

Psychometric Properties of the Turkish Version of the Green Space Use Satisfaction Scale

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Abstract

The benefits of green spaces for individuals' psychological, physical, and social well-being underscore the need to measure satisfaction with green spaces. However, the lack of measurement tools in Turkish culture limits research on satisfaction with green space use. Therefore, this study aims to adapt the Green Space Use Satisfaction Scale (GUSS) to Turkish culture and to conduct validity and reliability analyses. The Turkish form of the scale was subjected to linguistic adaptation by the back translation method and shaped by expert opinions. Confirmatory factor analysis and measurement invariance across gender groups were used to assess construct validity. Reliability analyses were conducted using Cronbach's alpha, CR, and the split-half method. The study sample comprised 357 students recruited from three public universities in the Mediterranean region of Türkiye via convenience sampling. The findings revealed that the Turkish version of the scale aligns with the original scale structure, demonstrates measurement equivalence across gender groups, and exhibits high internal consistency. Additionally, the concurrent validity test demonstrated a significant and positive relationship between the GUSS and the Satisfaction with Life Scale. This study offers a significant cultural perspective to the literature by adapting the GUSS to Turkish culture, thereby facilitating cross-cultural comparisons in the broader literature.

Keywords: Green Space Use, Need Satisfaction, Outdoor Recreation, Life Satisfaction, Scale Adaptation, Validity and Reliability

INTRODUCTION

Over the past century, urbanization has accelerated at an unprecedented rate, primarily driven by global population growth. According to data from the World Bank (2024), approximately 57% of the world's population currently resides in urban areas, and this proportion is projected to increase in the coming decades. As one of the major global megatrends, urbanization has the potential to be a transformative force across all dimensions of sustainable development, including the reduction of social and economic inequalities (World Bank, 2020). When strategically planned and effectively managed, urbanization can contribute significantly to poverty alleviation and the

reduction of inequality by fostering increased employment opportunities, improved living standards, and enhanced access to education and healthcare services. Conversely, poorly managed urbanization can exacerbate existing urban challenges such as traffic congestion, environmental degradation, elevated crime rates, and widening social disparities. For example, urbanization is recognized as one of the key factors shaping the transformation of green spaces and forestry in Türkiye (Atmış & Günşen, 2016). This effect increasingly restricts access to green spaces, particularly in large cities like Istanbul, with significant impacts on public health and environmental awareness (Yıldızbaş et al., 2025). In particular, the rapid, often unregulated expansion of large metropolitan areas has led to unmanageable growth patterns. This phenomenon has placed immense pressure on urban infrastructure and public service delivery systems, frequently leading to inadequate access to essential services and the inability to ensure a minimum quality of life for all urban residents (World Bank, 2020). Because urban green spaces are central to residents' well-being, these uneven patterns of access and quality make it critical to measure how satisfied people are with the green spaces available to them. Reliable assessment tools such as the adapted GUSS scale help assess these perceptions and inform equitable urban planning.

One notable consequence of uncontrolled urbanization is its adverse impact on urban green spaces. Urban expansion often leads to significant alterations in the spatial distribution and structure of green areas (Kong & Nakagoshi, 2005). A primary manifestation of this change is the encroachment upon green spaces and the subsequent fragmentation of their ecological integrity (Tian et al., 2011). This phenomenon is particularly evident in (over) urbanized regions of developing countries, where both the quantity and quality of green areas are frequently insufficient (Rigolon et al., 2018). In densely populated urban environments, limited access to and availability of green spaces can reduce or even eliminate the positive effects of urban green spaces, which the World Health Organization (2017) has identified as improving the quality of urban environments, enhancing local resilience, promoting sustainable lifestyles, and improving the health and well-being of urban residents.

The mere presence of green areas within urban environments does not necessarily ensure their utilization by residents, as availability alone does not guarantee accessibility, engagement, or perceived value. Previous empirical studies have reported that the amenities provided by parks often exceed their actual use and that the benefits derived from urban green spaces depend on how efficiently people utilize them (Dunton et al., 2014). Moreover, factors such as perceived safety, maintenance quality, and social cohesion have been shown to influence visitation and

satisfaction strongly (Bedimo-Rung et al., 2005; Kaczynski & Henderson, 2007). Individuals may differ significantly in how they perceive and value urban green spaces, influenced by personal expectations, preferences, and socio-cultural contexts (Ko & Lee, 2025). In this regard, understanding users' perceptions and levels of satisfaction with urban parks is critical for enhancing urban livability and promoting social well-being (Ostoic et al., 2017). Furthermore, gauging satisfaction levels is as important as identifying potential barriers such as physical, social, or perceptual, that may hinder the effective use of green areas (Gozalo et al., 2018). Such insights are essential for evidence-based policymaking and the strategic planning and management of urban green infrastructure (Zhang et al., 2017). Ultimately, this knowledge can enable urban decision-makers to deliver more responsive and inclusive services, thereby improving residents' quality of life (Ostoic et al., 2017).

In this regard, assessing individuals' satisfaction with urban green spaces is as critical as their physical integration into the urban fabric. Ko and Lee (2025), in their recent study, critique the existing literature for lacking comprehensive, multidimensional measurement tools, despite the presence of various conceptual explanations of the influence of green space use on individual well-being. The authors argue that while numerous studies highlight the benefits of green spaces, the prevalent use of broad, one-dimensional indicators often fails to address negative experiences or unintended consequences. For instance, individuals visiting urban green areas primarily to socialize with friends may simultaneously experience restorative benefits such as appreciating natural beauty and reducing stress. Yet commonly used single-dimensional metrics—such as simple counts of visitation or overall satisfaction scores—are too broad and vague to capture these layered experiences or detect potential adverse effects, leading to an incomplete understanding of how green space use supports well-being. Studies that focus only on a single need or outcome, such as physical activity or stress reduction, therefore risk overlooking other dimensions of benefit and masking disparities in access or quality. These practical shortcomings underscore the necessity of a specialized, multidimensional instrument capable of measuring both the positive and unintended consequences of urban green space use. As a result, the complex and multifaceted human needs related to well-being are frequently overlooked. To address this gap, Ko and Lee (2025) propose a multidimensional measurement scale (including social, aesthetic, growth, knowledge, and health needs) designed to assess the impact of green spaces on individuals' lives. Their approach, grounded in need satisfaction theory and the diffusion model, moves beyond isolated outcomes and aims to offer a more holistic understanding of how green spaces contribute to human well-being. Compared to other instruments that focus on single outcomes, such as

physical activity or general satisfaction, GUSS offers a theoretically robust, multidimensional framework, making it particularly suitable for contexts where social and aesthetic needs are prominent. This multidimensionality addresses a critical gap in the literature, where most existing tools emphasize isolated benefits – such as rest and relaxation (Barakat & Yousufzai, 2020; Stoltz & Schaffer, 2018; Zhang et al., 2013), aesthetic appreciation and recreational opportunities (Stoltz & Schaffer, 2018), or social interaction through physical activity (Ambrey, 2016; Conedera et al., 2015) – without capturing their combined effects. Even when individuals visit green spaces primarily for social purposes, they often experience restorative benefits and stress relief, yet unidimensional indicators fail to measure these layered experiences (Agyemang et al., 2007; Bai et al., 2013; Guite et al., 2006; Pazhouhanfar, 2018). By integrating dimensions such as social, aesthetic, growth, knowledge, and health needs, GUSS provides a more holistic understanding of how green spaces contribute to well-being. However, its original design assumes leisure norms that differ in Türkiye, requiring cultural adaptation to ensure validity.

Accordingly, the present study aims to adapt and validate the multidimensional scale developed by Ko and Lee (2025) into Turkish, thereby enabling a more comprehensive and contextually relevant assessment of the impact of urban green spaces on individual well-being within the local context. Specifically, this study addresses the main research question:

RQ1: Does the adapted GUSS demonstrate acceptable psychometric properties in the Turkish context? It is expected that this study will provide a valid and reliable measurement tool for use in Türkiye, thereby supporting future research and enabling cross-cultural comparisons that may contribute to the literature.

One of the most fundamental perspectives on satisfaction posits that it is directly linked to product performance (Engledow, 1977). Visitor satisfaction, in its broadest sense, is defined as the outcome of the interaction between a visitor's experiences at a destination and their expectations of that destination (Pizam et al., 1978). This definition, although developed in the context of tourism destinations, could be equally applicable to urban green spaces, which serve as recreational destinations for both residents and visitors. Users of parks and other urban green areas arrive with specific expectations – such as opportunities for relaxation, social interaction, or contact with nature – and evaluate their experiences against those expectations. From this perspective, satisfaction with the use of green spaces is a highly complex construct, influenced by a variety of factors including the spatial and environmental characteristics of the green area (Coles & Bussey, 2000), the presence and quality of facilities (Adinolfi et al., 2014), management and maintenance

practices (Lee & Kim, 2015), the behavior of other users (Aspinall et al., 2010), and socioeconomic factors (Jim & Chen, 2006).

Understanding people's perceptions and satisfaction regarding green spaces serves as a tool for enhancing urban livability and societal well-being (Ostoic et al., 2017). Knowing whether individuals are satisfied with urban green spaces is essential for addressing potential barriers that may undermine their satisfaction and ultimately hinder their proper use (Gozalo et al., 2018). Green spaces planned and managed with such insights in mind can also maximize the benefits they provide.

Ko and Lee (2025) argue that urban and suburban green spaces are not just places for material needs but also social and environmental resources that improve quality of life through leisure, education, healing, and social activities. They categorize five types of human needs that green spaces help fulfill: social, growth (actualization), health, aesthetic, and knowledge (cognitive). The literature on green space use frequently examines criteria for satisfying these needs. For instance, numerous studies have consistently shown that the presence and use of green spaces significantly improve health outcomes (Bell et al., 2014). In particular, green spaces promote healthy lifestyle behaviors by offering opportunities for outdoor physical activity (Browning et al., 2022; Kondo et al., 2018). Such promotion plays a critical role in addressing major public health concerns, including morbidity, stress, obesity, and cardiovascular and respiratory diseases (Maas et al., 2009; Tamosiunas et al., 2014). In a systematic review on green spaces and public health, Gianfredi et al. (2021) reported that, beyond their contributions to physical health, the use of green spaces also positively affects mental health and stress management. Accordingly, both the availability and use of green spaces have been found to have beneficial effects on the mental well-being of urban residents.

Urban green spaces support favorable social interactions that promote social cohesion, which in turn improves health and well-being (Jennings & Bamkole, 2019). Conversely, the lack of access to such spaces has been associated with feelings of loneliness and a perceived lack of social support (Maas et al., 2009). Within these environments, individuals can engage in social activities with family members, friends, and neighbors, thereby maintaining social ties and building new relationships (Ko & Lee, 2025). Unlike many other social settings, green spaces uniquely facilitate meeting new people and forming friendships, strengthening social interaction, place attachment, and overall social cohesion within the community (Peters et al., 2010). Consequently, the use of

green spaces improves societal well-being by supporting subjective well-being through maintaining social contact and promoting a sense of belonging.

Another frequently discussed topic in the literature regarding the use of green spaces concerns their role in fostering a connection to nature. Exposure to natural environments has been shown to alleviate negative psychological conditions such as stress, mental health disorders, and depressive symptoms, while also promoting positive psychological outcomes, including subjective well-being and the experience of positive emotions (Bratman et al., 2021). In this regard, urban green spaces are widely recognized as important settings that provide opportunities for nature experiences and facilitate a sense of connection to the natural world (Gobster & Westphal, 2004; Palliwoda et al., 2017). Recent studies have investigated the link between nature experiences and health outcomes by quantifying specific indicators such as the frequency, duration, and intensity of urban residents' interactions with green spaces (Shanahan et al., 2016). Moreover, individuals who exhibit positive emotional responses to the beauty of nature tend to feel a stronger sense of connectedness to nature and report a higher quality of life (Zhang et al., 2014). Although Zhang and colleagues examined nature experiences broadly, many studies explicitly include urban green spaces and parks within this concept. Designated community gardens and urban parks contain natural features, appear natural, and provide opportunities to observe and interact with natural processes (Hartig et al., 2014). Similarly, research has shown that contact with urban green environments is associated with higher levels of well-being and stronger feelings of nature connectedness (Callaghan et al., 2021; Hartig et al., 2014; White et al., 2013). Therefore, Ko and Lee (2025) argue that green spaces increase subjective well-being by fulfilling individuals' aesthetic needs.

The use of green spaces can create a sense of being in nature, thereby supporting individuals in achieving their goals and promoting personal growth and development—needs commonly classified as growth-oriented dimensions (Ko & Lee, 2025). Research indicates that a connection with nature is associated with indicators of well-being, including autonomy, vitality, meaning, and personal development (Howell et al., 2011; Pensini et al., 2016). Moreover, nature contact is significantly more strongly associated with personal growth than with many other aspects of well-being (Pritchard et al., 2020). These findings underscore the essential role that a relationship with nature plays in advancing psychological growth and development. In this context, green spaces, by offering opportunities for meaningful and purposeful activities, may help individuals fulfill their growth needs and achieve a higher sense of well-being (Ko & Lee, 2025).

Green spaces can offer educational opportunities that meet individuals' informational needs through various activities such as participating in educational programs, engaging in diverse outdoor pursuits, traveling, exploring nature, and conducting observations. Participation in educational activities is a factor influencing the visitation of such spaces (Halkos et al., 2021). Educational opportunities are directly associated not only with the frequency of visits to these areas but also with the satisfaction derived from them (Halkos et al., 2021). In this regard, many national governments today organize various educational activities and programs in urban green spaces—such as urban forests—intending to enhance visitor satisfaction from both recreational and educational perspectives (Lee & Kim, 2022).

METHODS

Participants

The study involved 357 students from three public universities in the Mediterranean region of Türkiye, using a convenience sampling method. Data were collected online from university students from April 7 to October 13, 2025 using a structured self-report questionnaire. Considering that the scale consists of 20 items, the sample size of 357 exceeds the recommended minimum of 100-200 participants based on the guideline of 5-10 participants per item (DeVellis, 2017; Worthington & Whittaker, 2006). Furthermore, Comrey and Lee (1992) suggest that a sample size of 300 is considered “good” for factor analysis. Similarly, while emphasizing that there is no absolute rule, Kline (2016) recommends a minimum of 200 participants for factor-analytic techniques, as smaller samples may yield unreliable model estimates. Therefore, the sample size is considered adequate for conducting psychometric analyses.

64.7% of the participants were female ($n = 231$) and 35.3% were male ($n = 126$). Their ages ranged from 18 to 48 years, with a mean age of 27.80 years ($SD = 6.45$). Participants were also asked how frequently they spend time in nature. Responses demonstrated that 19.3% spent time in nature once a month or less, 40.3% several times a month, 34.7% several times a week, and 5.6% every day. While some participants reported rarely spending time in nature, the study did not restrict participation based on exposure to preserve a diverse range of experiences with natural environments.

Procedure

Initially, the corresponding author granted permission via e-mail to adapt the GUSS for Turkish culture. Subsequently, the study was conducted after receiving ethical approval on March 4, 2025,

with reference number 2025/03-1492, obtained by submitting an application to the ethics committee of the institution to which one of the researchers was affiliated. In line with the study aim, a cross-sectional design was adopted to examine the psychometric properties of the Turkish version of the GUSS. All data were collected at a single time point using a structured, online self-report questionnaire.

In the translation phase of the study, Brislin's (1970) guidelines were mainly followed. Firstly, the source language was translated into the target language. Following this, the scale form derived from the initial translation was rendered back into the source language. Finally, the back-translated version was compared to the original scale form. To minimize potential translation errors and enhance linguistic precision throughout this process, a methodological triangulation approach was employed, incorporating various translation resources, including a large language model (LLM), neural machine translation (NMT) systems, and experts in linguistics and English language education. Using triangulation in research enables integrating the strengths of diverse methods and mitigating their limitations, thereby reinforcing the verifiability of research outcomes (Creswell, 2012). Moreover, LLMs and NMT systems are increasingly instrumental in translating from English into other languages, with advances in technology significantly enhancing translation quality (Son & Kim, 2023).

During the translation of the scale from English to Turkish, three consistent translations were obtained using the LLM (GPT-4o) and NMT systems (DeepL and Google Translate). Subsequently, the researchers evaluated the translation samples and determined which translations were the most appropriate for the target language. After this stage, considering that artificial intelligence-based software may be inadequate in detecting cultural nuances, the scale was translated back from Turkish to English by a linguistics expert. In the final stage, the original scale and the back-translated English scale were comparatively evaluated by an English language teaching expert in collaboration with the researchers, and thus, the final version of the scale was obtained.

Data Collection Instruments

Green Space Use Satisfaction Scale

The scale developed by Ko and Lee (2025) has 5 dimensions: social needs (e.g., "Through activities in green spaces, I was able to have a good time with my family, friends, and other close people"), growth needs (e.g., "Through activities in green spaces, my faith in myself was strengthened"), health needs (e.g., "Through activities in green spaces, I was able to forget my daily worries for a

while”), aesthetic needs (e.g., “Through activities in green spaces, I was able to appreciate the wonders of nature”), and knowledge needs (e.g., “Green space activities were good for me to acquire new information and knowledge”). Participants rated 20 items on a 5-point Likert scale from 1 (*strongly disagree*) to 5 (*strongly agree*). The alpha internal consistency coefficients for the original scale dimensions range from 0.85 to 0.91. Consistent with the original scale, the alpha coefficients in this study ranged from 0.86 to 0.92.

Satisfaction with Life Scale

The unidimensional and five-item scale was developed by Diener et al. (1985) and adapted to Turkish culture by Durak et al. (2010). The seven-point Likert-type scale ranges from 1 (*strongly disagree*) to 7 (*strongly agree*). The internal consistency coefficient calculated for the Turkish university students’ sample in the adaptation study was 0.81. The alpha coefficient in this study was calculated as 0.88.

Data Preparation

Prior to conducting the primary analyses, responses were screened for completeness and consistency. There were no missing values as the online survey was structured to require responses to all items before the questionnaire was submitted. Then, responses were screened for univariate outliers using standardized z-scores since even a small proportion of outliers can seriously bias or influence the results of a statistical analysis, leading to inflated error variance and distorted parameter estimates (Osborne & Overbay, 2004). Following the recommendation by Hair et al. (2019), 9 cases with z-scores exceeding ± 4 were excluded from the dataset. Multivariate normality was assessed using Mahalanobis distance to identify multivariate outliers (Tabachnick & Fidell, 2019). Nine cases exceeded the $p < .001$ threshold and were removed from the dataset. After exclusion, the remaining data met the assumption of multivariate normality, ensuring that extreme values did not bias parameter estimates or standard errors. Descriptive statistics were calculated to examine the distribution of all variables. No serious deviation from normality was observed; skewness and kurtosis values for all items were within the acceptable range of ± 2 as recommended by George and Mallery (2019). Variance Inflation Factor (VIF) values were calculated to assess multicollinearity. All VIF values were well below the threshold of 5 (Hair et al., 2019), confirming that multicollinearity was not a concern for this study.

Data Analysis

AMOS 24.0 was used to conduct confirmatory factor analysis (CFA) to evaluate the construct validity of the GUSS. The analysis included standardized factor loadings, composite reliability (CR), average variance extracted (AVE), and model fit. The maximum likelihood method was employed in the CFA. For discriminant and convergent validity, the Fornell-Larcker criterion and the HTMT ratio were used. Multi-group CFA was conducted to evaluate measurement invariance across gender. Concurrent validity was evaluated by correlating the scale's dimensions with the Satisfaction with Life Scale. Internal consistency was determined through Cronbach's alpha and composite reliability, and split-half reliability was calculated using the Spearman-Brown coefficient to support the internal structure further.

RESULTS

Model Fit

The five-factor measurement model showed an acceptable to good fit across multiple indices (see Table 1). The chi-square statistic was significant due to sensitivity to sample size ($n = 357$), $\chi^2(160) = 611.972$, yet the normed chi-square ($\chi^2/df = 3.83$) was below the upper limit of 5 (Kline, 2016). Both the Comparative Fit Index (CFI = .929) and the Tucker-Lewis Index (TLI = .916) exceeded the .90 threshold for adequate fit (Hu & Bentler, 1999; Kline, 2016). Absolute fit indices also supported model adequacy. RMSEA was .089, which is below the acceptable threshold of .10 (Browne & Cudeck, 1993; MacCallum et al., 1996) and SRMR was .067, which is below the .08 threshold, indicating good fit (Hu & Bentler, 1999).

Table 1
Goodness of Fit Indices

χ^2	<i>df</i>	χ^2/df	CFI	TLI	RMSEA	SRMR
611.972	160	3.825	.929	.916	.089	.067

Convergent Validity

Convergent validity was assessed using standardized factor loadings, CR, and AVE, following Hair et al. (2019). All standardized factor loadings were statistically significant at the $p < .001$ level and ranged from .713 to .920, exceeding the recommended threshold of .50 (see Figure 1). As shown in Table 2, CR values were also well above the minimum acceptable value of .70 and ranged from .870 to .929, indicating high internal consistency for each construct. Furthermore, AVE values ranged from .573 to .766, all exceeding the .50 criterion, confirming that the latent construct itself

accounted for the majority of the variance in the indicators of each construct. These results indicated a strong convergent validity across all five dimensions.

Discriminant Validity

Discriminant validity was assessed using the Fornell-Larcker criterion (Fornell & Larcker, 1981) and the Heterotrait-Monotrait (HTMT) correlation ratio (Henseler et al., 2015). According to the Fornell-Larcker approach, the square root of the AVE for each construct should be greater than the correlations between that construct and the others. As seen in Table 3, all diagonal values representing the square roots of AVE are higher than the correlations between the corresponding constructs in the matrix, indicating adequate discriminant validity for all factors except the “Social Needs” dimension. On the other hand, the HTMT values between constructs ranged from .554 to .846 (Table 4). All values are below the conservative threshold of .85, indicating satisfactory discriminant validity. Taken together, these results confirm that the constructs are statistically divergent and that the measurement model demonstrates both convergent and discriminant validity.

Figure 1
Path Diagram of the Green Space Use Satisfaction Scale

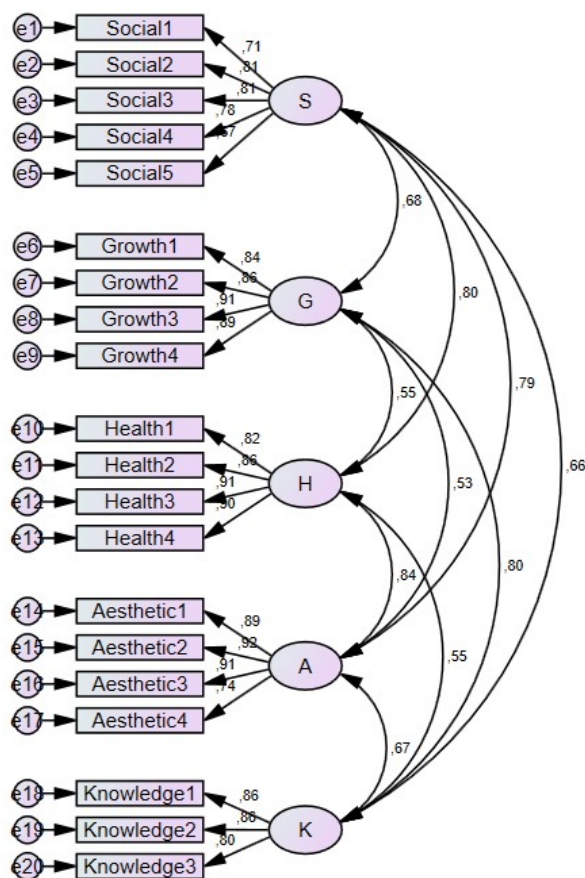


Table 2
Confirmatory Factor Analysis

Factor	Item	Loading	Alpha	CR	AVE
Social needs	S1	.713	.863	.870	.573
	S2	.806			
	S3	.810			
	S4	.776			
	S5	.670			
Growth needs	G1	.840	.924	.929	.765
	G2	.859			
	G3	.914			
	G4	.886			
Health needs	H1	.819	.924	.929	.766
	H2	.862			
	H3	.913			
	H4	.904			
Aesthetic needs	A1	.888	.919	.924	.754
	A2	.920			
	A3	.913			
	A4	.741			
Knowledge needs	K1	.861	.878	.878	.705
	K2	.857			
	K3	.801			

Measurement Invariance

To assess whether the GUSS performed equivalently across gender groups, a series of measurement invariance tests were conducted using multi-group CFA. The analysis followed a hierarchical approach, testing for configural, metric, and scalar invariance based on Chen's (2007) guidelines.

The configural invariance model, which tests whether the factor structure is similar across groups, yielded acceptable fit indices: $\chi^2(320) = 901.406$, CFI = .911, RMSEA = .072. This result suggests that the scale's basic structure is equivalent for both females and males. Metric invariance was then tested by restricting the factor loadings to be equal across groups. Model fit remained constant: $\chi^2(335) = 919.518$, CFI = .911, RMSEA = .070. The change in CFI was .000 and the change in RMSEA was .002. These results show that both groups interpreted the items similarly, supporting metric invariance. Scalar invariance was examined by further restricting item intercepts. The fit indices remained within acceptable limits: $\chi^2(355) = 938.334$, CFI = .911, RMSEA = .068, Δ CFI = .000, and Δ RMSEA = .002. This supports the equivalence of item means across gender groups, providing support for scalar invariance (Table 5).

Table 3
Discriminant Validity (Fornell-Larcker)

Factor	1	2	3	4	5
1. Social needs	.757				
2. Growth needs	.682	.875			
3. Health needs	.803	.551	.875		
4. Aesthetic needs	.788	.529	.841	.869	
5. Knowledge needs	.665	.804	.549	.669	.840

Note. Square root of the AVE is shown on the diagonal in bold. All correlations significant at the $p < .001$ level

Table 4
Discriminant Validity (HTMT)

Factor	1	2	3	4	5
1. Social needs	-				
2. Growth needs	.708	-			
3. Health needs	.805	.564	-		
4. Aesthetic needs	.812	.587	.846	-	
5. Knowledge needs	.688	.803	.554	.734	-

Reliability

The internal consistency of the five dimensions was assessed using Cronbach's alpha, CR and split-half reliability. All reliability indicators for the five dimensions exceeded the commonly accepted threshold of .70, indicating satisfactory internal consistency (Nunnally & Bernstein, 1994). Specifically, Cronbach's alphas ranged from .86 to .92, indicating strong reliability across all dimensions. Similarly, CR values ranged from .87 to .93, further confirming the construct's consistency. Split-half reliability coefficients ranged from .84 to .91, indicating high reliability. These findings indicate that each dimension of the scale demonstrates high internal consistency and reliability.

Table 5
Measurement Invariance

Gender	χ^2	df	CFI	RMSEA	Δ CFI	Δ RMSEA
Configural	901.406	320	.911	.072	-	-
Metric	919.518	335	.911	.070	.000	.002
Scalar	938.334	355	.911	.068	.000	.002

Table 6
Correlation Analysis

Factor	1	2	3	4	5	6
1. Social needs	-					
2. Growth needs	.645***	-				
3. Health needs	.715***	.523***	-			
4. Aesthetic needs	.722***	.553***	.777***	-		
5. Knowledge needs	.607***	.725***	.500***	.675***	-	
6. Life satisfaction	.247***	.205***	.174***	.188***	.203***	-
Mean	4.10	3.53	4.38	4.30	3.75	4.36
SD	0.68	0.94	0.64	0.68	0.88	1.30

Note. *** $p < .001$

DISCUSSIONS

The present study aimed to adapt the GUSS into Turkish and evaluate its psychometric properties in Turkish culture. CFA findings revealed that the Turkish version of the scale retained the original factor structure and provided acceptable model fit indices. This suggests that the core dimensions of green space use satisfaction are conceptually applicable and interpretable in the Turkish context.

The assessment of the construct validity of the GUSS involved extensive psychometric analyses, which confirmed the adequacy of the measurement model. Each item on the scale exhibited standardized factor loadings exceeding the conventional threshold of .50 (Hair et al., 2019). This indicates that each observed variable contributes significantly to its corresponding latent construct. This finding supports the factorial structure of the adapted instrument and demonstrates that the items are both theoretically coherent and empirically consistent with their associated latent dimensions.

Regarding convergent validity, the results revealed that the AVE values for all factors exceeded the recommended cutoff value of .50. Additionally, the CR coefficients were all higher than the threshold of .70. Furthermore, for each factor, the AVE values were smaller than their corresponding CR values, which is another indication of internal consistency and convergent validity (Hair et al., 2019). Taken together, these findings demonstrate that the indicators of each construct share a high proportion of variance, thereby providing strong evidence that the constructs adequately represent their intended domains of green space use satisfaction.

The assessment of discriminant validity was conducted using both conventional and contemporary approaches. Initially, the Fornell-Larcker criterion (Fornell & Larcker, 1981) was applied. According to this criterion, the square root of AVE for each latent construct should exceed its correlations with other constructs. The results showed that this assumption was generally satisfied across the scale; however, the "Social Needs" factor showed a marginal deviation, as its AVE root was slightly lower than its correlations with the "Health Needs" and "Aesthetic Needs" factors. While such a finding might traditionally raise concerns regarding discriminant validity, recent methodological research has demonstrated that the Fornell-Larcker criterion often yields biased or unreliable results, particularly in variance-based structural equation modelling (Henseler et al., 2015). This bias arises because the Fornell-Larcker approach tends to underestimate structural correlations and overestimate factor loadings, thereby providing an inaccurate assessment of discriminant validity.

Given the limitations of the Fornell–Larcker criterion, the more robust and widely accepted HTMT ratio of correlations was used as the primary criterion for evaluating discriminant validity. The HTMT values for all factor pairs were below the conservative threshold of .85, indicating that all constructs were empirically distinct. This finding provides compelling evidence that the dimensions of the GUSS measure conceptually unique yet related aspects of individuals' satisfaction with green space experiences. The use of HTMT is especially appropriate in this context, as simulation-based evidence has shown that HTMT possesses superior sensitivity and specificity in detecting discriminant validity compared to traditional methods (Henseler et al., 2015; Voorhees et al., 2016).

In addition to the HTMT analysis, inter-construct Pearson correlation coefficients were also examined. The correlations among the five factors ranged from .500 to .777, reflecting moderate to high, but non-redundant, associations. These coefficients align with theoretical expectations that the dimensions of green space use satisfaction (e.g., social, growth, health, aesthetic, and knowledge needs) are interrelated yet conceptually distinct constructs. Correlation values below .80 are typically interpreted as indicative of satisfactory discriminant validity (Hair et al., 2019; Kline, 2016), further reinforcing the absence of multicollinearity or construct overlap in the measurement model.

The Turkish version of the GUSS also showed high internal consistency, as Cronbach's alpha coefficients were well above the generally accepted threshold of .70 (Nunnally & Bernstein, 1994). Additionally, CR and split-half reliability values confirmed the scale's internal consistency. These psychometric outcomes align with the original scale (Ko & Lee, 2025), which provides further support for its reliability in measuring green space use satisfaction in diverse cultures. The availability of a reliable Turkish version of the GUSS fills an important methodological gap by providing researchers in Türkiye with a standardized instrument to measure satisfaction with using green spaces. It is also an increasingly important area of research in urban and environmental psychology, especially in rapidly urbanizing societies (Zang & Qian, 2024).

Another key contribution of this study is the demonstration of measurement invariance across gender, indicating that the scale functions equivalently for female and male participants. This supports the fairness and comparability of the scale in gender-based research. In addition, concurrent validity was supported by a positive correlation between green space use satisfaction scores and life satisfaction, as measured by the widely used Satisfaction with Life Scale (Diener et

al., 1985). This finding is consistent with previous studies showing that interaction with green spaces can increase subjective well-being and life satisfaction (Jabbar et al., 2022).

Beyond psychometric validation, the present study advances a culturally grounded understanding of environmental experience. During the adaptation process, cultural characteristics were carefully considered – such as the common use of municipal parks for family gatherings, the central role of tea gardens and picnic areas in social life, and the emphasis on accessibility for multigenerational use. While spending time in nature is valued as a leisure activity in Turkish culture, the primary purpose of visiting green spaces often centers around picnics, barbecues, and family-oriented social gatherings (Jay & Schraml, 2009). These contextual adaptations ensured that items reflected local practices (e.g., frequency of social activities in green spaces) and expectations (e.g., availability of shaded areas and seating), thereby enhancing the interpretability of satisfaction with green space use in Türkiye.

When compared with the original validation by Ko and Lee (2025), the Turkish version preserved the five-factor structure (social, aesthetic, growth, knowledge, and health). It achieved comparable reliability levels, indicating structural stability across distinct cultural contexts. However, the Turkish adaptation extends the interpretation of satisfaction by embedding culturally specific meanings – shifting the focus from individual-oriented recreation, as seen in the Korean model, to collective, family-based experiences that dominate green space use in Türkiye. Similar cross-cultural research supports such contextual variation. For instance, Liu et al. (2023) reported differences in satisfaction and design preferences between Japanese and Chinese users, while Gavrilidis et al. (2024) found contrasting perceptions of small parks between Iranian and Romanian participants. Likewise, Son et al. (2025) demonstrated that perceptions of ecosystem services vary significantly between Korea and Germany. Collectively, these findings emphasize that although the structural composition of the GUSS remains stable across cultures, the underlying meanings and priorities of green space satisfaction are culturally shaped. The Turkish adaptation, therefore, contributes to the growing body of evidence underscoring the necessity of culturally grounded approaches to capture the nuances of environmental experience in non-Western contexts.

While green space experiences have been widely studied in Western contexts, less is known about how individuals in non-Western societies conceptualize and evaluate their use of green spaces (Pala & Acar, 2024). Given that cultural values, perceptions of public spaces, and expectations from green areas may vary across cultures (Özgüner, 2011), the availability of a culturally adapted

measurement tool is essential for conducting context-sensitive research. Recent research underscores this gap, showing that studies on urban green space (UGS) use are concentrated in China, followed by the USA and UK, with limited work in Latin America and Africa (Terefe & Hou, 2024). The validated Turkish version of the GUSS can serve as a fundamental tool for future studies examining the role of green spaces in urban living and environmental behavior in Türkiye. Additionally, the scale may facilitate evidence-based decision-making in the design, maintenance, and promotion of green spaces, consequently enhancing public engagement and satisfaction.

Limitations and Future Research

Despite its valuable contributions, this study has several limitations. First, the sample consisted of university students, which may limit the generalizability of the findings. University students, due to their age, lifestyle, and patterns of green space use, may not fully represent the broader population, including older adults, children, working professionals, or individuals living in rural or underserved areas. Future research should aim to replicate the scale's validation with a more diverse and representative sample to confirm its validity across different age groups, educational backgrounds, and geographic regions. Additionally, the scale's predictive validity was not assessed in this study. While the scale shows high internal consistency, concurrent validity, and measurement invariance across gender groups, it remains unclear whether green space use satisfaction can predict long-term outcomes such as mental health, physical activity involvement, or environmental engagement. Future studies should evaluate the scale's predictive power over time using longitudinal designs.

CONCLUSION

This study adapted the GUSS into Turkish and analyzed its psychometric properties within the Turkish cultural context. The Turkish version retained its original structure and showed acceptable model fit indices. The findings suggest that the core dimensions of green space use satisfaction are both conceptually valid and culturally meaningful in the Turkish context. The adapted scale is a reliable tool for assessing satisfaction with green space use among the Turkish population, and it can be used in future research and practice aimed at promoting the effective use of green spaces in Türkiye.

PRACTICAL IMPLICATIONS

The validated Turkish version of the Green Space Use Satisfaction Scale provides an evidence-based assessment tool that can support decision-makers, urban planners, recreation managers,

and public health authorities in evaluating users' satisfaction with green space experiences. By systematically measuring multidimensional user needs, including social interaction, health, aesthetic appreciation, personal growth, and knowledge acquisition, the scale enables practitioners to identify which aspects of green spaces most strongly influence user satisfaction and engagement.

From an urban planning perspective, the scale can help municipalities and local governments design and manage green spaces based on user-centered data rather than infrastructure availability alone. For example, identifying low satisfaction levels in specific dimensions, such as safety, accessibility, or social interaction opportunities, can guide targeted improvements in park design, maintenance quality, and recreational programming. This evidence-based approach may enhance the effectiveness of green infrastructure investments and support equitable access to high-quality recreational environments.

The scale also offers practical value for public health and community well-being initiatives. Since green space use is associated with psychological recovery, physical activity participation, and social cohesion, practitioners can use the GUSS to monitor the effectiveness of health promotion programs implemented in urban parks and nature-based recreation areas. Additionally, recreation and environmental education professionals can utilize the scale to evaluate the outcomes of educational and nature-based intervention programs designed to increase environmental awareness and outdoor participation.

Finally, the availability of a culturally adapted and psychometrically robust measurement tool facilitates cross-cultural research and comparative studies, enabling policymakers and researchers to benchmark green space satisfaction across different populations and geographic regions. This capability supports long-term monitoring and strategic planning for sustainable urban development and nature-based recreation policies.

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Authors' Contribution

Both authors contributed equally to the conceptualization, data curation, and the writing of the original draft. The first author was responsible for the methodology, formal analysis, and investigation. The second author performed the final review and editing of the manuscript.

Declaration of Conflict Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Ethics Statement

The study approved by the Ethics Committee of Istanbul Yeni Yüzyıl University (2025/03-1492).

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APPENDIX A

YEŞİL ALAN KULLANIM TATMİNİ ÖLÇEĞİ

	Hiç Katılmıyorum	Katılmıyorum	Kararsızım	Katılıyorum	Tamamen Katılıyorum
Lütfen aşağıdaki ifadeleri geçtiğimiz yıl boyunca yeşil alan ziyaretlerinizde (örneğin; kent parkları/bahçeleri, milli parklar, ormanlar ve dağlık alanlar) yaşadığınız deneyimleri düşünerek yanıtlayınız.					
1. Yeşil alanlardaki aktiviteler yoluyla ailem, arkadaşlarım ve diğer yakınlarımla iyi vakit geçirebildim.					
2. Yeşil alanlardaki aktiviteler yoluyla oraya birlikte gittiğim insanlara kendimi daha yakın hissettim.					
3. Yeşil alan aktiviteleri, tanıdıklarımla bir araya gelmek için harika bir fırsattı.					
4. Yeşil alanlardaki aktiviteler yoluyla diğer insanlarla güzel sohbetler edebildim.					
5. Yeşil alan aktiviteleri, oraya birlikte gittiğim insanları daha iyi anlamama yardımcı oldu.					
6. Yeşil alanlardaki aktiviteler yoluyla kendime olan inancım güçlendi.					
7. Yeşil alan aktiviteleri, düşüncelerimi ifade etmeme ve harekete geçmeme yardımcı oldu.					
8. Yeşil alan aktiviteleri, ihtiyaç duyulan ve değerli biri olduğumu hissettirdi.					
9. Yeşil alanlardaki aktiviteler yoluyla potansiyelimi ve olanaklarımı keşfedebildim.					
10. Yeşil alanlardaki aktiviteler yoluyla günlük endişelerimi bir süreliğine unutabildim.					
11. Yeşil alanlardaki aktiviteler yoluyla ruh halimi değiştirebildim.					
12. Yeşil alanlardaki aktiviteler yoluyla duygusal olarak rahatlamış hissettim.					
13. Yeşil alan aktiviteleri, stresimi atmama yardımcı oldu.					
14. Yeşil alanlardaki aktiviteler yoluyla doğanın harikalarının değerini anlayabildim.					
15. Yeşil alanlardaki aktiviteler yoluyla doğal çevrenin güzelliğini keşfettim.					
16. Yeşil alanlardaki aktiviteler yoluyla doğal çevrenin önemini hissettim.					
17. Yeşil alanlardaki aktiviteler yoluyla ormanlara ve doğaya ilgi duymaya başladım.					
18. Yeşil alan aktiviteleri, yeni bilgi ve anlayışlar edinmem için faydalı oldu.					
19. Yeşil alan aktiviteleri, farklı durumları fark etmeme ve anlamama yardımcı oldu.					
20. Yeşil alanlardaki aktiviteler yoluyla çevremi öncekinden farklı bir şekilde gözlemledim.					