

Insight to Planning and Design of Public Open Space: Assessing Graduate Students' Access to POS and Impacts on Wellbeing

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Abstract

In a rapidly globalizing world, urban areas like Seoul have become cultural and education melting pots, necessitating inclusive and vibrant public open spaces (POS) to foster multicultural integration and social cohesion. This study delves into the relationship between POS access and non-physical wellbeing, aiming to give insight on the planning and design of these essential spaces. Employing a cross-sectional design and quantitative approach including descriptive, ANOVA, and moderated regression analysis, the research used questionnaires distributed to graduate students in Seoul to capture a comprehensive snapshot of POS usage among a diverse educational community. The study's findings underscore the significance of perceived access to POS, rather than mere physical access, as a crucial determinant of non-physical wellbeing. The study calls for culturally-sensitive urban designs that value the unique perceptions of graduate students. It highlights the need for perceived, rather than just physical, access to POS, emphasizing its impact on wellbeing. For international students, proximity to amenities and transport is crucial, while local students desire activities and visibility. Additionally, it notes that the enclosed nature of Asian university campuses, including Korea's, may hinder connectivity with urban life, contrasting with the more open layouts in the West, suggesting a design approach that fosters inclusivity and integration.

Keywords: public open spaces, open campus design, perceived access, urban connectivity

Introduction

In the wake of globalization, urban areas like Seoul have become culturally diverse, necessitating inclusive and vibrant public open spaces (POS) that foster multicultural integration, social cohesion, and resilience (Van Winden, 2007; Li et al., 2013; Koohsari, 2011; Jung, 2023). Amidst this urban evolution, this study delves into the relationship between POS access and the non-physical wellbeing of Seoul's demographic, including both local and international graduate students. It aims to offer urban planners and policymakers insights to enhance POS planning, design, and regulations, addressing the demands on Seoul's infrastructure and contributing to a balanced urban life. This pioneering research seeks to fill the literature gap on POS dynamics, exploring how these spaces can be aesthetically pleasing, functional, inclusive, and conducive to wellbeing, thus adapting to the city's evolving identity as a major Asian educational hub and enriching the discourse on urban design and wellbeing amidst the complexity of modern urban life.

Literature Review

The evolution of urban landscapes and POS is an evidence to the dynamic nature of city development. Scholars like Liu & Liu (2013) have dissected the transformation of ancient cities like Xi'an, highlighting how urban construction reshapes not only the physical landscape but also the ecological and cultural milieu. This interaction is mirrored in the development of urban squares and streets, which are fundamental elements of POS. In examining the cultural gravity of green spaces, studies such as those by Bliankinshyein & Popkova (2021) focus on cities like Krasnoyarsk, where the historical significance of green public spaces is preserved even as they adapt to contemporary urban requirements. These spaces are pivotal for both active and passive recreation, contributing significantly to urban comfort and aesthetics.

The intersection of urban design, public health, and POS is a focal point of research, emphasizing how these spaces encourage physical activity and facilitate social interactions, as described by Koohsari et al. (2015). The evolution of POS, thus, mirrors changing lifestyles and values, and presents an opportunity for urban designers to foster sustainable urban habitats that resonate with modern attitudes towards nature and community living. Lastly, the role of POS in environmental redevelopment is highlighted by Marrone & Orsini (2018), who recognize these spaces as essential for urban resilience. POS acts as a platform for environmental adaptation and mitigation strategies, thereby playing a significant role in counteracting urban deterioration.

Importance of POS in Communities Wellbeing

The significance of POS in community wellbeing is increasingly recognized in scholarly research. The connection between POS quality and mental health is particularly notable. Zhu, Wang, & Qin (2021) have demonstrated that POS with high-quality amenities, environmental conditions, and safety can significantly contribute to mental restoration and reducing stress. Complementing these findings, Gilchrist, Brown, & Montarzino (2015) have shown that greenspaces within workplace environments, especially in the peripheries of urban centers, are positively correlated with enhanced employee wellbeing. These greenspaces not only offer aesthetic value but also serve as vital resources for physical and emotional rejuvenation.

Further, Pearce & Maddison (2011) argue that high-quality POS can be instrumental in addressing health inequalities by promoting physical activity, particularly in underprivileged communities. The design and accessibility of these spaces are essential for fostering community wellbeing and social cohesion. In tandem, Francis et al. (2012) highlight the role of well-conceived public spaces, including POS, in nurturing a strong sense of community, crucial for social wellbeing. The physical attributes of POS, such as infrastructure and landscape quality, are found to correlate with increased physical activity among residents, thereby contributing to public health (Wang et al., 2019). This is particularly impactful for demographic groups like women and the elderly. Lastly, the work of Vaništa Lazarević, Lazarević, & Maric (2020) emphasizes the restorative effects of multi-sensory open space designs, such as those in Japanese gardens, which promote mental wellbeing through a harmonious stimulation of the senses.

Identification of Gaps in the Literature

Within the research on POS, there's a significant gap in differentiating between actual visits and the subjective perception of accessibility to these spaces, crucial for defining 'effective' access. Measuring actual visits is straightforward, but perceived access involves potential and subjective experiences, often overlooked in metrics. This lack of detailed study on perceived access, its impact on user experiences, and its role in non-physical wellbeing becomes more pronounced considering the varied lifestyles and cultures in urban areas. Thus, there's a pressing need for in-depth research dissecting both aspects to furnish urban planners with a comprehensive understanding of POS, integrating both tangible and perceived aspects of POS.

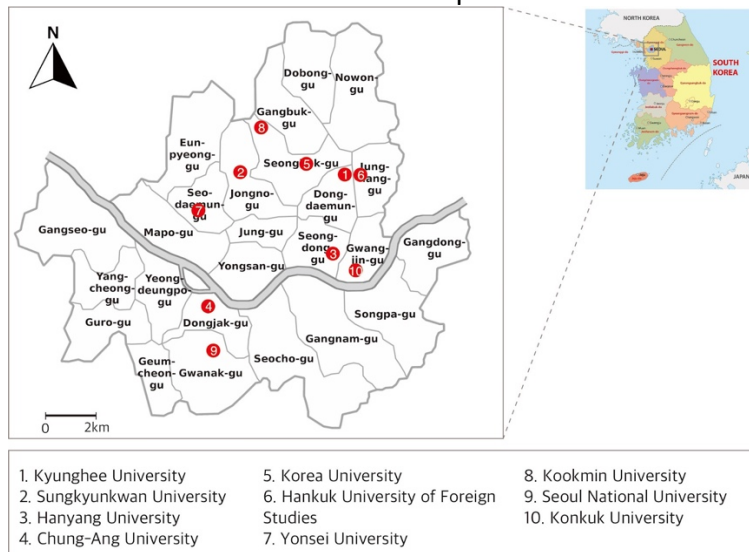
Furthermore, the literature often neglects the detailed experiences of certain demographics like graduate and international students in their use of POS, despite these groups facing unique challenges. The interactions of these students with POS, particularly against the backdrop of the growing internationalization of academic institutions and the ensuing diversity in student bodies, are insufficiently studied. This research seeks to address this gap by examining how POS impacts these students, both on campus and in the broader urban setting. The intention is to enhance urban planning and POS design with insights that respect the rich cultural, geographical, and academic diversity of the student population, aiming to improve the contribution of POS to their overall wellbeing.

Method

The study utilized a cross-sectional design and quantitative approach to examine POS usage by Seoul's graduate students, aiming for data that is both objective and generalizable. The choice of variables, such as demographic details and frequency of POS visits, supports the goal of enhancing POS design to meet the diverse wellbeing needs of students, grounded in the analysis of statistical relationships between variables (Bostic et al., 2009).

Sample and Site Location

Figure 1. Ten locations of the universities where the questionnaire was distributed.



The study in Seoul engaged a total of 300 graduate students, divided equally between international and local attendees. Utilizing the Cochran formula, a sample of 150 international students was derived and the number of local students followed, making a total of 300 respondents. Questionnaires were disseminated via student associations across ten universities as shown in Figure 1, and data was strategically collected at the start of the Spring semester to capture the peak of on-campus POS use. In November 2022, a pilot test involving 20 respondents led to revisions of the questionnaire for greater clarity on POS and non-physical wellbeing, incorporating specific examples from campus and city settings. Local students participated through direct engagement at their universities, where they were provided with physical copies of the questionnaire. This bifurcated approach allowed for a nuanced comparison of the two demographics, offering a broad perspective on their interactions with POS and the subsequent impact on their wellbeing.

Descriptive Statistics

Descriptive statistics offer a primary analysis, helping in understanding data distribution and central tendencies. The methodological approach for analyzing demographic data utilizes frequency tables, a statistical tool apt for organizing and summarizing data categories. This approach presents a clear snapshot of the sample's demographic landscape. For constructs composed of several indicators, such as "Perceived Image of POS," "Perceived Access to POS," and "Perceived Non-physical Wellbeing," psychometric scales are the chosen descriptive tool. This visualization is instrumental as it fosters quick and intuitive comprehension of the data spread, showcasing the diversity and attributes of the participants in a clear manner (Mukami, 2023).

Psychometric scales are advantageous as they aggregate complex and multiple dimensions of subjective perceptions into a coherent index, facilitating a more accurate and comprehensive depiction of these multi-faceted constructs. They offer a robust method for quantifying subjective phenomena, thus ensuring the validity and reliability of the data analysis. To elucidate the relationship between perceived and actual access to POS with non-physical wellbeing, partial regression plots are employed. This analytical technique is ideal for visualizing the relationships between variables, particularly when controlling for the effect of additional covariates. By isolating the unique effects of perceived and actual access, these plots provide a clear visual representation of the direct associations with non-physical wellbeing.

Inferential Statistics

Inferential statistics were employed to scrutinize the relationships and potential causal connections outlined in the hypotheses. Hypothesis H1 posits that the frequency of visits and perceived access to both on-campus and city POS are positively and significantly associated with non-physical wellbeing. Hypothesis H2 proposes that the perception of the image and awareness of the benefits of POS moderate the relationship between the frequency of visits and perceived access to POS and non-physical wellbeing. Moderated regression was used to assess H1 and H2, examining the interaction effects between variables, with significance levels set at a p-value less than 0.05, borderline between 0.05 - 0.09, and insignificant above 0.09, suggesting that larger samples might yield significance (Dahiru, 2008). Testing was conducted separately for international and local students to consider cultural and environmental

differences. Reliability and validity were established through Pearson correlation and Cronbach's alpha, ensuring the robustness of the scales used. Significance levels were set at a p-value less than 0.05, with borderline significance considered between 0.05 - 0.09, and insignificance above 0.09. Python's statistical capabilities facilitated these analyses.

Results

Descriptive Statistics

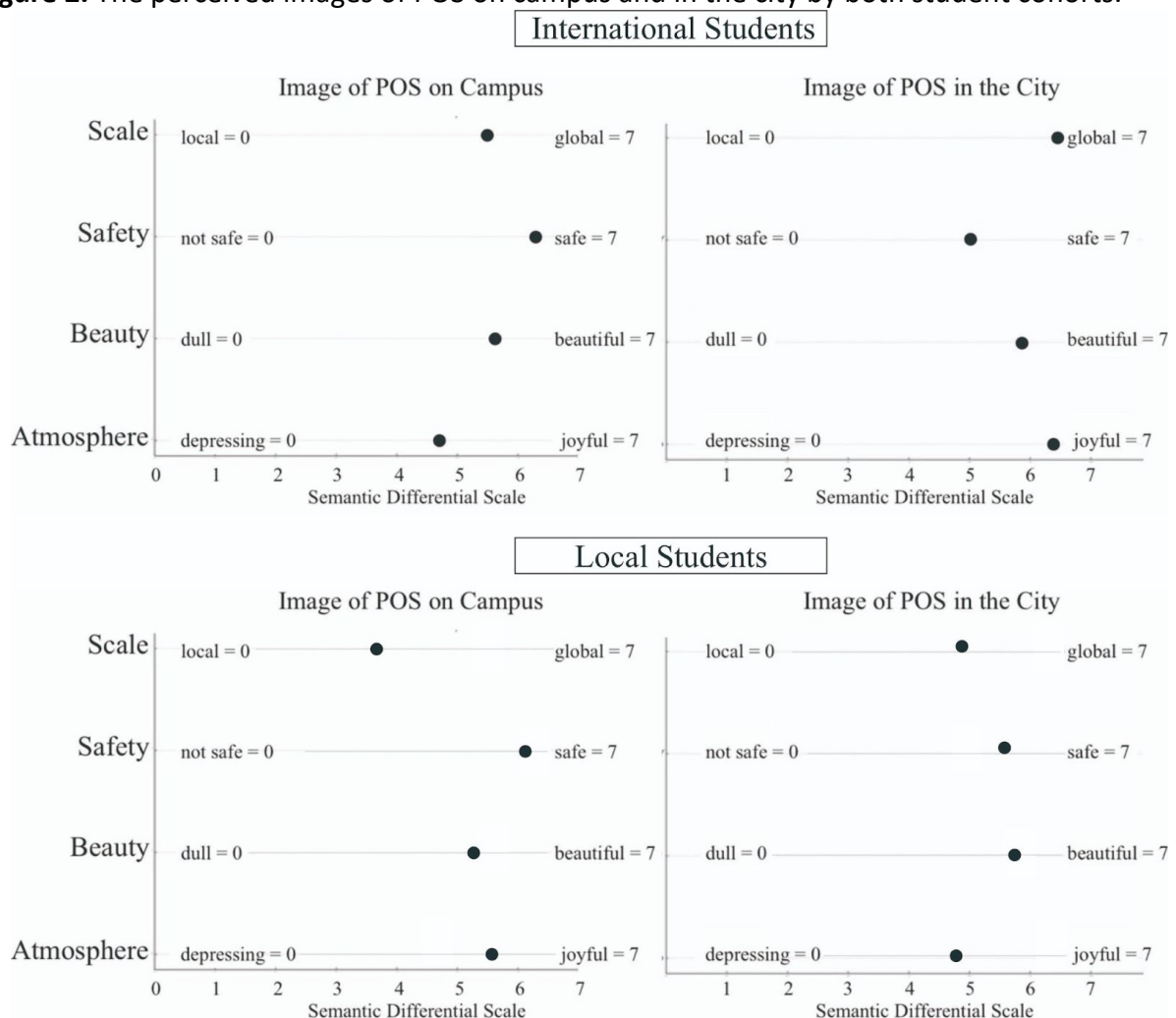
The demographic data provides a comprehensive understanding of the diverse makeup of the graduate students in Seoul. As seen in Table 1, the majority of the international students is female (57.3%), with males representing the remaining 42.7%. Students from Indonesia form the largest national group at 29.3%, followed by those from Other (Asian countries) at 24%, USA at 17.3%, and other European countries at 13.3%. The majority are enrolled in Master's programs across various fields, with all students in the field of Medicine pursuing a PhD. The survey of local Korean graduate students shows a balanced gender distribution across various academic disciplines, predominantly in Engineering, Natural Sciences, and Social Sciences. The representation of students from diverse institutions and the higher number of Master's students (62.84%) compared to PhD candidates (25.7%) allows for an examination of differing academic experiences. Most local students live without roommates (55.3%), indicating a preference for living independently, close to their universities, a choice that likely impacts their daily routines and personal development.

Table 1. Demographic data of the respondents.

Variable	Value	Quantity (International Students)	Quantity (Local Students)
Gender	Male	64	68
	Female	86	84
Nationality	Indonesia	44	N/A
	USA	26	
	Other (Asian countries)	36	
	Other (European countries)	20	
	Other (African countries)	13	
	Other (North and South American countries)	11	
Field of Study	Social and Humanities	56	7
	Science and Engineering	50	99
	GSIS	44	44
Degree Level	Master	79	93
	PhD	52	38
	Integrated Master/PhD	19	9
Length of Stay in Korea	6 months to 1 year	17	N/A
	1 year to 3 years	75	
	more than 3 years	58	

The semantic differential scale employed shown in Figure 2 illustrates varying perceptions between international and local graduate students regarding the image of POS in Seoul. International students reported high satisfaction with city POS, particularly noting their safety, beauty, and joyful atmosphere. In comparison, their perception of campus POS suggested a slight decrease in these positive attributes. It's interesting to observe that attributes for POS on campus and in the city often score in contrasting patterns, such as the attribute of safety which is rated lower on campus but higher in city POS. Local students, conversely, rated both campus and city POS favorably, with city POS receiving notably higher scores for safety and aesthetic appeal. These divergent views highlight the different experiences and interactions that international and local students have with urban open spaces within their campus and the city.

Figure 2. The perceived images of POS on campus and in the city by both student cohorts.



The data from the perceived access and its indicators indicates a dichotomy in perceived access to POS between international and local students, with international students experiencing lower access and visibility on campus, but higher engagement in activities and

availability of visiting time in city spaces. Still from Figure 3, local students report a more uniform perception of access across campus and city POS, with proximity being a distinct factor in the city. These findings may suggest that international students encounter barriers to campus facilities, while finding city environments more conducive to engagement, potentially due to the broader accessibility of public amenities. Conversely, local students' consistent perceptions could reflect a more integrated experience with the urban fabric of Seoul, influenced by their familiarity and proximity to these spaces.

Figure 4 offers a deeper insight into the social and mental wellbeing of graduate students, distinguishing between international and local cohorts in Seoul. International students report moderate levels of community support, suggesting potential barriers to fully integrating socially, possibly due to cultural and linguistic differences. Relationships with friends and colleagues are less satisfactory, highlighting a critical area for support systems to target. In terms of mental wellbeing, there's evidence of resilience among these students, as they exhibit a capacity to manage emotional stress and maintain control over their life circumstances. Local students indicate a stronger social network and slightly better mental wellbeing, which could reflect the benefits of a familiar cultural environment. This data prompts a critical reflection on the support structures and resources available to international students to enhance their social integration and mental health.

Figure 3. The perceived access of POS on campus and in the city by both student cohorts.

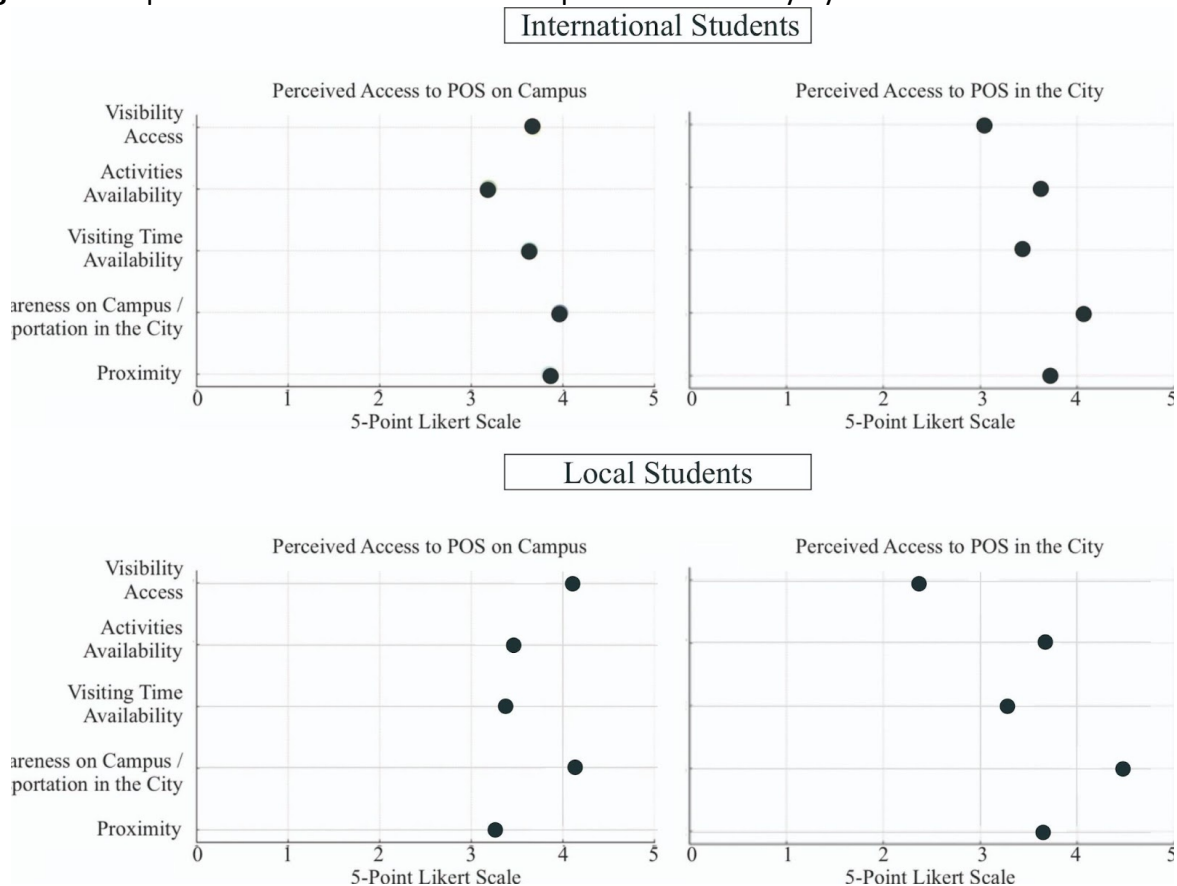
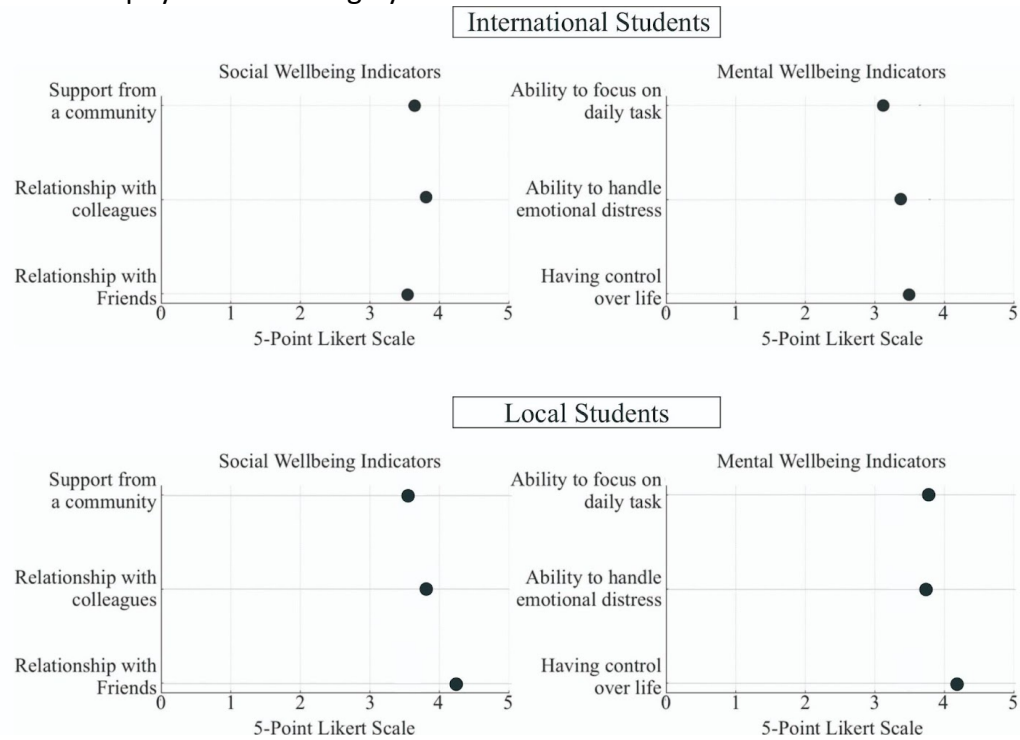


Figure 4. The non-physical wellbeing by both student cohorts.

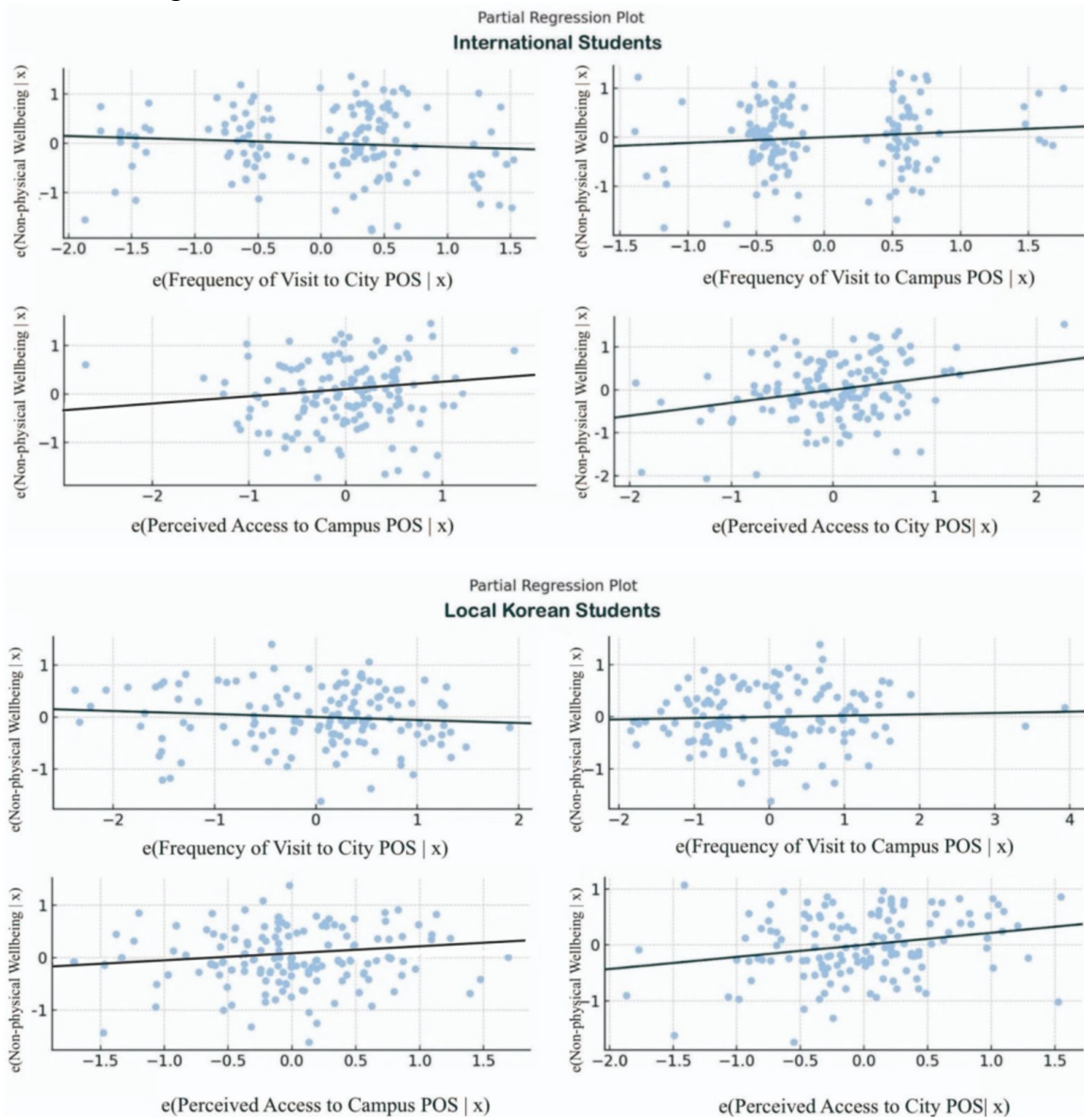
The regression plots in Figure 5 reveal that perceived access to POS is a more significant predictor of non-physical wellbeing than the actual frequency of visits, a trend more accentuated in international students. This insight is pivotal for urban planners and policymakers, highlighting the need for strategies that enhance not only the physical infrastructure but also the perceived quality and accessibility of POS. The findings suggest that international students' wellbeing could be disproportionately influenced by their perceptions of POS, pointing towards the potential benefits of targeted interventions to improve these perceptions. For local Korean students, with their responses indicating a more even distribution, the relationship between access to POS and wellbeing appears to be less pronounced. This nuanced understanding of different experiences emphasizes the value of customized approaches to urban design that address the diverse needs of student populations.

Inferential Analysis

The analysis, as indicated in Table 3, highlights intriguing aspects of the relationship between perceived access to POS and the non-physical wellbeing of students, with a notable distinction between international and local cohorts. Particularly, PA to POS, both on-campus and within the city, demonstrates a more pronounced influence on non-physical wellbeing compared to the actual frequency of visits. This is evident from the significant coefficients for PA on campus and in the city for both student groups, underscoring the psychological impact of merely perceiving these spaces as accessible. However, this positive correlation is nuanced by the perceived image of POS and awareness of its benefits. The interaction terms reveal that the positive impact of perceived access on non-physical wellbeing is moderated differently for local and international students. For city POS, the perceived image of POS diminishes the positive

impact of perceived access for international students (Coefficient = 0.255, P-value = 0.032), indicating a complex interplay between perception and actual access. Similarly, the awareness of POS benefits tempers this positive influence for local students (Coefficient = 0.164, P-value = 0.028), suggesting a differential cognitive processing of POS benefits based on cultural or experiential background.

Figure 5. The partial regression plots showing the relationship between access to POS and non-physical wellbeing .



Expanding further on the intricate dynamics revealed in the analysis of campus POS, it's apparent that the subjective valuation of these spaces plays a pivotal role in shaping students' wellbeing. The perceived image of campus POS not only moderates the relationship between perceived access and non-physical wellbeing but also introduces a layer of complexity in

understanding how students interact with their immediate environment. For local students, the negative coefficient (Coefficient = -0.205, P-value = 0.041) suggests that even when campus POS are accessible, the perceived image might overshadow the actual benefits, possibly due to familiarity or misaligned expectations. In contrast, for international students, the borderline significance (Coefficient = 0.172, P-value = 0.059) indicates a tentative yet notable interaction between perceived access and perceived image. This implies that international students' wellbeing might be more sensitive to how they perceive and interpret the quality and essence of campus POS, potentially influenced by cultural differences or adaptive processes in a new environment. This nuanced understanding emphasizes the need for a more tailored approach in designing and promoting POS, one that recognizes and addresses the diverse perceptual and cultural dimensions experienced by different student populations.

Table 3. Regression results assessing Hypotheses H1 and H2.

Variable/Interaction	International Students				Local Students			
	R-squared	F-statistic	Coefficient	P-value	R-squared	F-statistic	Coefficient	P-value
FV on Campus	0.294	3.70	-0.269	0.635	0.161	3.831	-0.039	0.434
FV in the City			0.686	0.302			0.005	0.812
PA on Campus			2.183	0.001			0.192	0.012
PA in the City			1.810	0.019			1.810	0.019
Interaction 1: FV on Campus & Awareness Benefits			-0.025	0.8073			0.027	0.650
Interaction 2: FV in the City & Awareness Benefits			0.097	0.521			-0.033	0.643
Interaction 3: PA on Campus & Awareness Benefits			0.269	0.078			-0.096	0.261
Interaction 4: PA in the City & Awareness Benefits			0.151	0.231			0.164	0.028
Interaction 5: FV in the City & Image in the City			-0.180	0.117			0.025	0.712
Interaction 6: PA in the City & Image in the City			0.255	0.032			0.829	0.319
Interaction 7: FV on Campus & Image on Campus			0.062	0.522			0.061	0.344
Interaction 8: PA on Campus & Image on Campus			0.172	0.059			-0.205	0.041

FV: Frequency of Visit, PA: Perceived Access

Discussion

In light of the study's findings, it becomes imperative to scrutinize the role of urban design in the context of POS and their nuanced implications for the non-physical wellbeing of student populations. The research vividly demonstrates that perceived access and the subjective image of POS significantly influence students' psychological comfort, a factor that urban designers and planners cannot afford to overlook. For international students, the perceived image of POS within the city uniquely moderates the positive effect of perceived access on wellbeing, underscoring the complex interplay between environmental perception and cultural background, as well as the need for a sense of belonging in a new city. Conversely, local students value the global scale of POS on campus, suggesting a preference for spaces that provide a sense of connection to the broader world. The findings align with the work of Vaništa Lazarević et al. (2020), which underscores the mental health benefits of multi-sensory open spaces. Yet, this study nuances this understanding by differentiating the needs of international and local students, suggesting that the multi-sensory design should be complemented by considerations of safety, beauty, and atmosphere tailored to the cultural contexts of these diverse student groups.

Moreover, the study reveals that the awareness of POS benefits notably moderates the relationship between perceived access and non-physical wellbeing among local students. This insight is pivotal, suggesting that urban design initiatives should not only focus on enhancing physical access to POS but also on educational endeavors to raise awareness about the benefits of such spaces. For campus POS, the perceived image significantly moderates the impact of perceived access for local students and presents a borderline significance for international students. This observation calls for a critical examination of the design and promotional strategies of campus POS. It emphasizes the need for spaces that are not just physically accessible but are also perceived as quality spaces, fostering a sense of belonging and mental wellbeing among students.

The study also revealed that perceived access to POS outweighs the actual frequency of visits in influencing non-physical wellbeing, underscoring the crucial role of POS in urban planning, particularly for campuses. This research extends the dialogue on urban space transformation and its qualitative impact on community wellbeing by positioning perceived access as a key determinant of wellbeing among graduate students. It highlights the necessity of POS integration within walking distance and the importance of public transit accessibility for international students. Local students' emphasis on diverse activities and flexible visiting hours suggests POS should cater to varied recreational needs and schedules. Additionally, the study prompts a reconsideration of the closed/gated campus designs prevalent in Asia, including Korea. Such designs, while offering exclusivity, may inadvertently foster a sense of disconnect from the urban fabric, contrasting with the open, integrated campuses more common in the West. This insight calls for a design approach that not only makes POS physically accessible but also promotes a sense of openness and integration, enhancing the feeling of belonging and mental wellbeing among all students, especially those navigating campus geography for the first time.

Conclusion

This research unfolds the vital significance of POS in the broader canvas of urban design, particularly spotlighting their impact on the non-physical wellbeing of graduate students in Seoul. Unearthing a pivotal insight, the study positions perceived access to these spaces as a salient indicator of wellbeing, surpassing the frequency of actual visits. This paradigm shift steers the focus towards a comprehensive urban planning strategy that interweaves physical design with the intricate perceptions and diverse cultural backdrops of the student populace, advocating for an urban landscape that champions personalized, culturally-attuned designs to bolster student wellbeing. While studies like Pearce & Maddison (2011), who argue for the importance of high-quality POS in promoting physical activity and, by extension, wellbeing, this study goes a step further by suggesting that the subjective perception of access plays a potentially more critical role than the physical attributes of these spaces. Moreover, the reconsideration of closed/gated campus designs prevalent in Asia, including Korea, emerges as essential, hinting at how more open, integrated spaces could better serve the emotional and psychological needs of students, aligning with the findings on perceived access and wellbeing.

The study's insights illuminate the imperative for personalized, culturally-sensitive urban designs that appreciate the diversity of student experiences and perceptions. By integrating these considerations, urban spaces can evolve to support a more profound sense of wellbeing, fostering spaces that are not just physically accessible, but also psychologically supportive and culturally congruent. This shift in focus marks a significant departure from traditional urban planning paradigms, emphasizing the importance of mental and emotional health considerations in the creation and maintenance of urban POS. Through this lens, the research contributes to a more holistic understanding of urban space utility, suggesting that the future of urban design lies in its ability to craft spaces that support the intricate tapestry of human needs and experiences.

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