received limited attention in tourism literature. However, its role in shaping residents' living environments and experiences is critical. Residents, like foreign visitors, also act as domestic tourists. Infrastructure projects such as the development of national parks, water parks, recreational areas, conservation of natural and cultural heritage sites, and eco-friendly housing developments can encourage local tourism by attracting residents to explore their regions (JovanoviĆ & IliĆ, 2016; Mamirkulova et al., 2020). Therefore, tourism-related environmental infrastructure represents a key opportunity to support both cultural and environmentally sustainable activities, while simultaneously contributing to the broader development of the tourism industry.

Environmental Infrastructure and SDG 3

The growing urgency of climate change has intensified focus on the role of green policies within communities, prompting a shift toward more efficient and sustainable tourism planning. Innovative approaches and strategies in tourism development are increasingly seen as vital not only for environmental sustainability but also for addressing significant mental and physical health concerns. Scholars advocate for the integration of more blue and green spaces into urban and rural planning, while medical experts highlight their benefits for residents' overall health and well-being (Barnhill & Smardon, 2012; Majeed & Ramkissoon, 2020).

Ramkissoon (2021) emphasizes that green infrastructure in neighborhoods significantly contributes to residents' positive mood, daily physical activity, recreational engagement, emotional stability, and happiness. Similarly, through a study of tourist perceptions in Tokyo, Chen et al. (2020) found that the development of diverse green gardens enhances tourist preferences and supports the sustainable development of natural environments.

In recent years, eco-tourism—tourism centered on natural environments—has garnered increasing attention as an effective means of improving quality of life and strengthening social bonds, while also ensuring a minimal environmental footprint (Minikhanova et al., 2024). Viewed as a strategy for both sustainable development and environmental preservation, the ongoing growth of eco-tourism has become a priority (Akbar et al., 2022). Within this context, tourism, as a component of environmental infrastructure, plays a key role. The integration of well-designed green spaces, pollution control measures, and effective waste treatment systems fosters healthier societies and enhances residents' well-being and happiness. Proper treatment of sewage, waste disposal, and air purification reduces environmental degradation and improves public health. Kim et al. (2013) also demonstrate that tourism development can positively impact environmental health through improved water quality, increased tree planting, and nature conservation. Accordingly, we hypothesize the following:

H1: Environmental infrastructure is likely to positively influence SDG 3 (Figure 1).

Infrastructure Development and Place Affect

Place affect refers to individuals' emotional connections with environmental settings and their social experiences, which contribute to mental restoration and mood enhancement (Ramkissoon et al., 2013; Townsend et al., 2018). Over the past decade, various academic fields, including environmental management, business, environmental psychology, sociology, and economics, have increasingly examined the role of place attachment. Likewise, tourism research has begun to investigate how tourists, as well as residents, develop affective relationships with destinations (Isa et al., 2020). From the perspective of residents, place affect is often conceptualized as one dimension of place attachment, alongside place identity and place dependence (Lv et al., 2019). Methodologically, studies have assessed residents' involvement in tourism-related economic activities (Lv & Xie, 2017) as predictors of place affect and identity. However, relatively few empirical studies have explored the place effect as a mediating variable in the relationship between environmental infrastructure and residents' perceptions.

This study seeks to address that gap by analyzing how environmental infrastructure influences residents' place attachment. It posits that the quality and availability of environmental infrastructure significantly affect the emotional bonds residents form with their surroundings. As Walker & Ryan (2008) suggested, both residential development and conservation initiatives can strengthen emotional and psychological ties between individuals and their landscapes.

In this context, residents' emotional connections to their neighborhoods may be shaped by their participation in leisure, recreational, and physical activities facilitated by well-developed environmental infrastructure. A destination can only achieve long-term sustainability if residents, who are central stakeholders, are satisfied with tourism development and actively participate in planning processes (Akbar & Yang, 2022). The perceived benefits and quality of infrastructure, such as recreational spaces, natural landscapes, and social cohesion, enhance residents' experiences and contribute to stronger place affect (Lv & Xie, 2017). These positive experiences foster emotional attachment and identification with place (Arnberger & Eder, 2012). Residents' preference for accessible, well-maintained green spaces, such as parks and gardens, aligns with this notion. In essence, when environmental infrastructure, such as clean water facilities, air quality, electric transportation, and recreational amenities, is both attractive and accessible, place attachment is likely to increase (Gross & Brown, 2008). Nonetheless, some studies caution that merely expanding green space or improving access does not necessarily enhance community connectedness (Kimpton et al., 2014).

A more comprehensive approach, considering both the physical and visual attributes of environmental infrastructure, is necessary to foster frequent, meaningful interactions with nature. These elements allow residents to engage more regularly with their surroundings and deepen their experiential connection to place. Infrastructure coherence, such as road quality, connectivity, safety, and spatial clarity, facilitates accessibility and supports orientation (Ali et al., 2017).

Features such as waymarks, well-designed pathways, and visible routes to green areas enable residents to easily access tourism and recreational opportunities. The presence of natural features like water and lush vegetation further enhances engagement with the environment. Visually and physically appealing surroundings create positive atmospheres, evoke memorable experiences, and promote place identification, all of which enhance comfort, enjoyment, and well-being. In sum, residents' connection with nature, facilitated by accessible and high-quality environmental infrastructure, can improve emotional stability and promote healthier lifestyles.

Thus, the development of environmental infrastructure can enhance place value, deepen emotional bonds between residents and their environments, and strengthen place affect. This emotional satisfaction, in turn, has positive implications for public health and well-being (Abbas et al., 2024). Based on this reasoning, the study hypothesizes that:

H2: Environmental infrastructure is likely to positively influence place attachment (Figure 1).

Place Affect and SDG 3

From childhood homes to favorite vacation destinations, individuals' attachment to places can have a profound influence on their well-being and sense of identity. This raises compelling questions about how such emotional bonds are formed in the brain and how they shape human behavior and decision-making.

Ramkissoon (2020) argues that place affection, along with the physical attributes of environments (Mansor et al., 2009) and emotional connections to place (Lv & Xie, 2017) can significantly enhance quality of life (QOL). Supporting this view, van Vliet & Hammond (2021) suggest that individuals' self-perception and sense of progress can be revitalized through the use of well-designed green infrastructure, which can evoke feelings of being advanced, active, and connected to their surroundings. According to Mansor et al. (2009) exposure to clean lake and river corridors, as well as green park environments, contributes to cognitive well-being and fosters positive emotions such as comfort, serenity, happiness,

relaxation, and satisfaction. Even though many individuals may not reside near designated recreational or tourism areas, emotional bonds with one's home, community, and natural surroundings, enhanced by accessible infrastructure, can foster strong place affection. Research shows that such affection toward nearby parks and natural areas can play a role in psychological rehabilitation (Ramkissoon et al., 2018). Furthermore, place affection has been associated with reduced stress, improved mental health (Grahn & Stigsdotter, 2010), and overall improvements in quality of life (Ramkissoon, 2020).These findings highlight the importance of designing infrastructure that not only meets physical needs but also nurtures emotional and psychological connections to place, thereby promoting holistic well-being.

One of the key advantages of environmental infrastructure is its ability to facilitate meaningful interactions between local communities, tourists, and the natural environment. Inhabitants who lead more traditional, home-centered lifestyles often engage, either directly or indirectly, in agro-tourism and eco-tourism activities such as farming, gardening, and planting. With improved access to modern environmental infrastructure, residents may develop a stronger sense of place attachment, particularly about green spaces, national parks, and public gardens. Connecting with nature has well-documented benefits for both physical and mental health (Mansor et al., 2009).

Health professionals, including those in integrative medicine and behavioral health, often recommend spending time outdoors, as it promotes physical activity and positive emotional states (Ramkissoon, 2020). In line with this, contemporary infrastructure has been shown to strengthen socio-environmental ties, resulting in greater happiness and improved well-being (Ali et al., 2021; Mamirkulova et al., 2020). Supporting this argument, Abbas & Mamirkulova (2024) found that infrastructure development enhances quality of life, but primarily through the mediating role of sustainable practices. Based on these insights, this study proposes the following hypothesis:

H3: Place of affection is likely to positively influence SDG 3 (Figure 1).

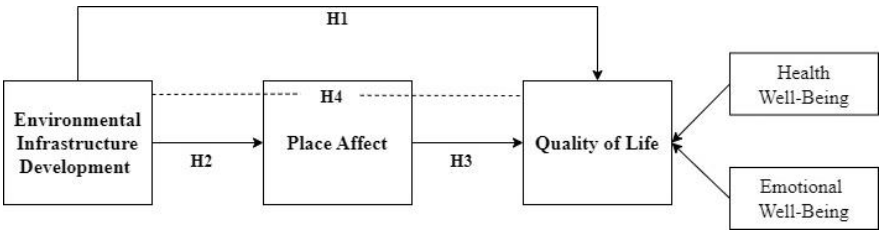

Figure 1. Conceptual model

In our study area, Lenger town, recent infrastructure modernization efforts have introduced new green parks, sanitary zones, and pedestrian-friendly spaces, particularly around the national park and medical tourism zones. These improvements are increasingly used by residents not only for recreational purposes but also for health and wellness. Such spaces support physical health and enhance emotional well-being by fostering deeper connections to nature.

Local engagement in environmental conservation, such as tree planting and neighborhood clean-up initiatives, has also increased, suggesting a heightened sense of environmental ownership and place affection. However, the benefits of tourism-related infrastructure are not perceived equally by all (Mamirkulova et al., 2020). While some residents associate the changes with civic pride and progress, others view them as top-down government initiatives that overlook local needs (Akbar et al., 2021). These divergent perceptions underscore the complexity of infrastructure impacts, making this region an ideal case study for exploring how emotional bonds to place influence well-being. Thus, we propose a fourth hypothesis:

H4: Place affection mediates the relationship between environmental infrastructure and SDG 3 (Figure 1).

MATERIALS AND METHODS

Study context

The study was conducted in the Turkistan region of Kazakhstan, an area known for its rich historical heritage. Turkistan is one of the oldest settlements in the country, with centuries of cultural and historical significance. Owing to its strategic location along the ancient Great Silk Road, the region has become an increasingly popular destination for both domestic and international tourists (Issakov et al., 2023).

The Great Silk Road, as a historical and cultural corridor, fosters mutual understanding and peace among nations, promotes cultural exchange, and stimulates the growth of tourism, trade, and commerce (Moldagaliyeva et al., 2024). Within this broader region, the researchers selected Lenger town, a mountainous locality situated near Sairam-Ugam National Nature Park (Figure 2). Sairam-Ugam is a striking yet relatively underexplored national park in southern Kazakhstan, offering unique ecological and recreational value. The Lenger was chosen for its proximity to the park and its strategic function as the primary gateway for tourists visiting the area.

The town supports the most tourism-related activities and infrastructure in the region. As the nearest urbanized settlement, Lenger plays a pivotal role in facilitating the interaction between the natural environment and tourism development. Its environmental infrastructure, including road networks, sanitation systems, lodging, and recreational amenities, has a direct impact on both the quality of the tourist experience and the sustainability of park usage.

Additionally, the local population serves as key stakeholders in this tourism ecosystem. They provide essential services, help manage visitor flows, and experience both the economic opportunities and social pressures associated with tourism growth. Furthermore, the region is witnessing rapid growth in domestic eco-tourism, driven by increasing interest from

families and small groups in nature-based and medical tourism. This trend underscores the importance of studying the role of environmental infrastructure in shaping sustainable tourism and community well-being in Lenger and similar mountainous destinations. The study employed snowball sampling, a cost-effective and flexible referral method, to address low survey participation rates in Kazakhstan and effectively gather responses from residents of Lenger Town.

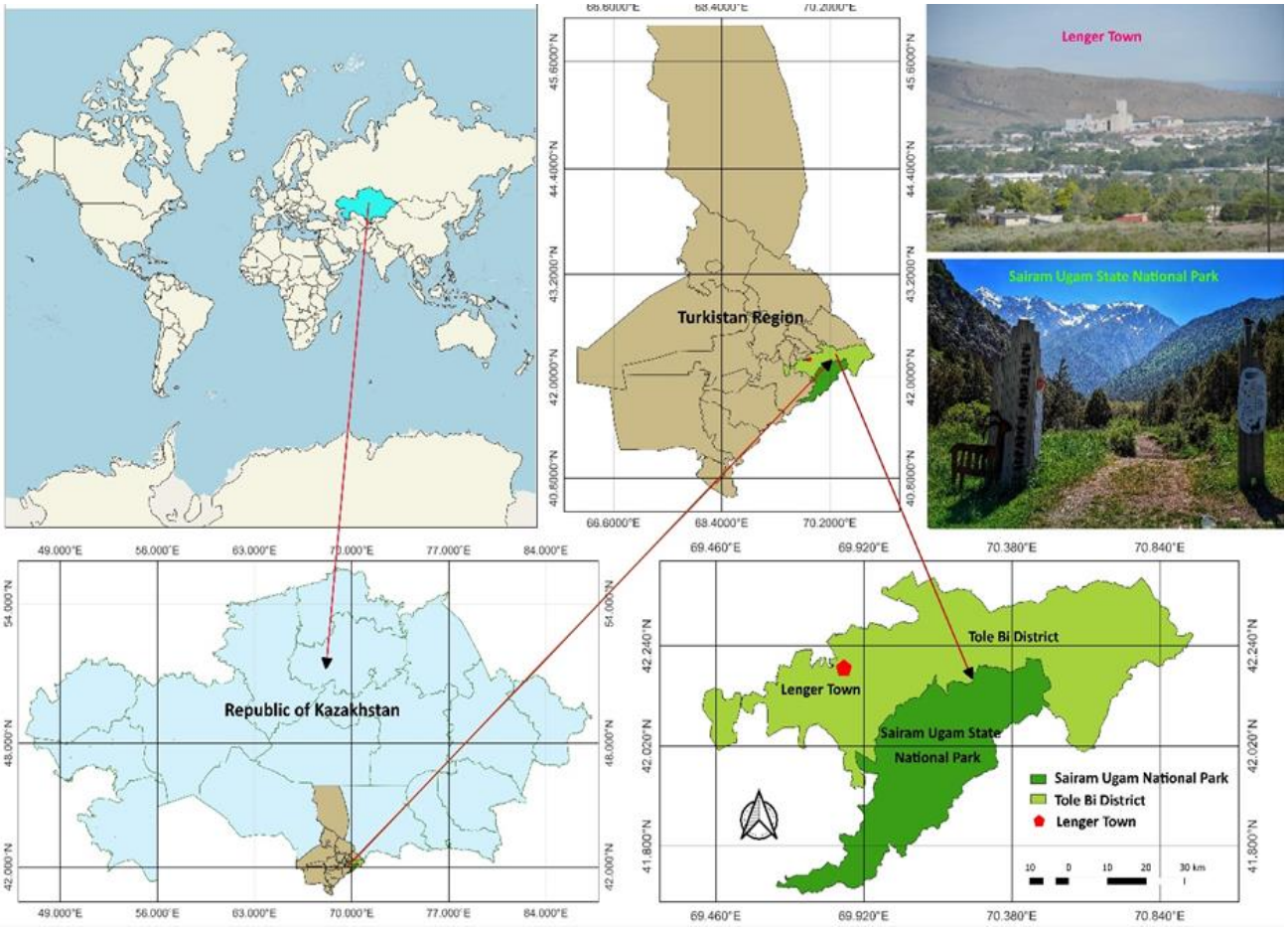

Figure 2. Geographical location map of the research area

To minimize sampling bias, local town leaders were enlisted to help by providing contact information for a diverse group of participants. Additionally, the study followed the sample size determination criteria outlined by Krejcie & Morgan (1970) to ensure statistical validity and representativeness. This method offers a widely accepted formula for selecting a sample size based on a defined confidence level and margin of error. Given Lenger Town's population of 24,302, the required minimum sample size was 379 to achieve a 95% confidence level with a ±5% margin of error. To ensure the sample's representativeness, the authors distributed approximately 600 survey links to Lenger Town residents via personal contact.

Instrument Development and Data Collection Process

A four-part self-administered questionnaire was developed using a quantitative research method as the primary data collection tool. The first section focused on the respondents' demographic factors, such as gender, age, and occupation. The second section assessed environmental infrastructure development, considering the unique characteristics of Lenger Town. A 5-item scale was created to evaluate both tourism-related and general environmental infrastructure development (Abbas et al., 2024; Mamirkulova et al., 2020). The third section measured place attachment, using a 4-item scale adopted from (Lv et al., 2019). The fourth section assessed the quality of life (QOL) concerning SDG3, using a 4-item scale from (Kim et al., 2013). Following the pre-test, we tested the reliability of the scales.

All variables were rated on a five-point Likert scale. The research was conducted between May and July 2022. Out of 600 questionnaires distributed, 470 responses were received. After cleaning the raw data in SPSS, 417 valid surveys were retained. Descriptive statistics were then calculated for each item to determine the mean and standard deviation, reflecting the central tendency and variability of respondents' perceptions.

Data Analysis Approaches

The study employed the statistical platforms SPSS and AMOS (version 23.00) to conduct all data analyses, including testing for convergent and discriminant validity. SPSS 23.0 was used for processing the questionnaires, performing descriptive statistical analysis, and assessing reliability using Cronbach's alpha, which involved mean comparison.

Finally, confirmatory factor analysis (CFA) and structural equation modeling (SEM) were applied to evaluate the significance of the proposed model relationships (Figure 3).

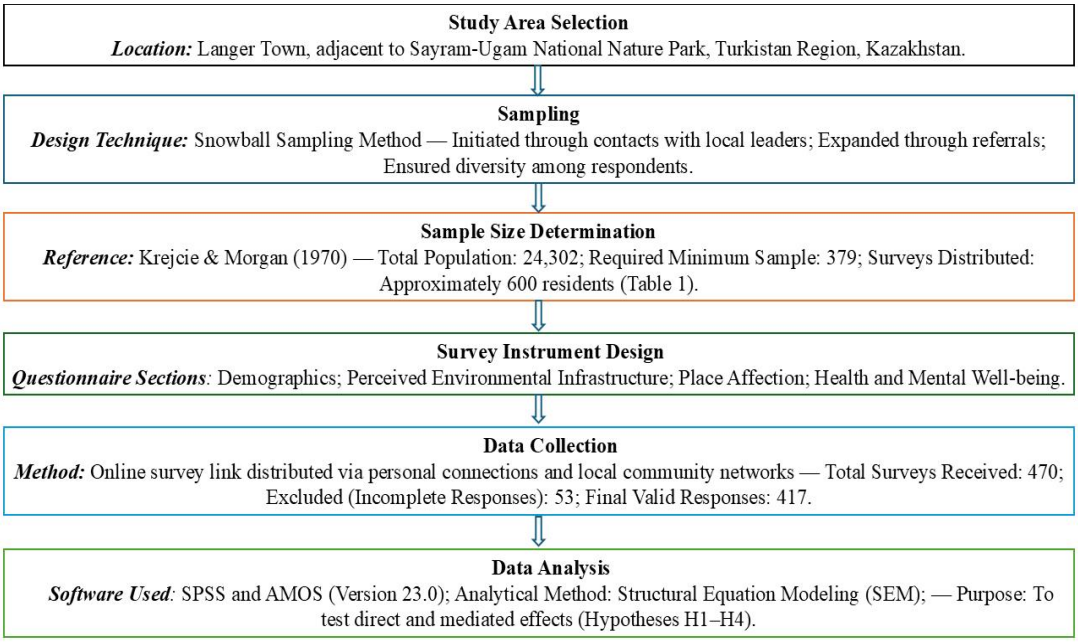

Figure 3. A flowchart of the study methodology steps

Sample Characteristics

As shown in Table 1, 54.90% of participants were female and 45.10% were male. Of the surveyed participants, 24.00% were aged between 18–30, 29.50% were between 31–45, 26.10% were between 46–59, and 20.40% were over 60. Additionally, 29.70% of respondents worked in government institutions, 30.50% in non-governmental institutions, 15.10% were self-employed or engaged in business, animal husbandry, and farming, 20.40% were retired, 2.60% were students, and 1.70% were homemakers (Table 1).

Table 1. Demographic Profile of the respondents (compiled by the authors based on the questionnaire survey)

Variables	Dimensions	Number	Percentage
Gender	Female	229	54.90%
	Male	188	45.10%
Age	18-30 years	100	24.00%
	31-45 years	123	29.50%
	46-59 years	109	26.10%
	60 years and Above	85	20.40%
Current Occupation	Government job	124	29.70%
	Non-government job	127	30.50%
	Self-employment	63	15.1%
	Retired	85	20.40%
	Students	11	2.60%
	Housewife	7	1.7%

RESULTS AND DISCUSSION

Measurement Model

To validate the constructions, Environmental Infrastructure, Place Attachment, and Quality of Life, we conducted a Confirmatory Factor Analysis (CFA) using AMOS. The key metrics resulting from this process are presented in Table 2.

Standardized Factor Loadings (SFL) indicate the strength of the relationship between each item and its underlying construction. Average Variance Extracted (AVE) assesses the amount of variance captured by a construct relative to the measurement error. Composite Reliability (CR) and Cronbach's Alpha (CA) measure the internal consistency of the constructs. As shown in Table 2, the Cronbach's alpha coefficients for all constructs range from 0.83 to 0.94, exceeding the threshold value of 0.70. Furthermore, all measurement items were found to be statistically significant, with standardized factor loadings above 0.70, indicating strong loadings on their respective constructs (Table 2).

The AVE for all constructions was greater than the proposed threshold of 0.50, further confirming construct validity. According to the criteria proposed by Bagozzi et al. (1991), the CFA results demonstrated that the proposed model's goodness of fit was excellent, with the following fit indices: $\chi^2/df = 1.164$, SRMR = 0.053, GFI = 0.942, AGFI = 0.931, NFI = 0.947, RFI = 0.941, IFI = 0.992, TLI = 0.991, CFI = 0.992, and RMSEA = 0.030.

Table 2. Measurement model results (n = 417)

	Constructs and Indicators:	Mean	St. dev.	CSL (L)	AVE	CR	CA
	Environment Infrastructure				**.595**	**0.946**	**0.946**
1	Preserve and restore wildlife habitats with modern methods	3.82	1.249	.793			
2	Attract locals to participate in ecology conservation initiatives	3.93	1.278	.789			
3	Connecting people to nature through outdoor recreation and outdoor sports activity opportunities	3.83	1.238	.800			
4	Create a new source of community identity through an environmental and recreational resource connected to adjacent development	3.72	1.255	.793			
5	Creates green spaces, parks, and green corridors for places of solace and respite.	3.79	1.200	.714			
	Place affect				**0.553**	**0.906**	**0.843**
1	I feel Lenger is a part of me	3.57	1.339	.705			
2	I am highly attached to Lenger	3.77	1.249	.787			
3	I feel a strong sense of belonging to Lenger	3.71	1.175	.761			
4	Visiting Lenger says a lot about who I am	3.65	1.186	.712			
	Quality of life				**0.547**	**0.881**	**0.908**
1	Your overall health status is good.	3.50	1.339	.757			
2	You enjoy better psychological status	4.01	1.285	.725			
3	There are more opportunities to enjoy the happiness of life	3.62	1.334	.729			
4	Your daily life has been filled with things that interest you.	3.68	1.340	.716			

Hypothesis Testing and the SEM Model

The SEM analysis confirmed the relationships among the constructs and indicators (Figure 4). The goodness of fit measures indicated an excellent model fit, with the following values: $\chi^2/df = 1.175$ (Chi-square values), SRMR = 0.052 (root mean square residual), GFI = 0.942 (goodness-of-fit index), AGFI = 0.930 (adjusted goodness-of-fit index), NFI = 0.949 (normed fit index), RFI = 0.943 (relative fit index), IFI = 0.992 (incremental fit index), TLI = 0.991 (Tucker-Lewis index), CFI = 0.992 (comparative fit index), and RMSEA = 0.031 (root mean square error of approximation).

These measures demonstrate a strong overall model fit. The SEM results revealed that environmental infrastructure directly impacts Quality of Life (QOL), confirming H1 (ß = 0.28, p < 0.001). The total effect (ß = 0.323) suggests additional influence through indirect pathways. Similarly, the direct effect of environmental infrastructure on place attachment was supported (H2: ß = 0.220, p < 0.001), with a total effect of 0.262.

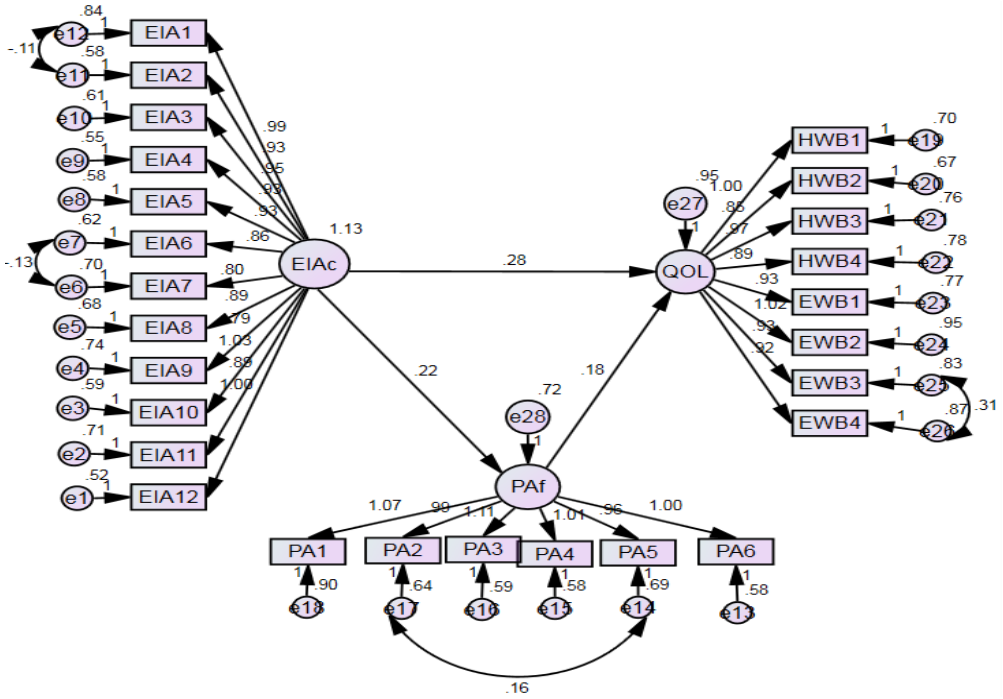

Figure 4. SEM model tests

Furthermore, place attachment significantly influenced QOL (H3: ß = 0.180, p < 0.01), although the total effect was slightly lower (ß = 0.156), indicating complex dynamics between perception and impact (Table 3).

Tourism infrastructure encompasses transportation, social, and environmental infrastructure. This study specifically focused on environmental infrastructure as part of tourism infrastructure development, emphasizing destination development and creating a better living environment for residents. The location and design of innovative environmental infrastructure are crucial. Hypothesis 1 is supported by the findings, which suggest that environmental infrastructure

development in tourism neighborhoods can enhance residents' health and emotional well-being. This improvement is due to the creation of better recreational green spaces, more parks and gardens, and the preservation of natural heritage. These results align with the findings of Mamirkulova et al. (2020), who demonstrated that large-scale infrastructure development can improve quality of life (QOL), indicating a positive relationship between environmental infrastructure and QOL.

Table 3. Results of the model test

We hypothesized path coefficients.	**Stand. estimates**	**t value**	**SE values**	**95% biased corrected confidence interval**		**Test Results**
				Lower bounds	Upper bounds	
H1: EI-> QOL	0.28***	5.224	0.058	0.152	0.391	Supported
H2: EI -> PA	0.22***	4.851	0.060	0.148	0.375	Supported
H3: PA -> QOL	0.18**	2.841	0.063	0.037	0.278	Supported

Hypothesis 2 focused on testing the direct impact of environmental infrastructure on place attachment within the model. The findings showed that environmental infrastructure development significantly predicted residents' place attachment, thus supporting H2. This suggests that environmental infrastructure development enhances residents' emotional connections to a place. In other words, the positive effects of tourism infrastructure development make residents proud of the uniqueness and distinctiveness of their community (Daye et al., 2020), thereby increasing their sense of place attachment. Although no prior research directly examined the impact of environmental infrastructure on residents' place attachment, earlier studies suggest that individual affective connections to places develop over time through environmental and social experiences (Lv & Xie, 2017; Lv et al., 2019). Therefore, fostering a strong sense of place attachment can aid in economic revitalization and recovery, providing valuable insights for government officials in developing strategies to build a more resilient domestic and international tourism industry.

Furthermore, Hypothesis 3, which proposed a positive relationship between place attachment and quality of life (QOL) in terms of health and emotional well-being, was also supported by the data analysis. Residents' emotional attachment to their area was strengthened by the perception that their community is both a tourist attraction and a safe environment. The opportunity to spend time in local parks and gardens contributed to improved emotional and physical well-being.

Hypothesis 4 suggests that the relationship between environmental infrastructure development and quality of life (QOL) in terms of emotional and health well-being is partially mediated by place attachment (Table 4). Therefore, H4 is supported. The findings indicate that enhancing residents' place attachment is a key mechanism linking environmental infrastructure development to improvements in emotional and health-related QOL.

Table 4. Results of the bootstrapping method for mediation

Path	Coefficient			95% biased corrected confidence interval	
	Total effect	Direct effect	Indirect effect	LLCI	ULCI
EI on QOL	.323	.282	-	0.1955	0.3727
EI on PA	.262	.262	-	0.1529	0.3000
PA on QOL	.156	.156	-	0.0936	0.3165
EI impacts QOL via PA	-	-	0.41	BootLLCI: 0.0176	BootULCI: 0.0862

In other words, as residents form stronger bonds and emotional connections to their community, the development of environmental infrastructure leads to enhanced QOL. This study aligns with the work of Ramkissoon (2020), who proposes that place attachment can serve as a link between social tourism development and QOL.

CONCLUSION

This study examined how residents in a mountainous tourism area perceive the impacts of environmental infrastructure and how these perceptions influence their emotional connection to the place (place attachment) and their sense of health and well-being, aligned with SDG 3 (Good Health and Well-being). The SEM model analysis revealed that perceived environmental infrastructure significantly enhances place attachment, which, in turn, strongly predicts residents' well-being. Notably, place attachment partially mediates the relationship between environmental infrastructure and well-being, highlighting the psychological mechanisms through which infrastructure investments can influence community health outcomes. These findings provide empirical support for incorporating emotional and cognitive responses into sustainable tourism planning, particularly in ecologically sensitive and culturally rich regions like Lenger Town in the Turkistan region of Kazakhstan. From a policy and planning perspective, the results suggest that infrastructure improvements should address not only physical needs (such as roads, waste management systems, and green spaces) but also foster residents' emotional connection to their surroundings.

Such investments can contribute meaningfully to broader development goals, including environmental sustainability, community support for tourism, and public health promotion. Furthermore, researchers recommend policies that promote green tourism and eco-adventure tours, which can generate local jobs, increase incomes, and support biodiversity protection. Our study demonstrates that investing in protected areas, such as the Sairam-Ugam National Nature Park, not only promotes sustainable tourism but also serves as an effective strategy for economic recovery.

In conclusion, environmental infrastructure development in Kazakhstan's tourism sector must be strategically managed and planned, incorporating natural parks, wildlife reserves, greenways, recreational areas, and lands with

preservation value. Developers should focus on preserving native species of flora and fauna and supporting natural ecological processes that sustain air, water, and mineral resources—factors that significantly impact the health and quality of life (QOL) of communities and individuals in Kazakhstan.

Theoretical Contributions and Limitations

This research is among the first to explore tourism's environmental infrastructure as a precursor to place attachment, health, and emotional well-being. It also emphasizes the importance of multi-sectoral initiatives, such as the Belt and Road Initiative (BRI), in supporting the 2030 Sustainable Development Agenda.

However, like any research, this study has certain limitations that should be considered when interpreting the findings. The data for this study were collected from a survey of residents in Lenger Town, located near the Sairam-Ugam National Nature Park. To gain a broader perspective, it would be beneficial to explore the impact of environmental infrastructure development on locals' quality of life (QOL) in other national parks with varying economic and health conditions. Additionally, future studies could examine the connection between residents' place attachment in different contexts.

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