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Social Evaluation of Public Open Space Services and Their Impact on Well-Being: A Micro-Scale Assessment from a Coastal University

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Abstract: Public open spaces services have been shown to be profoundly affected by rapid urbanization and environmental changes, and in turn, they have influenced socio-cultural relationships and human well-being. However, the impact of these changes on public open space services (POSS) remains unexplored, particularly in the Saudi Arabian context. This study examines the socio-cultural influence of POSS on the King Abdulaziz University campus, Jeddah, Saudi Arabia and the impact of these services on well-being. A field survey and questionnaire were used to collect data. Non-parametric tests (Kruskal–Wallis and Mann–Whitney tests) were used to find significant differences in the importance of POSS as perceived by stakeholders based on socio-demographic attributes. Factor analysis was performed for 14 POSS to identify those that are most important. The study showed that (i) university stakeholders are closely linked to services provided by public open spaces (POS) and dependent on POSS, (ii) there were significant differences in the perceived importance of POSS according to gender, age, and social groups, and (iii) 70 to 90% of stakeholders reported POSS as having a positive impact on well-being. Thus, the findings will help design and plan POSS to meet the needs of society and promote well-being.

Keywords: public open space services; socio-cultural evaluation; well-being; coastal city; KAU; environmental sustainability

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1. Introduction

Public open spaces (POS) are public or privately owned open spaces, particularly green parks, playgrounds, and green parks [1–4]. Non-parkland areas are also regarded as POS and include squares, cycle paths, and green corridors that are important to people for their recreational and physical activities [5,6]. POS are mainly located in urban landscapes and are freely accessible to the general public [7]. These POS provide mental refreshment as well as opportunities for physical activities, such as walking, physical exercise, and leisure. They also enhance social cohesion [3,5,8–19]. Recognizing the potential impact of POS on mental and physical health and well-being, POS have recently been prioritized in urban planning as well as in public health research [5,8,20,21].

The services provided by POS are central to the well-being of the user population, providing tangible and intangible benefits [22]. Researchers have examined the contribution of POS to quality of life, and the findings have been integrated into policy frameworks to achieve sustainable urban planning [1,23]. Most studies of the relationship between POS and well-being have been conducted in developed nations, particularly in Australia, the USA, and Europe [3,12,20,24–26]. However, the assessment of public open space services (POSS) from a socio-cultural perspective remains unexplored, particularly in developing countries, including Saudi Arabia. The assessment of preferences and perceptions regarding public open space services (POSS) has emerged as a significant tool in addressing

complex challenges related to global environmental change and systematic urban planning and associated policies [27,28]. In Saudi Arabia, a desert country with a population of 34 million, there have been very few studies on the identification and assessment of POS [29–34]. Furthermore, to the best of our knowledge, few studies of POS have examined socio-cultural perspectives in detail or the contribution of POS to well-being.

Rapid urban expansion and a lack of awareness and appropriate management strategies have emerged as great challenges to the sustainable restoration of POS [27,35]. Particularly in the Saudi Arabian context, most studies have been performed on the type, quality, and design of POS in cities [28,32,34,36]. Thus, after a comprehensive review of the previous research, notable research gaps were found. First, most of the studies related to POS have been performed in Europe, Australia, and the USA [13,20,26]; very few studies have been conducted in the Saudi context. Second, in Saudi Arabia, most previous studies have been carried out on proposed planning related to POS and the role of government in enhancing the quality of POS [29,31,32]; these studies do not capture the importance of POSS as perceived by stakeholders. Third, the socio-demographic attributes (age, gender, educational level, social groups) of stakeholders largely determine the perceived importance of POSS, but no studies have carried out a socio-cultural evaluation of POSS in the Saudi context. Fourth, most of the studies in Saudi Arabia have been performed at a city scale [29,31,32,34,36], and very few have been carried out from a social perspective. Finally, previous research has shown that there is a strong nexus between POS and well-being but, in the Saudi context, no studies have been conducted to assess the impact of POSS on the well-being of stakeholders. Given these research gaps, this study set out to conduct out a socio evaluation of POSS on the KAU campus, Jeddah city in Saudi Arabia and the impact of POSS on well-being.

King Abdulaziz University (KAU) is a public university located in Jeddah city, Saudi Arabia. Jeddah is situated on the western coast of the RedSsea with an arid climate as per Koppen's climatic classification (BWh). During winter, the temperature ranges from 15 to 28 °C, and in summer, the temperature reaches 48 °C in the afternoon and 27 °C in the evening. A very small amount of rainfall occurs, usually during November and December. Thus, the climate is relatively uncomfortable due to very high temperatures and little rainfall, and it is necessary to focus on the effective restoration and management of POS, particularly green and blue POS, for the well-being of urban dwellers. In particular, in an educational institution, evaluation of the services provided by POS is crucial not only to enhance the educational value of the institution but also to improve the well-being of students, faculty members, academic staff, and visitors. POS (such as gardens, parks, corridors, plazas) not only enhance the beauty of the educational institution but also improve mental (through mental refreshment, leisure, and good social relation) and physical health (through walking and other physical activities). This study mainly deals with (i) the social evaluation of POSS as perceived by the stakeholders of the university and (ii) the impact of POSS on the well-being of the stakeholders in a coastal university i.e., KAU in Jeddah city. This study is a unique example from a micro-scale in the Saudi context. Thus, this study has immense potential to aid understanding of the contribution of POS provided by an educational institution and the impact of POS on the well-being of teaching and non-teaching stakeholders. To fulfill the objectives of the study, research questions have been addressed: (i) is there any impact of socio-demographic attributes on the perceived importance of POSS, (ii) is there any impact of POSS on the well-being of the stakeholders of the university; and (iii) are the stakeholders satisfied with the management of POSS?

2. Materials and Methods

2.1. Study Area

The study mainly focuses on a socio-cultural evaluation of POSS and their impact on well-being on a micro-scale at KAU located in Jeddah city, Saudi Arabia (Table 1).

Geographically, the university is located on the western coast of Saudi Arabia and has an area of 2222 acres (Figure 1).

Figure 1. Location map of the study area. (Source: produced by the authors).

Table 1. Study area profile (King Abdulaziz University).

Name of the University	King Abdulaziz University
Absolute location	Between 21°29′ N and 21°30′ N and 39°14′ E and 39°16′0″ E
Relative location	Eastern coast of the Red Sea
City	Jeddah
Establishment	1967
Total students	82,152
Total staff	14,657
Campus type	Male and female
Major buildings	Faculty buildings, university hospital, central library, administrative buildings, sports facilities, staff housing complex

2.2. Identification of the Functions of POS

Stakeholders assessed the importance of POS based on their functional value (educational, environmental, or recreational utility) and their health benefits and their association with the land use type (Figures 2 and 3). The POS in this study were identified based on the landscape (garden, plaza, and corridors) and use by stakeholders following a comprehensive review of previous literature. Informed by the landscape POS pattern, 14 services were selected for the eight major POS types (Table 2).

Table 2. Public open spaces services and their general descriptions.

SL No	Functions/Service of Public Open Spaces	Description
1	Spiritual values (SPv)	Many public historic and religious places (such as temples, mosques, and churches) have spiritual value.
2	Educational value (EDv)	As an institution, POS are very important. POS provide opportunities for study and group discussions.
3	Inspiration (Ins)	POS (such as gardens, parks, corridors) provide opportunities for inspiration related to work and study.
4	Cultural heritage values (CHv)	Many POS have their own cultural heritage and historical identity.
5	Walking (WLk)	POS (such as gardens and parks) are used for walking.
6	Recreational (REc)	POS used for recreation activities.
7	Mental refreshment (MRt)	Gardens and parks play a significant role in people's mental refreshment.
8	Leisure (LEr)	POS used for leisure activities.
9	Sense of place (SPc)	People are closely attached to many POS for their functional value.
10	Physical fitness (PFs)	Walking and other physical activities enhance physical fitness.
11	Social cohesion (SCn)	Gathering people in POS enhances social relationships and cohesion.
12	Public participation (PPn)	POS provide various opportunities for formal participation.
13	Living area (LAa)	Many POS are suitable for living for their environment.
14	Parking (PRk)	People use POS for cars, motorcycles, and cycle parking.

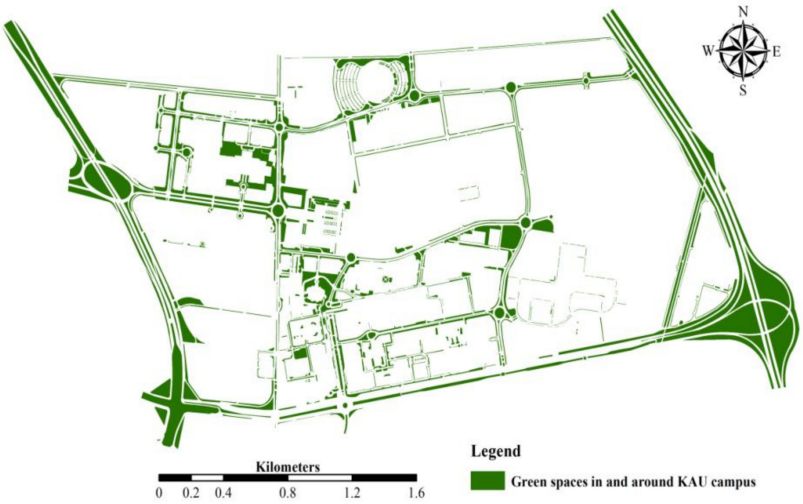

Figure 2. Green cover within and outside the campus.

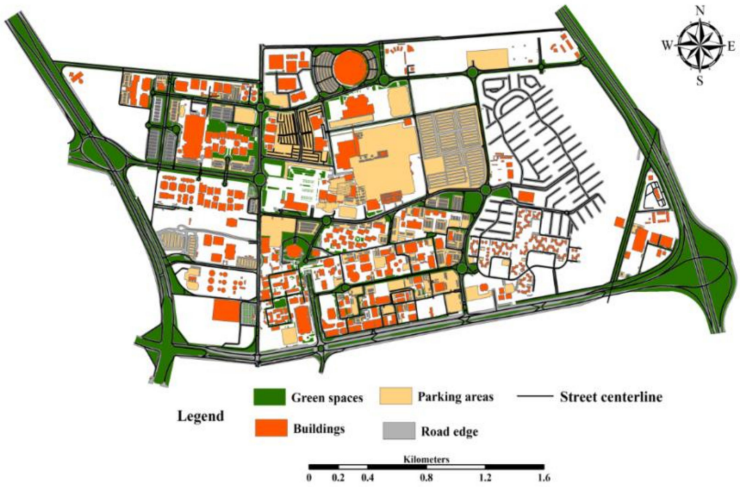

Figure 3. Major land use types of King Abdulaziz University (KAU) campus and public open spaces (POS).

2.3. Questionnaire Design and Collection of Data

The KAU campus was selected to examine stakeholders' perceptions of POS and well-being at a micro-scale. In recent years, POS have been severely affected by land use/land cover (LULC) changes, climate change, rapid urban expansion, and other anthropogenic effects [27,35]. In this study, POS and their services (functional importance of POS) were identified from previous literature [37,38]. The 14 POSS selected can be grouped into five main domains (cultural services, well-being services, mental health services, physical health services, and social cohesion services). A direct field survey method and an online questionnaire were used for the collection of data. The samples were collected for the eight POS, with 25 from each, giving a total of 200. The questionnaires were pre-tested and structured in the English language and then translated into Arabic for better understanding by stakeholders. The direct field survey interaction with the stakeholder took 20 to 25 min. For the assessment of the importance of POSS on the KAU campus, the respondents were chosen using a method proposed by [39]:

$$N = \frac{n}{1 + n(r)^2}$$

where N is the sample size, n is the number of respondents, and r is the confidence interval. The sample size has been estimated at a 0.5 level of significance. In line with this method, 200 samples were selected.

2.4. Evaluation of the Perceived Importance of POSS

The questionnaires were framed into three sections: (1) the socio-demographic profile of respondents (age, gender, educational qualification, period of residency, and stakeholder status); (2) the importance of POSS, i.e., a subjective perception by stakeholders measured using a Likert scale ranging from 1 (very low importance) to 5 (very high importance); and (3) assessment of well-being using a Likert scale ranging from 1 (highly disagree) to 5 (very highly agree). In addition, a 4-point Likert scale (1 = don't agree; 2 = fairly agree; 3 = agree and 4 = strongly agree) was used to examine the perception of the stakeholders of POS attributes and management. Stakeholders were asked to state whether they are satisfied with the management of POS within the university campus.

2.5. Statistical Analysis

A Kolmogorov–Smirnov (K-S) test was performed to check whether the data were normally distributed (tested at <0.10 level of significance); the data were found to be not normally distributed.

The average value of the perceived importance of POSS was calculated to find the relationship between the services provided by POS. Spearman rank correlation (*r*) was performed to examine the correlation between POSS. The correlations were considered statistically significant at 0.01 and 0.05.

Non-parametric tests i.e., a Mann–Whitney U-test (for bi-grouped variables; male and female in this study) and a Kruskal–Wallis test were conducted to examine differences in perceptions of POS. Statistically significant differences were tested at <0.05 level of significance.

Principal component analysis (PCA) was performed to identify the principal services. In previous studies, PCA has been used to identify dominant ecosystem services [40–42], health services [43–46], educational services [47], and tourism services [48]. However, no study has been performed to examine the dominant POSS.

3. Results

3.1. Characteristics of the Respondents and POS Preferences

Respondents were selected from different socio-demographic backgrounds through a field survey and online survey. In the field survey and online survey together, 51% of respondents were male and 49% were female. The largest proportion of respondents had a Ph.D. (49%), followed by a bachelor's degree (33%), master's degree (9%), high school (6.58%), and diploma (2.38%). To analyze the importance of services provided by POS, respondents were divided into six age groups: <24 (11.84%), 25–34 (44%), 35–44 (28.94%), 45–54 (22.36%), 55–60 (7.89%), and >60 (14.47%). The largest percentage of respondents was in the age group 35–44. Information was collected from respondents who benefit from the services provided by POS within the university campus. Thus, respondents were divided into four categories (students, faculty members, staff, and visitors). The largest percentage of respondents surveyed were faculty members (51%), followed by staff (21%), students (18%), and visitors (10%) (Figure 4).

The results show that more than 70% of respondents were aware of the services (benefits) provided by POS. Of these services, educational value (4.71) was ranked highest followed by sense of place (4.70), spiritual value (4.69), inspiration (4.65), social cohesion (4.61), leisure (4.52), and living area (4.50) (Figure 4).

As per the correlation in Table 3, there were relatively significant positive correlations between spiritual value and cultural value (r = 0.685), educational value and sense of place (r = 0.684), inspiration and social cohesion (r = 0.642), walking and physical fitness (r = 0.657), and mental refreshment and social cohesion (r = 0.733). On the other hand, relatively weak negative correlations were found between spiritual value and physical fitness (r = −0.212), social cohesion and spiritual value (r = −0.047), and cultural heritage and physical fitness (r = −0.078). The positive correlation between walking and physical fitness has been recorded because walking enhances stakeholders' physical fitness. Similarly, the negative correlation between spiritual value and physical fitness has been reported because people use spiritual spaces mostly for mental refreshment, not for physical activities. Thus, the overall results show that most of the POSS were positively correlated with each other.

Table 3. Correlation between services provided by POS.

POSS	Spiritual Values	Educational Value	Inspiration	Cultural Heritage Values	Walking	Recreational	Mental Refreshment	Leisure	Sense of Place	Physical Fitness	Social Cohesion	Public Participation	Living Area	Parking
Spiritual values	1	0.313												
Educational value	0.313	1												
Inspiration	0.289	0.393	1											
Cultural heritage values	0.685 **	0.011	0.201	1										
Walking	−0.375	0.420	0.053	−0.241	1									
Recreational	0.005	0.003	0.429	0.384	0.266	1								
Mental refreshment	0.039	0.479	0.521 *	−0.005	0.252	0.336	1							
Leisure	−0.133	0.364	0.506 *	−0.067	0.432	0.121	0.476	1						
Sense of place	0.261	0.684 **	0.338	0.371	0.489 *	0.098	0.445	0.653 **	1					
Physical fitness	−0.212	0.336	0.085	−0.078	0.657 **	0.306	0.438	0.221	0.391	1				
Social cohesion	−0.047	0.459	0.642 **	0.011	0.375	0.440	0.733 **	0.595 *	0.516 *	0.611 **	1			
Public participation	−0.002	0.504 *	0.533 *	0.106	0.560 *	0.399	0.734 **	0.464	0.551 *	0.737 **	0.724 **	1		
Living area	0.137	−0.058	0.154	0.522 *	0.214	0.406	0.092	0.049	0.183	0.426	0.248	0.445	1	
Parking	−0.125	−0.019	0.323	−0.101	0.555 *	0.389	0.152	0.312	0.091	0.463	0.397	0.418	0.286	1

** Correlation is significant at the 0.01 level (two-tailed). * Correlation is significant at the 0.05 level (two-tailed).

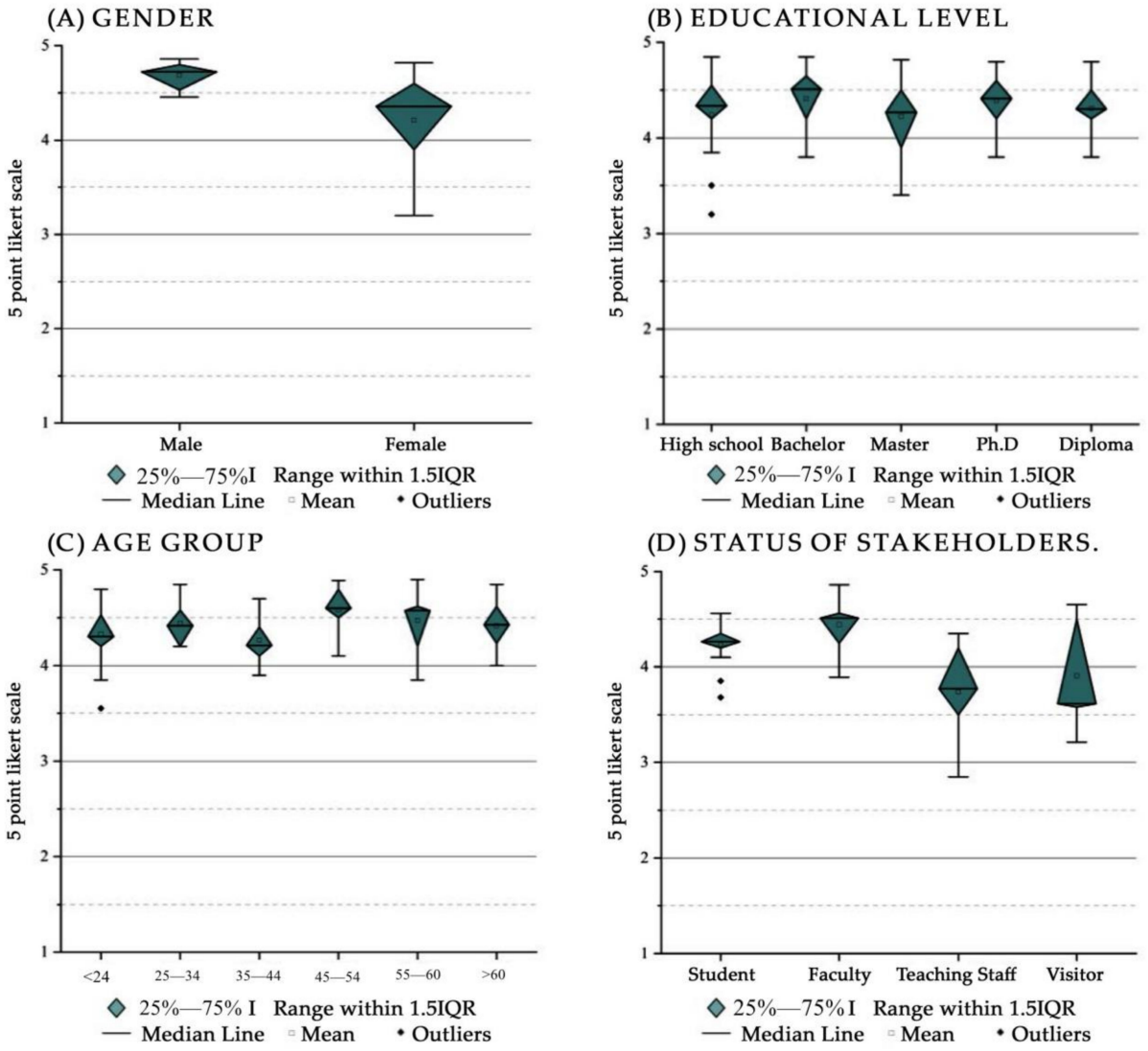

Figure 4. Box plots showing preferences for POS based on socio-demographic attributes; (**A**) Gender, (**B**) Educational level, (**C**) Age group and (**D**) Status of stakeholders.

3.2. Impact of Socio-Demographic Attributes on the Evaluation of POSS

It was found that there are substantial variations in the perceived importance of POSS based on social characteristics. The result shows that males (4.67) rated POSS more highly (perceived importance) than did females (4.07); this is likely because males spend more time in POS than females for walking, physical fitness, and leisure. There are also variations in preferences for POSS according to education level. Bachelor's students (4.35) rank POSS as most important, followed by Ph.D. students (4.30), diploma (4.25), high school (4.21), and master's (4.15). It was found that bachelor's students use POS most on the campus because of the educational value, recreational value, opportunities for mental refreshment, and scope of social cohesion. With the different age groups, the importance of POSS varied from 3.5 to 4.9. The highest-ranking was given by the age group 45–55 (4.51), followed by 55–60 (4.46), 25–34 (4.45), >60 (4.42), and <24 (4.35).

A Kruskal–Wallis test (K-W test) showed a statistically significant difference (at 0.10 level of significance) of the importance of POSS between different age groups ($p < 0.567$) and the status of respondents ($p < 0.007$ at 0.05 level of significance). In particular, significant statistical differences were recorded between the following age groups: 25–34 and

35–44, 35–44 and 45–54, 35–44 and 55–60, and 34–44 and >60, showing that POSS have different levels of importance to the different age groups. In addition, there were significant differences in the perceived importance of POSS between students, faculty members, staff, and visitors. The results show significant statistical differences in the perceived importance of POSS between students and staff ($p < 0.0032$), student and visitors ($p < 0.0491$), faculty members and visitors (0.0003), and visitors and staff ($p < 0.0307$) (Table 4).

Table 4. Bi-group comparisons (Mann–Whitney test) of socio-demographic attributes.

Groups	Variables	Significant Level Tested	*p*-Value	Significant (Yes/No)
Gender	Male and female	0.05	**0.0278**	**Yes ($p < 0.5$)**
Status of respondents	Students vs. faculty members		0.0718	No ($p < 0.5$)
	Students vs. staff		**0.0032**	**Yes ($p < 0.5$)**
	Students vs. visitors		**0.0491**	**Yes ($p < 0.5$)**
	Faculty members vs. staff		**0.0003**	**Yes ($p < 0.5$)**
	Faculty members vs. visitors		**0.0307**	**Yes ($p < 0.5$)**
	Visitor vs. staff		0.4650	No ($p < 0.5$)
Educational status	High school vs. bachelor's		0.4777	No ($p < 0.5$)
	High school vs. master's		0.5892	No ($p < 0.5$)
	High school vs. Ph.D		0.8593	No ($p < 0.5$)
	High school vs. diploma		0.9521	No ($p < 0.5$)
	Bachelor's vs. master's		0.2380	No ($p < 0.5$)
	Bachelor's vs. Ph.D		0.6170	No ($p < 0.5$)
	Bachelor's vs. diploma		0.3734	No ($p < 0.5$)
	Master's vs. Ph.D		0.4413	No ($p < 0.5$)
	Master's vs. diploma		0.6599	No ($p < 0.5$)
	Ph.D vs. diploma		0.6599	No ($p < 0.5$)
Age	<24 vs. 25–34		0.5485	No ($p < 0.5$)
	<24 vs. 35–44		0.1310	No ($p < 0.5$)
	<24 vs. 45–54		0.1260	No ($p < 0.5$)
	<24 vs. 55–60		0.4965	No ($p < 0.5$)
	<24 vs. >60		0.6455	No ($p < 0.5$)
	25–34 vs. 35–44		**0.0215**	**Yes ($p < 0.5$)**
	25–34 vs. 45–54		0.2891	No ($p < 0.5$)
	25–34 vs. 55–60		0.8650	No ($p < 0.5$)
	25–34 vs. >60		0.8807	No ($p < 0.5$)
	35–44 vs. 45–54		**0.0085**	**Yes ($p < 0.5$)**
	35–44 vs. 55–60		**0.0480**	**Yes ($p < 0.5$)**
	35–44 vs. >60		**0.0423**	**Yes ($p < 0.5$)**
	45–54 vs. 55–60		0.5892	No ($p < 0.5$)
	45–54 vs. >60		0.2301	No ($p < 0.5$)
	55–60 vs. >60		0.8181	No ($p < 0.5$)

3.3. Impact of POSS on Well-Being

POS play a crucial role in the improvement of well-being. The results show that POSS have a positive impact on the physical and mental well-being of stakeholders. More than 85% of respondents reported that the impact of POS on well-being ranged from little to extremely. Furthermore, about 90% of respondents reported that physical exercise helped them to maintain body weight (ranging from little to extremely). Similar results were recorded for hypertension, enhancement of activeness, and reduction of liver fat. More than 80% of respondents reported that POSS help to reduce mental stress and enhance energy levels. Around 70% of stakeholders reported that POSS are crucial to maintaining cholesterol and reducing blood sugar levels (Figure 5). Thus, stakeholders recognize that POSS play a significant role in enhancing the well-being of the stakeholders.

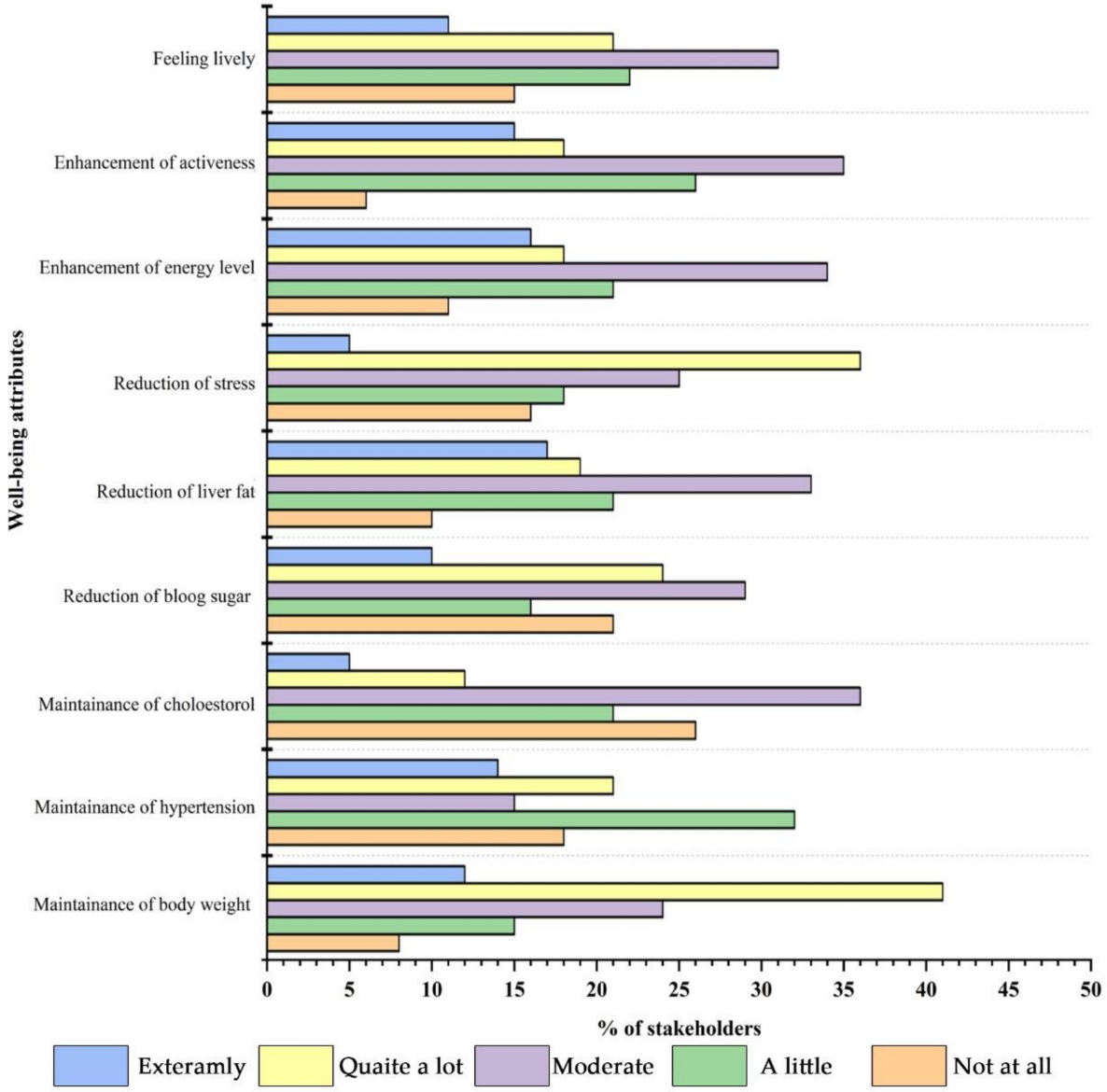

Figure 5. The well-being status of stakeholders (%) (based on a 5-point Likert scale).

3.4. Stakeholders Perception of POS Attributes and Management

As well as assessing POSS, this study examined perceptions of the attributes and management of POSS in KAU. The result showed that more than 90% of respondents strongly agreed (4) that seats in POS (particularly in plazas and the executive management plaza),

walkways, waste disposal systems, parking, and playgrounds are well managed, well maintained, and appropriate for their intended purpose. Equally, 80 to 90% of stakeholders agreed (3) that POS are neat and clean, green spaces (trees, parks, patches of vegetation) are well planned, accessibility of POS is good, and exercise equipment is well managed (Figure 5). From the result, it has been documented that gardens, playgrounds, exercise equipment, and green spaces need to be prioritized for better management of POS within the university campus (Figures 6 and 7).

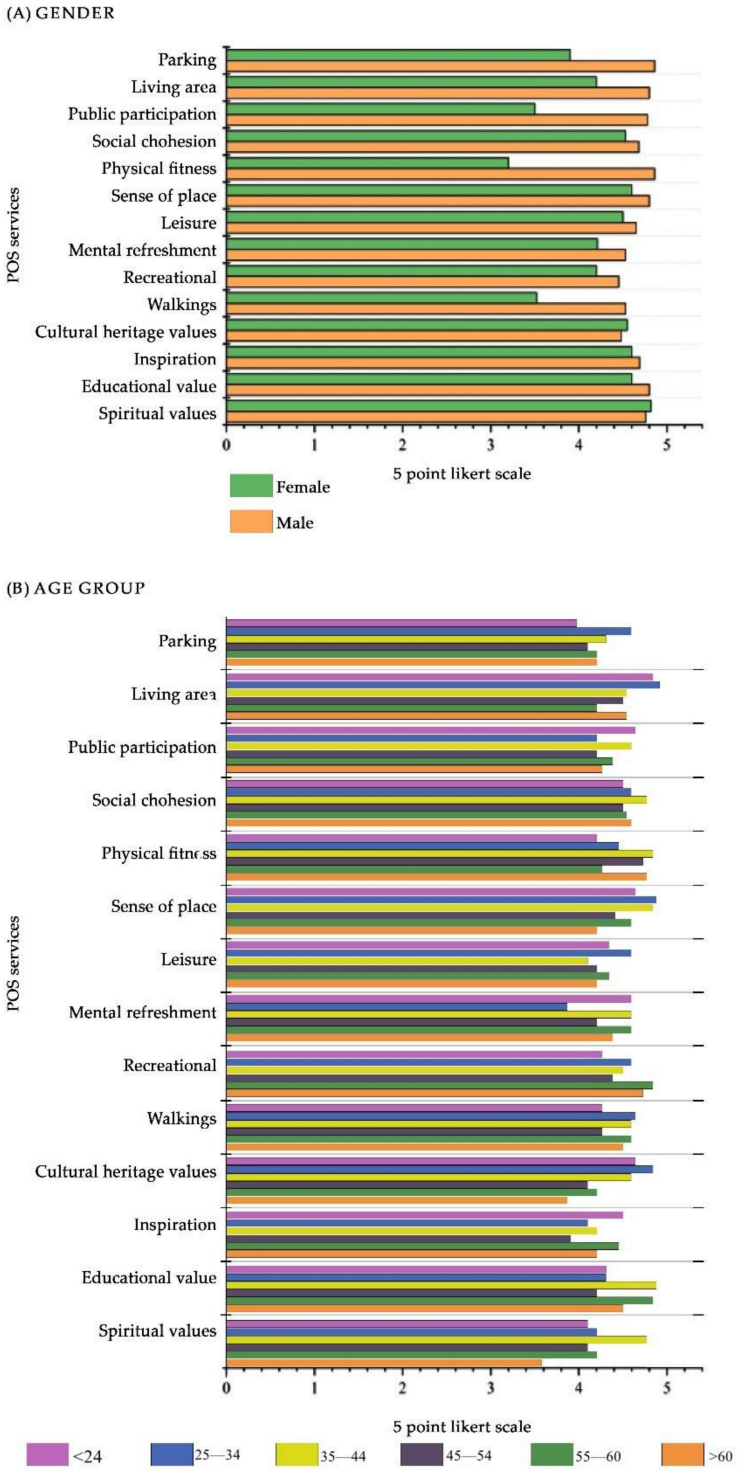

Figure 6. *Cont.*

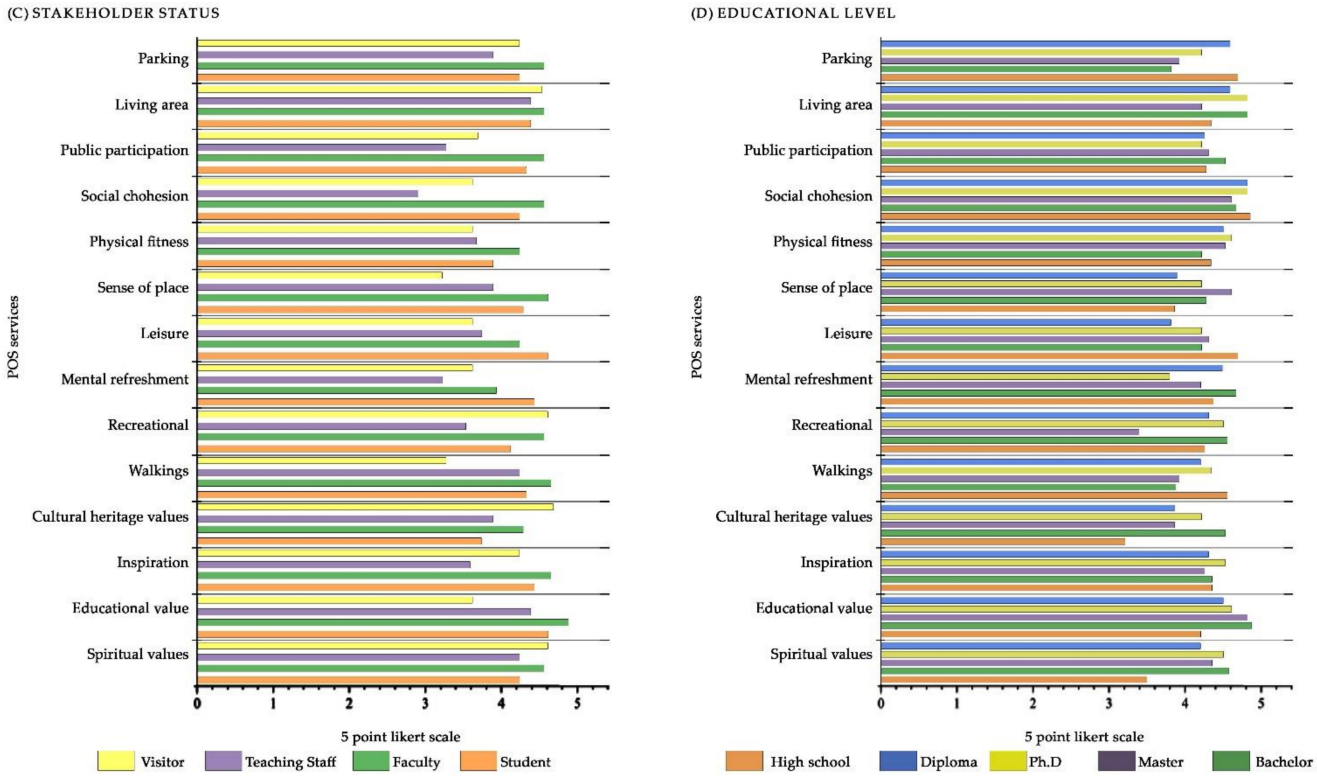

Figure 6. Variation of the importance of POSS based on social attributes; (**A**) Gender, (**B**) Age group, (**C**) Stakeholders Status and (**D**) Educational level.

Attributes	Statement			
	4	3	2	1
The POSs are well managed				
Seats in POSs are well managed				
No rubbish in streets				
Walkways are better for uses				
Waste disposal management is proper in POSs				
POSs are neat and clean				
The green spaces are properly planned				
Parking is suitable for uses				
Accessibilty is easy to POSs				
Plays grounds are properly managed				
Excercise equipments are properly maintained				
Gardens are suitalble for uses and well managed				
(Legend) Stakeholder's statement (%)	>90	80-90	70-80	<70
Where, 4 = strongly agree; 3 = agree; 2 = fairly agree and 1 = don't agree				

Figure 7. Stakeholder's perception (%) on the attributes of POS in KAU.

3.5. Factor Analysis and Segmentation of POSS

Explanatory factor analysis was performed to identify the principal services provided by POS on the KAU campus. Services with more than >0.50 loading are marked in bold font. Four principal components with an eigenvalue greater than from the result of factor analysis have been extracted (Figure 8). In the first principal component, there are seven services (about 46% of the total services), and most of the services are related to well-being (both physical and mental health), which clearly shows that POS on the KAU campus provide adequate health services to the stakeholders. The second principal component is explained by four POSS (inspiration, mental refreshment, leisure, and social cohesion) that align with the educational enrichment of stakeholders; for learning in any educational institute, there must be scope for mental refreshment and leisure and the opportunity for strong social cohesion. From these perspectives, effective focus must be given to these services provided by POS. There are two services under principal component three (F3), namely educational values and sense of place. These services are mainly related to educational aspects. Lastly, principal component four (F4) is explained by two services provided by POS: spiritual values and cultural heritage. Most of the services are related to the cultural value of POS on the university campus.

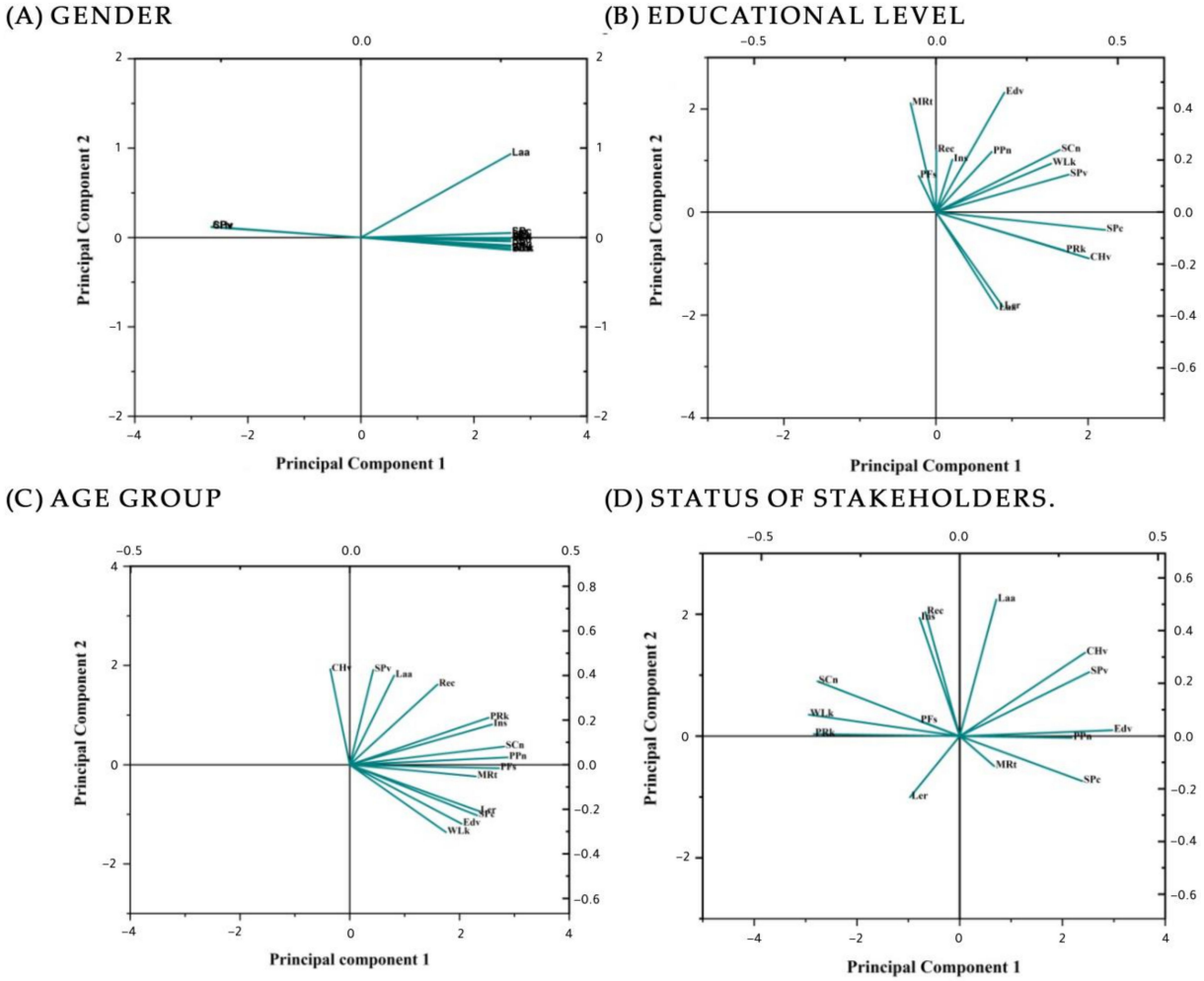

Figure 8. CA based Bi-plot showing socio-demographic attributes (principal components 1 and 2); (**A**) Gender, (**B**) Educational level, (**C**) Age group and (**D**) Status of stakeholders.

From the factor analysis in (Table 5), it can be seen that services provided by the KAU campus not only contribute to environmental, educational, and cultural factors but also play a crucial role in the health of stakeholders. Thus, it can be said that the services

provided by POS have a significant value due to their environmental, educational, cultural, and health value.

Table 5. Factor analysis for selected POSS.

POSS	Component			
	1	2	3	4
Spiritual values	−0.442	0.076	0.263	**0.765**
Educational value	−0.033	0.297	**0.858**	0.038
Cooling	−0.002	**0.882**	0.095	0.230
Cultural heritage values	−0.015	0.039	0.035	**0.950**
Walking	**0.735**	0.003	0.471	−0.257
Swimming	**0.790**	0.351	−0.006	−0.067
Recreational	**0.520**	0.466	−0.292	0.382
Mental refreshment	0.266	**0.733**	0.308	−0.058
Improvement of air quality	0.202	**0.587**	0.426	−0.191
Sense of place	0.198	0.271	**0.822**	0.243
Physical fitness	**0.805**	0.083	0.369	−0.026
Social cohesion	0.398	**0.736**	0.316	0.004
Public participation	**0.622**	0.509	0.416	0.128
Living area	**0.604**	−0.034	−0.042	0.625
Parking	**0.625**	0.260	−0.084	−0.045
Variance explained (%)	**39.390**	16.230	12.900	8.380
Total services	**7 (46.66%)**	4 (26.66%)	1 (6.66%)	2 (13.33%)

Extraction Method: Principal component analysis. Rotation Method: Varimax with Kaiser Normalization; a. Rotation converged in ten iterations.

4. Discussion

From the result of the study, it can be seen that the perceived importance of POSS is largely determined by the socio-demographic attributes of the stakeholders. Previous studies have shown that evaluation of POS (and urban green spaces) is influenced by socio-demographic factors such as age, gender, and educational level [49–51]. In the case of gender, males are highly dependent on POSS compared to females, as males spend more time in various POS.

Almost 90% of stakeholders were surveyed within the university campus, and nearly 80% of the stakeholders visit POS four to six times per week. People living near POS are more likely to use them. Physical activities and well-being were positively associated with living near POS. Most of the residents reported that POS were visited for light physical activities (such as walking or jogging). In many previous research studies, it was found that POSS play crucial roles in providing different physical activities [16,52,53]. About 90% of respondents reported that physical exercise helps to maintain body weight (ranging from little to extremely). Similar results have been recorded for hypertension, enhancement of activeness, and reduction of liver fat. More than 80% of respondents reported that POSS help maintain hypertension, reduce mental stress, and enhance energy levels. Around, 70% of stakeholders reported that POSS are crucial to maintaining cholesterol and reducing blood sugar. Recent studies report that POSS are very closely related to physical and mental health through restorative effects and to social cohesion [25,54–57]. Different services provided by POS not only encourage stakeholders' informal association but also create awareness about the services provided POS among the public. POSS make an immensely positive impact in terms of strong social cohesion, health benefits, and well-being [17,58]. The findings of this study are similar to previous research studies.

From the result of the study, it can be seen that more than 80% of stakeholders are satisfied (ranging from agree to strongly agree) with the management of POS attributes. However, many stakeholders reported that a more effective focuses needs to be given to the maintenance of gardens, green spaces, and exercise equipment, as well as accessibility to enhance the quality of POS. Maintenance and accessibility are crucial to enhancing the quality of POSS [59–61].

Previous studies have shown that restoration and management of POS in developing countries have generated a trade-off between the importance and performance of POSS (Table 6). For example, increases in the population have created threats to POSS due to high demand. In this study, it was observed that there were discrepancies between the performance and importance of POSS on the university campus. There was a lack of understanding of the importance of POSS and the well-being value of POSS. To the best of our knowledge, this is the first study dealing with the socio-cultural evaluation of POSS at a micro-scale.

Table 6. Previous literature and major findings on public spaces across the world.

Study Area	Author	Published Year	Objectives of the Study	Major Finding
Jeddah city (Saudi Arabia)	Addas and Rishbeth	2018	To examine the pattern of use, perceived benefits, and attachment related to POS.	Variations of POS use between social groups.
Riyadh, Dammam and Jeddah city (Saudi Arabia)	Addas and Maghrabi	2020	To measure availability and accessibility of POS across cities.	Discrepancies between desired level and actual availability of POS.
Jeddah city (Saudi Arabia)	Addas and Alserayhi	2020	To assess per-capita availability of POS.	Current status of POS fails to meet the international standard in the city.
Chittagong (Bangladesh)	Paul et al.	2020	To find the nexus between POS, green exercise, and well-being.	POS have an immense impact on physical as well as mental health.
Mandalay city (Mayanmar)	Wai et al.	2018	To understand the benefits of utilizing POS.	Utilization of POS was largely determined by the quality of POS.
Berlin (Germany)	Enssle and Kabisch	2020	To assess the role of urban green spaces for health, well-being, and social interaction for older people.	Older people were closely linked with good health and well-being.
Shanghai (China)	Shen et al.	2017	To measure inequalities in the accessibility to public green spaces (UGS).	Disparities in the accessibility to PGSs according to social and household status.
Shanghai (China)	Fan et al.	2016	To understand the accessibility to public urban green spaces (PUGS).	Spatial variations of accessibility to PUGS.

Figure 9 represents management strategies for POS, which can be managed from four perspectives, namely landscape development, open space provision, landscape maintenance, and quadruple bottom lines. For each perspective, there are many attributes through which POS can be managed. These broad perspectives can be implemented at a local scale for better restoration and management of POS. Therefore, planners and policymakers must focus on these perspectives to improve the functional value of POS within the university campus.

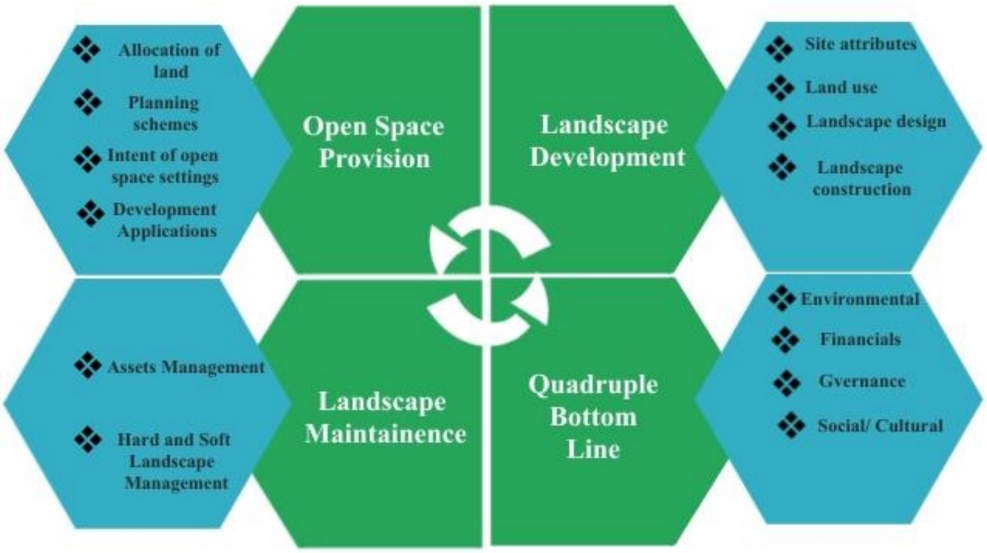

Figure 9. Conceptual framework regarding POS management, Adapted from [62].

Climate change has emerged as one of the most significant challenges to cities due to the deterioration as well as degradation of green and blue spaces. In this context, cities must have significant and effective strategies and laws to cope with climate change to enhance the quality of life of the city dwellers. Thus, urgent action is needed to restore and manage POS. In Saudi Arabia, effective guidelines and regulations related to green spaces and provision of POS have been implemented by the Ministry of Municipal and Rural Affairs (MoMRA). As per these guidelines, the integration of green spaces has been significantly prioritized in the decision-making framework. Apart from this, special focus has been given on the availability as well as the accessibility of POS in Saudi cities by the National Transformation Programme (NTP) in Vision 2030 [29,30]. The Saudi government is concerned with the provision of POS to make cities more livable and has invested huge sums to enhance the accessibility of POS [29,30,63]. At a local scale, municipalities must focus on the restoration and management of POS for urban environmental sustainability and improve the quality of life of city dwellers.

Limitations and Future Directions of the Research

This is the first study dealing with the assessment of the social valuation of POSS and their impact on the well-being of the university stakeholders. Thus, this study has immense scope to help understanding of the importance of POSS as perceived by university stakeholders and their impact on well-being at a micro level i.e., a university level. Despite this, the study has some limitations. First, the survey was performed when the entire world was passing through serious public health threat, i.e., COVID-19, and lockdown. Thus, limited samples were collected for the survey. Second, in Saudi Arabia, there is insufficient understanding of the impact of POSS on well-being. Thus, it may be difficult to delineate the impact of POSS on well-being. Third, few studies are available to support the findings of this study, as few have been performed on the social valuation of POS. Nonetheless, this study has a crucial role in highlighting the social value of POS as perceived by the stakeholders and the impact on well-being from at a micro-scale. Thus, there is scope to implement such studies at a large-scale i.e., a city-scale to improve understanding of the dependency of urban dwellers on POS and the well-being of the urban dwellers. Apart from this, future research must focus on the spatial distribution of POSS for a better understanding of the pattern of POSS at a city scale. In particular, future mapping of green and blue POS is crucial for enhancing the well-being of the urban dwellers and urban environmental sustainability.

5. Conclusions

This study mainly focuses on a socio-cultural evaluation of POSS at a micro-scale i.e., the campus of KAU. This study used a questionnaire survey and various statistical analyses for a socio-cultural evaluation of services provided by POS. From the result of the study, some notable findings emerge:

i. More than 70% of stakeholders were aware of the services provided by POS within the university campus.
ii. Among the services provided by POS, the highest preference was given to educational value (4.71) followed by sense of place (4.70), spiritual value (4.69), inspiration (4.65), social cohesion (4.61), leisure (4.52), and living area (4.50).
iii. The importance of POSS is largely determined by the socio-demographic attributes of the stakeholders (gender, age, educational level). It was found that males give more importance to POSS than females. Bachelor's students gave a relatively high value to POSS in comparison to Ph.D. students, diploma students, high school students, and master's students.
iv. There were significant differences in the perceived importance of POSS by gender, age, and social group, showing the significant impact of socio-demographic attributes on the perceived importance of POSS.

v. About 70 to 90% of the total stakeholders reported that POSS have a positive impact on well-being (ranging from little to extremely) such as maintenance of body weight, enhancement of activeness, maintenance of hypertension, reduction of mental stress, and enhancement of energy levels.
vi. It was observed that about 80 to 90% of stakeholders are satisfied (ranging from agree to strongly agree) with the management of POS within the university campus.
vii. The factor analysis showed that there were seven POSS (walking, recreational, physical fitness, public participation, living area) falling under principal component 1 (46% of the total POSS).

Thus, it was found that KAU campus stakeholders see POSS as being important to them, and their well-being is also closely linked with the services provided by POS. Although most of the stakeholders are satisfied with the management strategies, planners and policymakers must focus on further improving the management and restoration of POS. Previous studies have reported that people are not aware of the importance and contribution of POSS to their daily life or well-being. Thus, governments and local authorities must pay attention to POSS in decision-making.

This study was on a micro-scale, and the stakeholders are satisfied with the services provided by the KAU campus. However, moving to a large-scale study, such as city level, there are significant discrepancies in POSS provided and the desired level in the Saudi context. Thus, evaluation of the availability of POSS is not enough on its own, and an assessment of the importance of POSS from a socio-cultural perspective plays a significant role in understanding the importance of POSS from social perspectives. In fact, the ultimate goal of POSS is to satisfy the people's needs and adopt strategies on the basis of the expectation level of society.

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