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Review

A Bibliometric Review of Research on the Perceptions of Campus Public Spaces

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Abstract: With the rapid development of information and sensory technology, the construction mode of universities and the planning of campus public spaces are confronting great challenges and opportunities. It also brings about new perspectives for reconsidering the relationship between users' perceptions and the campus environment. This paper reviews the research on the perception of university public spaces over the past 20 years and summarizes the research hotspots by using co-citation analysis, co-occurrence analysis, and burst detection analysis through CiteSpace software. The results demonstrate that the overall development of this field experienced three stages: the initial development stage (2000–2007), the rapid growth stage (2008–2017), and the stable development stage (2018–2021). In terms of research content, hotspot studies are emphasized from the perspectives of thermal perceptions, health impact perception, spatial configuration perception, and user activity perception of on-campus space. In addition, this literature review concluded the emerging research tendencies and new quantification methods in recent years, proposing an enormous potential for quantifying campus space research based on new perceptual technologies. It also encourages the research and optimal design of campus spaces for a more student-oriented campus environment based on the study of the student's perception of the spaces.

Keywords: literature review; campus public space; perceptions; CiteSpace; new perceptual technologies; student-oriented campus environment

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1. Introduction

In the past, research on the university campus underwent centuries of development in developed countries, forming a series of systematic theories and practices in campus studies [1]. Originally, the preliminary campus research mainly concentrated on the overall university campus design from the morphological and typological perspectives [2]. Some scholars proposed to rethink the university campus planning through utilizing urban planning theories and methodologies [3]. Other scholars suggested that higher education institutions are supposed to accommodate the community life and promote urban development [4]. These studies provided the theoretical framework and design strategies that guided campus and building planning and design, as well as influenced the developing of campus forms for centuries.

However, campus construction in developing countries experienced accelerated growth over the past decades and gradually entered a phase of steady development. The number of newly built campuses is gradually declining and the construction mode of campuses shifted from "speed first" to "quality first" [5,6]. Therefore, the optimization and upgrading of the existing campus environment became a new trend. Furthermore, the innovation of technologies and human sensors makes it possible to better acknowledge people's feelings and emotions in an urban environment [7]. These technologies are widely used to quantify people's subjective feelings, such as "urban emotions" for urban streets [8], students' responses to renovated classrooms [9], and students' preferences

for informal learning spaces [10]. It also enables investigation of the space perceptions from multisensory social and physical perspectives [11]. Data from mobile devices are widely utilized to mapping the real time spatial–temporal movement of pedestrians [12]. Thus, new construction modes and new opportunities brought by technological upgrades promoted the study of campus public spaces.

Campus public space is one of the most important space types on campuses and plays a significant role in establishing an active campus environment [13]. Generally, the public space in universities is mainly adopted as an interactive place, which enables learning [14], sharing, and social interaction, as well as leisure activities. Some researchers emphasized the spatial setting and space design of campus space and believe that they are determined to accelerate the interactions and active connections in public space [15]. Some study highlights the influence of the campus environment on user behavior, which impacts students' feelings about space quality and assessment of the campus environment [16]. Currently, the papers are dominatingly concerned about the spatial settings [17] and physical settings [18] in the campus environment when investigating the perceptions of public space. On the other hand, the perceptual technology applied in the urban environment brought new changes to the measurement of perception in campus public space. There arises a series of explorations for the mechanism and relationship among users' perceptions, behaviors, and the campus environment through multimodal sensory techniques [19]. Originally, self-measured questionnaires and on-site observations are initially used to account for the amount and composition of physical activities in universities' public spaces [20]. Otherwise, the combination of perceptual analysis and spatial analysis methods allows for more targeted research on how spatial configurations affect human senses [21]. When subjective surveys integrate with microclimatic measurements, it enables dealing with the perceived thermal comfort issues in public spaces [22]. Compared to these measurement methods, multimodal technologies are more precise for collecting and analyzing physiological data, which indirectly reflects people's subjective feelings [23].

Therefore, previous studies mostly originated from a single perspective study, which normally explores the campus physical environment and investigates the corresponding design principles, design theories and design guidelines, but lacks attention to the students' experiences and feelings in the space. The current research themes and perspectives on campus perceptions seem to be diversified, but do not provide a systematic summary of the research status and trends. Although some explorations attempt to improve the design of student-oriented public space through perceptual experiments, the correlation between campus space characteristics and student perception is not thoroughly discussed. It is necessary to focus on research deficiencies and research questions through a review of existing campus perceptions to provide a foundation for future research and optimal design of campus space.

Therefore, this paper systematically reviews the recent 20 years of literature on campus space perceptions and is systematically organized into four parts. Section 2 shows the methodology of article collection and analysis and displays the descriptive explanation for the methodology. Section 3 points out research trends and hot research themes. Then, it reviews students' perceptual experience on campus by studying the physical thermal environment, spatial environment, and health restoration. Lastly, the user's activities are served as the objective validation for individuals' perceptions of the campus environment. Section 4 discusses the current research status and knowledge gaps. Finally, Section 5 concludes the overall study and outlooks future research directions.

The aims of this study are listed as follows:

- ✓ Review the research tendency and the hotspots of campus public space perceptions;
- ✓ Discuss the research progress and limitations of each hot research theme;
- ✓ Clarify the opportunities for campus research and space design as well as the application of new technologies in the campus perceptual studies;
- ✓ Propose the future development trends and current research gaps in the campus environment.

2. Materials and Methodology

2.1. Article Collection

In terms of scholarly databases, Web of Science is seen as the worldwide largest and most reputable literature resource and is considered as the most representative data source, with numerous high-impact factor journals [24]. Thus, this article utilizes the Web of Science (WOS) core database for initial data collection. When searching for target content, it originally uses the keyword phrases "campus*" OR "school*" OR "education*"AND "outdoor*" OR "public space*"AND "space perception*", through the advanced search of all fields and demonstrates 590 results. Then, it filters the selected papers with the following criteria: articles are supposed to be in the discipline of architecture, urban studies, public environmental occupational health, and environmental sciences. The time span of this article ranges from 2000 to 2021, for it mainly concentrates on the research field in the twenty-first century. Moreover, the document type is set up as journal and review journal. Thus, it ultimately generates 136 relevant records for campus perception study.

2.2. Bibliometric Analysis

In this paper, the bibliometric analysis and literature analysis method are preliminarily adopted to understand the research development trend of campus public space studies. CitesSpace software version 5.8 is utilized as a bibliometric approach to display the frontiers of disciplines and visualize the analysis results [25]. Currently, this bibliometric approach is applied in literature reviews to structurally understand the body of knowledge in the target research area. It specializes to analyze the social and structural relationships between various research components (e.g., research institutions and topics) and summarize the bibliography and knowledge structure of the field [24,26]. For visualization of research results, the keyword co-occurrence analysis along with burst analysis is used to detect current research trends [27]. The difference is that the co-occurrence method comprehensively reflects the knowledge networks, which not only represents the accumulated knowledge of a research field but also highlights the overall trending directions [28].

To understand the research structure and reveal research topics of campus public space perceptions, it adopts the co-occurrence network analysis and burst detection analysis through CiteSpace. It initially abstracts the terms, keywords, sources, and categories of the recent 20 years of relevant papers from the WOS database. Then, the cluster analysis indicates the popular research directions in campus public space perceptions. While the burst keywords during each period demonstrate the most innovative research field.

3. Results

3.1. Overview of Research Trends

3.1.1. Research Tendency Analysis

After obtaining publication time data from the Web of Science (WOS) database, the data are reordered chronologically in excel. Based on the publication time and growth rate of articles, the research in the field of campus perceptions can be divided into three development phases as follows: the initial research phase 2000–2007, the incremental development phase 2008–2017, and the steady growth phase 2018–2021 (Figure 1). At the beginning stage, the total number of publications is kept lower than 10 per year. It represents that scholars barely considered the intersections and potential quantification between user perceptions and space, especially in the campus-built environment. During the developing phase, the number of published papers gradually increased to over 30 each year. Since 2018, these articles seemed to grow dramatically to an average of 50 per year. It indicates the importance of perception studies in campus public space, which enables quantifying the specific influencing factors of user emotions in the spatial environment.

Figure 1. The number of publications from 2000 to 2021.

3.1.2. Co-Cited Reference Analysis

Co-citation analysis is normally served as an essential categorization mechanism for title keywords, keywords, and subject catalogues of the co-cited references. This analysis approach is specialized for determining the field of discipline and scope of research specialization [29]. It also utilizes the CiteSpace platform to visualize the clusters of the co-citation references by removing unrelated clusters [30]. In Figure 2, these clusters are Cluster#0 outdoor thermal comfort, Cluster#1 mental health, Cluster#2 ecosystem services, Cluster#3 urban parks, Cluster#4 public perception, Cluster#5 theory of planned behavior, Cluter#6 university campus, Cluter#7 iot, and Cluter#8 open space. Obviously, campus space perception research is inseparable from basic research on outdoor thermal comfort, human health, and spatial environment, while new behavioral theories are supplemented to bring novel innovations to public space research. Ito and other real-time interconnected wearable sensors and platforms are also promoting campus perception research.

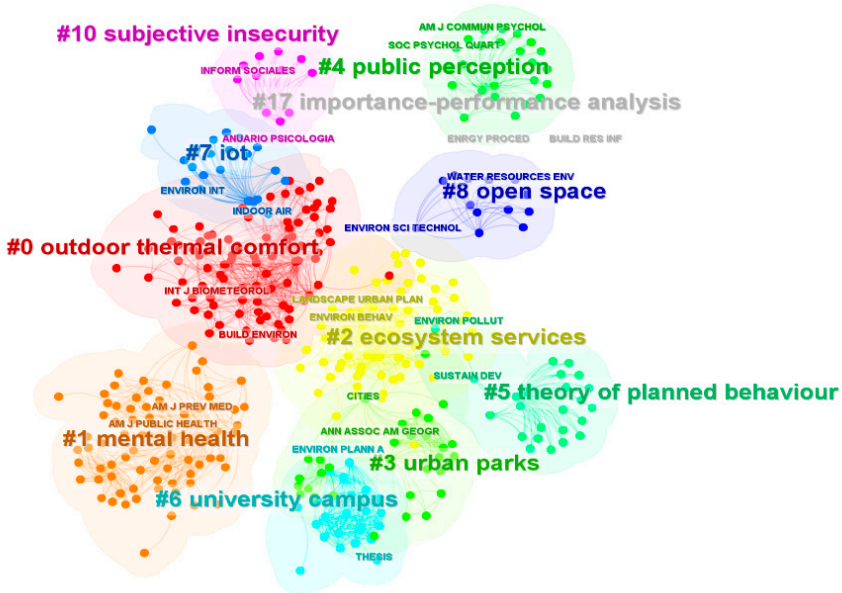

Figure 2. Clustering keywords from 2000 to 2021 of the co-cited references.

3.1.3. Co-Occurrence Keyword Analysis

Co-occurrence analysis of literature keywords is typically used to distinguish the research hotspots. Its graphical distribution illustrates the strength and relevance be-

tween each significant node, topic, and keyword [31]. The dominating keyword clustering items are relatively shown in Figure 3: (1) thermal comfort condition; (2) urban context; (3) physical activity; (4) environmental variable; (5) mental health; (6) particulate pollution.; (7) comparative analysis; and (8) social environment. These items illustrate that the study of campus public space especially focuses on students, the campus physical environment, and students' campus activities occupy a prominent place. More precisely, the results specifically display the hottest research branches for grouping.

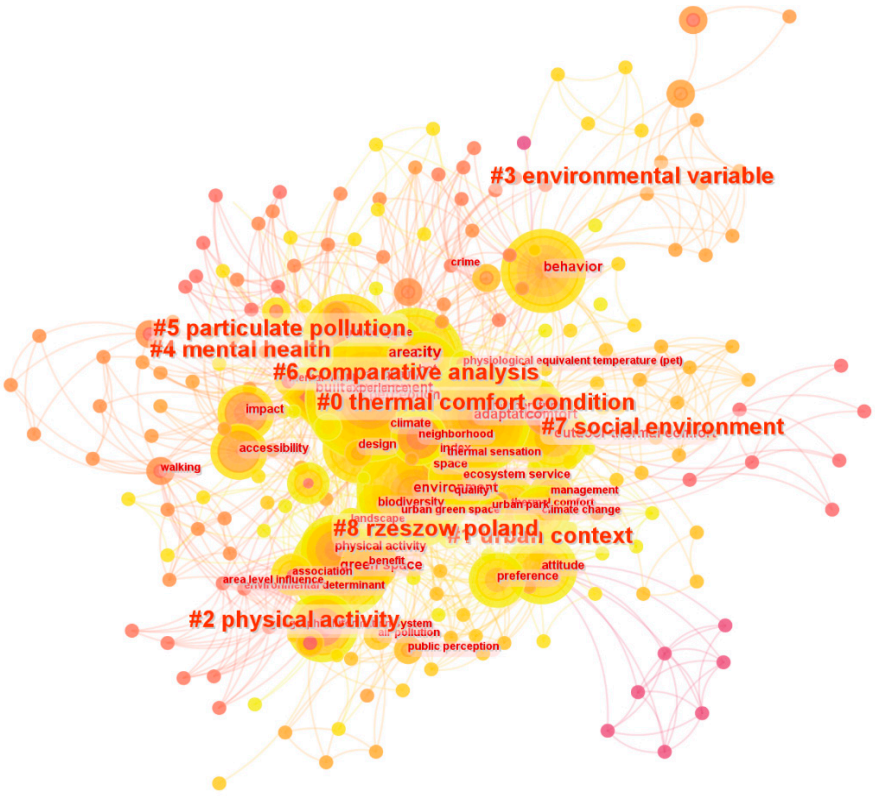

Figure 3. Co-occurrence keyword networks and clusters from 2000 to 2021.

3.1.4. Burst Detection Analysis

It is demonstrated that citation burst analysis can clearly illustrate the burst intensity and duration of the burst status lasts [32]. The burst branches display the most active and innovative study areas that have a rapidly significant increase in citations over a short period. In this section, burst analysis assists in identifying burst keywords for each developmental period separately (Figure 4) and the red segments highlight the emergence of new directions in graphics.

During 2000–2007, the publication during this process is less than 10 articles per year, whose topics initially emphasize theoretical research and primarily qualitative research of the campus physical performance, environmental perception, and students' experience (Figure 4). Generally, the distribution of research topics during this period was relatively scattered and innovative research topics have emerged, such as campus color perception and wayfinding behaviors.

From 2008 to 2017, the number of publications increased to 20 per year. Studies are majorly related to thermal perception and sensations, perception of spatial characteristics, and outdoor physical environment on campus, with such typical keywords as "sensation, temperature, thermal comfort". Since 2015, the research centrality shifted to the space optimal design from a human-oriented perspective, which is mainly abstracted from the terms "experience, design, and space".

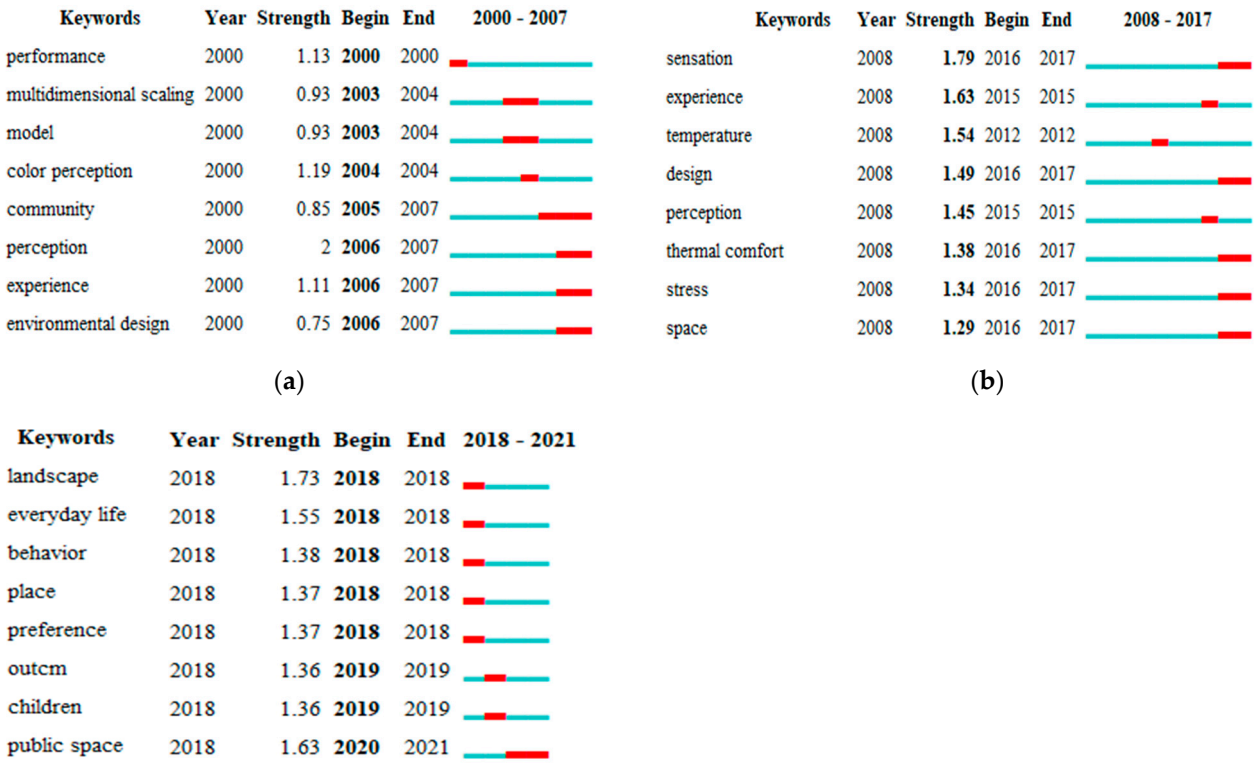

Figure 4. Burst detection analysis. (**a**) 2000–2007 keywords burstness. (**b**) 2008–2017 keywords burstness; and (**c**) 2018–2021 keywords burstness.

During 2018–2021, the number of issued articles arrived at 50 papers per year, and the research hotspot shifted to explore the individuals' campus life, behaviors, and spatial preference for campus spaces. For instance, it mentions green spaces, public spaces, and built environments. In particular, it represents further investigation for comprehensive relationships between human sensation, subjective perceptions, and specific environment that are deeply explored; the types of spaces studied became richer, with the study of campus public spaces remaining hot and the study of campus and other space types increasing.

3.2. Hotspots of Research Themes

Integrating these analysis results, the hottest research themes are defined as: perceptions of thermal comfort, spatial perceptions and quantification, health benefits and restorativeness, and users' behavior perceptions.

3.2.1. Perception of Outdoor Thermal Comfort on the University Campus

Outdoor thermal comfort, as an important indicator for evaluating the comfort of public spaces, indirectly affects human physiological and psychological health and the vitality of urban space [33]. Generally, the microclimatic parameters are regarded as the main contributing conditions for the outdoor comfort level [34], which are, respectively, air temperature, wind speed, relative humidity, globe temperature, and solar irradiance [35]. Additionally, sky view factors, atmospheric pressure, environment maximum temperature [36], and other indirect environmental elements are involved to assess the thermal comfort and thermal sensation level. Recently, human-centered thermal comfort was investigated in thermal environment studies. Gender, metabolic level, age groups, and clothing are defined as dominating factors for previous thermal study [37,38]. However, there is no distinction of quantitative experiments for the subjective factors of outdoor thermal comfort [39].

To measure the thermal comfort level on campus, the PET, TSV, the mean thermal sensation vote (MTSV), and UTCI are regarded as the generic metrics for the outdoor thermal environment [40–42] (Table 1). The strength of the PET indicator is its adaptability to most weather and seasonal conditions, and it also presents its predictive accuracy in both indoor and outdoor thermal conditions according to case studies. For instance, Canan et al. conducted a year-long field survey on the university campus to determine subjects' thermal perceptions and thermal preferences by means of a questionnaire survey, which led to the calculation of seasonal preferred and neutral PET and PET comfort ranges [43]. For quantitative study, the linear regression analysis specializes in extrapolating the uncertain relationships between the independent and dependent variables and can effectively calculate the strength of the relationship between variables.

Table 1. The influential factors and research methods of thermal comfort perceptions on the campus environment.

Research Groups	Influencing Factors	Research Methods	Research Contents
Yin et al., 2012	Individual mood, gender, level of exercise, and previous environmental experiences; solar radiation, atmospheric pressure, environment maximum temperature, wind speed, and relative humidity.	Survey	Verify the relationship between thermal comfort and microclimatic conditions; different genders share the same perceptions of extreme high temperature; and mood strongly impacts on thermal comfort.
Shooshtarian et al., 2015	Air temperature (Ta), wind velocity (Va), relative humidity (RH), and globe temperature (Tg); season factor.	Concurrent measurement, questionnaire survey	Seasonal changes impact on thermal perceptions.
Nastos and Polychroni, 2016 [44]	Environment elements (air temperature, relative humidity, wind speed, and global solar irradiance).	Field measurements	Use PET index to quantify the human thermal burden.
Shooshtarian and Ridley, 2016	Individual elements (gender, age group, exposure to sun, level of activity and clothing insulation, skin color); social element (position, companionship, and cultural background).	Socio-ecological System Model (SESM)	Human factors have medium influence on thermal comfort while social factors have low impact on that.
Li et al., 2016	People adaptive activities, thermal experience, and expectation.	Physical measurements and survey	Thermal sensation, comfort, and PET values varies in different seasons.
Shooshtarian and Ridley, 2016	People's thermal preference (satisfaction), thermal sensation votes, thermal acceptability, and overall thermal comfort.	Field survey	The thermal perception conditions are not equals to thermal sensations; utilize the TSV scale as to validate the acceptable thermal range (ATR).
Huang et al., 2017	Elevated building designs enhance the human perceived microclimate.	Linear regression	Compare and assess the outdoor thermal comfort models, PET, UTCI, and UC-Berkeley model.
Wang et al., 2017	Subjective factors, exposure time in green spaces, previous thermal environment and activity, and their thermal history.	Linear regression and probit analysis	To explore the impact indicators for human thermal comfort and the relationship between urban green infrastructure (UGI) and thermal comfort.

Table 1. *Cont.*

Research Groups	Influencing Factors	Research Methods	Research Contents
Gocer et al., 2018	User-oriented elements (i.e., sitting and shading facilities).	Space syntax methodology	Spatial elements and user-oriented elements can help to improve user. thermal performance.
Huang et al., 2019	Shadings, biological sex and adaptive behaviors.	Field measurement and questionnaire survey, PET physiologically equivalent temperature (PET).	Explore the effects of shading, biological sex and adaptive behaviors on outdoor thermal comfort.
Tao et al., 2019	Spatial settings (building orientation, void-to-solid ratio).	Questionnaire survey, physical measurements.	Thermal sensation of wind speed and temperature linked with thermal environment.
Canan et al., 2020	Seasonal climate and culture.	Micrometeorological measurement and field survey.	Test seasonal and annual neutral PET values, the relations between seasons and predicted percentage of dissatisfied (PPD) and identify the Turkish Outdoor Comfort Index (TOCI).

3.2.2. Spatial Perceptions of Campus Public Space

Some scientists aim to explore the relationship between spatial perception and public space configurations [16]. At the urban scale, the mixture of the local typologies, land use, land configurations, and space functions potentially affects the daily operation on the university campus [45]. At the building scale, building orientation, ventilation condition, spatial features of buildings [46], and the natural environment are tightly related to the campus experience at the architectural scale [47]. Moreover, the variation in space functions brings about a different experience. For instance, Hami and Abdi suggested that studying areas were likely influenced by natural elements while leisure spaces associated more with space form, colors, and texture design [48]. Otherwise, the study of the space preferences for informal learning spaces (ILS) increasingly became an emerging research theme in the field of campus public spaces [49,50]. However, there is still short a unified qualification and evaluation paradigm for the spatial perceptions of campus public space rather than interior space [16,51].

Table 2 demonstrates the research approach for spatial perceptions, such as the questionnaire, field observation, and survey frequently undertaken as to collect preliminary data. Integrated with the questionnaires, SPSS analysis is applied to obtain students' answers to survey questions. To simplify the information obtained, the answers are usually categorized according to different scenarios or research subjects. For scientific statistic approaches, space syntax, linear regression, and the POE method are used to analyze the correlation between students' perception and outdoor environment design [52,53]. While multimodal perception techniques represented by machine learning, physiological sensors, and eye tracking are used to record the experimental data and emotional data of users [54]. In particular, geographic information visualization software, such as ArcGIS, enables the ability to facilitate the migration of spatial–temporal data from the actual campus to the campus map.

Table 2. Research methods of campus public space design.

Research Groups	Research Methods	Research Contents
McFarland et al., 2010	On-line survey, statistical analysis	Students' use of campus green spaces has a relationship with perceptions of quality of life.
Sun et al., 2015	ArcGIS, questionnaire	Measure the walk accessibility by GIS and find the local topography impacts on human perceptions.
Göçer et al., 2018	POE method, spatial-temporal mapping, space syntax and behavioral mapping, biometeorological assessments, use tracking	Assess the outdoor campus space through the physical environment and its users' behavior and activities, level of satisfaction, and perceptions of comfort.
Li et al., 2019 [55]	Questionnaire survey, site observations, space syntax	The frequency of visiting the green land, seasonal factor, and green space quality influence on students' perceptions. While the gender and past experience do not affect students' perception.
Alhusban et al., 2019	Questionnaire, descriptive statistics, and the Pearson product-moment correlation coefficient	The accessibility and connectivity between spaces, availability of safe and welcoming spaces, mental map elements design and urban structure relate to students' satisfaction.
Peker and Ataöv, 2020	Inquiry, interviews, and site observations; stepwise regression analyses for relevance study	Design of campus open space impacts students' learning activities.
Soares et al., 2020	Literature study, space syntax analysis, volunteered geographic information (VGI), andnon-participatory observations	Creativity relates to the mixture of the land use, physical features, people positive experiences, and perceptional sense of place.
Hami and Abdi, 2021	Photo questionnaire, SPSS analysis	Active studying areas require more landscape design with vertical and natural elements. People expect an open and spacious space. Recreational areas need diverse forms, colors, and texture design, and students welcome the semi-refuge and friendly atmosphere for leisure space.
Alnusairat et al., 2021	Space syntax, microclimate simulations, and questionnaire.	The relationships between students' attitudes and urban layout, physical features, and outdoor thermal conditions, as well as the students' needs and behavior.
Wang et al., 2021 [56]	SPSS analysis	Aesthetic of environment, hardscape and campus landscape with natural elements helps to increase the recreational activities on campus.

3.2.3. Health Benefits and Perceived Restoration Effects of Campus Public Space

The perceived health effects of campus space normally concentrate on two aspects, students' stress-related problems, and students' health levels. From an early age, previous scholars found that the outdoor natural environment is related to users' mental health and restorations [57]. In particular, researchers from Texas State University initially stated that the design of the campus environment may be strongly related to the stress level [58]. For example, Lu and Fu proposed that waterfront areas had a positive impact on the attention restoration effect through a comparative analysis between water space and other green spaces [59]. Lateral studies are concerned more with the correlation between restorative impact and personal perception factors.

In Table 3, indicators of personal health, perceived greenness [60,61], personal nature rate [62], restoration experience [63], and users' preference for space [64] are typically representing the health recovery level of people in campus outdoor space. Some experiments confirmed the restorative effect of campus green spaces on psychological well-being through emotional and perceptual regulation. For instance, Malekinezhad et al. verified

the associations between the subjective sensory dimensions with restorative experience by using the partial least squares structural equation modeling (PLS-SEM) [63].

Table 3. Research on health and restorativeness on campus space.

Research Types	Research Groups	Research Contents
The relationship between environment and perceived restoration	McFarland et al., 2008	The designed environment may relate to the stress level.
	Hipp et al., 2016	Associations between perceived greenness and perceived restorativeness.
	Van den Bogerd et al., 2018 [65]	Students' preferences and perceived restoration have relationship with high nature rated preference.
	Liu et al., 2018	A self-rated naturalness scale (SRNS) has correlation with perceived naturalness, restoration, and health.
	Gao et al., 2019	Individual preference with psychophysiological restoration.
	Loder et al., 2020	Perceived greenness with mental health.
Influencing factors of perceived restorativeness	Grahn and Stigsdotter, 2010 [66]	Refuge and nature are highly related to the restorative environments.
	Malekinezhad et al., 2020	The relationship between perceived sensory dimension, perceived restorativeness, and restoration experience.
	Van den Bogerd et al., 2018	Green elements, greenery.
	Lu and Fu, 2019	Waterfront spaces, vegetation spaces, courtyard spaces, and square spaces have the optimal effect on perceived restorativeness.

3.2.4. Perception of Users' Activities on Campus Public Space

The selected articles continuously concern the relationship among human perceptions, behaviors, and physical environment in the campus field. Considering the student activities, walking, and sitting are the most popular and welcoming activities observed in the university public spaces [67,68]. Bicycling, also the typical traffic flow in the university, is mainly recorded by human observations, scan audits, and counting tools, but is hard to distinguish from other types of transportation by counting sensors [69]. However, learning activities and wayfinding activities as comprehensive cognitive activities gradually became recent research trends. For wayfinding activities, scholars explored the influencing factors of wayfinding behaviors [70,71] and verified the effectiveness of students' cognitive perceptions and spatial preferences in alleviating wayfinding difficulties through multimedia tools.

Currently, multimodal technologies are used to explore the mechanism of subjects' activities. They are represented by physiological sensors, VR facilities, and machine learning technologies and are used in the quantification of behaviors perception (Table 4). For quantification and performance tools, space syntax, memory maps, surveys, and questionnaires were applied to the assessment of people's subjective feelings and are able to relate emotions and behaviors with spatial characteristics [72,73]. Some researchers preferred to study the characteristics of students' behavioral activities, such as walking path, space dimensions, and students' walkability [74], whereas the accuracy and precision of physiological sense devices in an outdoor environment cannot catch up with the stability as that in indoor spaces due to the temperature and other uncontrollable conditions in outdoor space.

Table 4. Behavior perceptions of the public space on university campus.

Type of Behavior	Research Groups	Data Types	Research Contents
Walking/ Sitting	Debener et al., 2012 [75]	Mobile EEG data	Verify that single trial EEG data available for indoor and outdoor filed observation.
	Middleton, 2010	Survey, diaries, and interviews	Explore the association between walking and the environment; examine the types, forms and characteristics of walking;
	Mavros et al., 2016	Eye-tracking, EEG data	Explore the psychological effects of environment; understand the spatial cognition of pedestrians;
	Lee and Shepley, 2020	Sketch maps, survey questionnaires, and observations	Deal with the relationship between student perception and the characteristics of walk routines.
	Lin et al., 2020	Mobile EEG data, Emotiv EPOC	Examine the emotional transfers when people walk or sit in campus.
	King et al., 2020	Environmental scan audits and survey	Both the subjective perceptions and walkability characteristics influenced the walkability in campus.
Biking	Alexander Erath, n.d.	VR facilities, 3D modelling	Experience the virtual streetscape through new technology.
	Kellstedt et al., 2021	The observation audit and bike account, students' assessment	Bicycling activities varied by time of day, especially for peak hours. The perception of bikeability is lower than the objective bicycling evaluation.
Learning	Hemer et al., 2019	Data from personal and social responsibility inventory (PSRI) survey	Identify that student's subjective perception associated with campus climate.
	Ibrahim and Fadzil, 2013	Questionnaires survey	The usage and space preference related to the space characteristics and space types.
	Tao et al., 2019		Students' thermal perceptions correlated with spatial settings and campus environment.
Wayfinding	Iftikhar et al., 2021	_	Explore the impact factors of wayfinding, such as behaviors, cognitive factors, and spatial configurations.
	Afrooz et al., 2018	Scene recognition test, mirror image discrimination, sketch maps, spatial ability questionnaire (SAQ), and eye tracking data	Recognition memory, visual memory, and recollective memory related with wayfinding.

4. Discussion

4.1. Overall Research Trends

According to the whole research tendency, it directly demonstrates the number of publications on human perceptions research in campus public spaces and the growth rate of this research.. It represents the positive attitude of the scientific community toward this research direction. Thus, there still exists huge research potential for exploring the interaction mechanisms between the campus environment and student experience.

In terms of research hotspots of the perception of university public space, the hottest literature themes are highlighted and summarized below. According to the results of bibliometric analysis, it generates the hottest keywords according to the word account, frequency, centrality, clusters, and burst strength [24]. Considering their similarity and

resemblance, the main research topics are systematically constituted and reclassified into four aspects (Table 5).

Table 5. Keywords and classification of research themes.

Keywords	Research Themes
Temperature, outdoor thermal comfort, hot, ecosystem service, adaption, performance, thermal comfort, climate, built environment, outdoor comfort	Perception of outdoor thermal comfort
Green space, city, public space, space, sensation, experience, environmental design, design, urban green space, quality, experience, public perception, urban park	Space perception and quantification
Health, attitude, landscape, sensation, public health, mental health, human thermal comfort	Health benefits and perceived recovery effects
Physical activity, behavior, preference, walking, pedestrian level	Users' behavior perceptions

4.2. Perceptions of Campus Public Space from Multiple Perspectives

In terms of the four significant research themes, it is found that the research perspectives and objects on university public space became more diverse. In terms of outdoor thermal comfort, scholars usually emphasize campus microclimate and physical environmental conditions, such as temperature, wind speed, and relative humidity, while it is still yet to figure out a unified metric to measure the thermal comfort in campus outdoor environment. Furthermore, quantitative studies on the interactions between spatial design and users' perceived feelings were discussed. Some articles discussed the impact of campus space types and configurations at various spatial scales on people's perceptions. However, it still needs to establish a quantitative paradigm with the assistance of new technologies. For the perceived health effects, it examines the dominating indicators of the student's health level and finds out that stress level is greatly influenced by the natural elements on campus and students' personal factors. Moreover, some scholars investigated the typical student activities in campus public spaces. Among them, the operating mode of learning, informal learning, and wayfinding activities are still under exploration. The transition of studies from a single perspective to multidisciplinary perspectives contributes to promoting the quantification and optimization of campus environment and education spaces. Thus, these multi-perspective studies, such as the emerging interdisciplinary research, represent the complexity and dynamism of the research on campus public spaces.

4.3. Preference for Student-Oriented Campus Public Space Studies

After reviewing the students' outdoor activities and health status, it seems that the emphasis on campus studies gradually changed into constructing a student-oriented environment. For students' health level, researchers found that individual factors are also tightly related to people's perceived health level and restoration levels except for space indicators, and except for spatial factors. For example, some experiments confirmed that greenness perception level, individual nature rate, personal experience, age, and gender will affect people's health recovery level. On the other hand, there abruptly appear plenty of papers acknowledging students' transportation on campus and some scholars are interested in novel directions, such as campus learning activities and wayfinding activities. Finally, these tendencies indirectly reflect the influence of human-centered thinking in campus public space study in recent decades.

4.4. New Research and Design Opportunities Brought by the Application of Human Perceptional Technologies

With the adoption of multisensory data, it is possible to accurately obtain enormous amounts of perceptual data, which helps to enhance the quantitative accuracy of students' real-time emotional and physiological senses, so it helps to discuss more accurately the correlations between public space and subjective perceptions in campus research and design. The new perception technology enables tracking student activity and mobility on campus. Furthermore, the geographic information visualization platform allows for visualization of the spatial and temporal distribution of users' activities in dynamic mappings and indirectly reflects the status of public space usage. Whereas human perception techniques still have limitations due to their applicability conditions and accuracy. Additionally, it is also essential to get supplementary validation by other technical means.

5. Conclusions

Through the bibliometric approach, this paper investigates the current research trends in university perception research. The results initially demonstrate that the literature in the field of campus public space perception experienced three development periods, which are the initial development period, rapid growth period, and steady development period. The papers from 2000 to 2007 were concerned about the campus physical performance, environmental perception, and students' activities in the campus public space; the research focused on campus spatial characteristics and space optimization during 2008–2017; the research objects became more abundant and emphasized the campus life quality, individual behaviors, and spatial preference for campus public spaces during 2018–2021. Furthermore, the hotspot topics mostly concentrate on four aspects, perception of outdoor thermal comfort, perception, quantification of spatial settings, perception of health benefits, and perception of student behavior.

The literature around the perceptions of university public spaces became much more diversified. The highlight of current research on the campus space gradually shifted from a morphological and typological perspective to an environmental behavioral perspective. Scholars explored the users' space perceptions, users' behaviors, and subjective experiences in campus public space in terms of users' perceptual experience in a campus environment. Studies on outdoor thermal comfort performance, student perceived restorativeness, and student activities are all highly related to the user feelings and perceptions.

Although scholars confirmed the correlation between thermal environment factors, spatial factors, and personal factors with the perception of public space, there continuously remain some knowledge gaps for campus perception studies:

(1) Firstly, it seems that it is practical to utilize physiological sensory technology to study the students' perceptions in campus public space and their adaptation probably varies under different climatic conditions and regions. Therefore, the results of the campus perception studies are not broadly applicable.
(2) Secondly, due to the complexity and systematic mechanism of campus space operations, the relevant influencing factors and indicator weights were investigated and screened, but there is no unified statement yet.

This article identifies that the emerging trends in campus perceptions research is primarily driven by the application of physiological sensing technology, information technology, and big data technology. This article critically reviews the worldwide perception articles on campus spaces, partially exploring the multidimensional influencing factors that affect students' perceptions but does not involve the new theoretical discussions of campus perceptions. Furthermore, there is still no unified design paradigm to guide the research and design of campus corresponding to user perceptions because of the complexity of the relationship among campus spatial environment, student behavior, and student perceptions. Much work will be conducted in the future to construct a quantitative evaluation system that integrates the spatial environment with human perception.

In summary, this article presents a literature review with CiteSpace software in the field of perception on university campuses over the past 20 years. Additionally, it demonstrates the comprehensive interactions among the people's awareness, activities, and public spaces on university campus spaces through a multidimensional research approach. This paper discusses the current research hotpots and new opportunities brought by perceptional technologies in campus perceptions research, which enables future exploration and construction of a human-centered campus environment. It seems that new technologies and research methods are integrated to implement in campus space design and their application practically reshapes the university's public places. Therefore, this paper is conducive to studying and optimizing the design of campus public spaces with the purpose to create a vibrant and highly energetic atmosphere for the campus public space in the future.

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References

1. Morosini, M.C.; Corte, M.G.D.; Guilherme, A. Internationalization of Higher Education: A Perspective from the Great South. *Creat. Educ.* **2017**, *8*, 95–113. [CrossRef]
2. Schmertz, M.F. (Ed.) *Campus Planning and Design*; McGraw-Hill: New York, NY, USA, 1972.
3. Yudell, M.R. *Campus & Community: Architecture & Planning*, 1st ed.; Rockport Pub.: Rockport, WA, USA, 1996.
4. Johnson, D.M.; Bell, D.A. *Metropolitan Universities: An Emerging Model in American Higher Education*; University of North Texas Press: Denton, TX, USA, 1995.
5. Zhao, S.; Kong, Y.; Kong, Y. On the In-Depth Integration of ICT with Present Education. *DEStech Trans. Econ. Bus. Manag.* **2019**, 30825. [CrossRef]
6. Rached, I.; Elsharkawy, H. The Role of Open Spaces in the University Campus in the Egyptian Context. In Proceedings of the Designing Place—International Urban Design Conference, Nottingham, UK, 2–3 April 2012.
7. Burke, J.A.; Estrin, D.; Hansen, M.; Parker, A.; Ramanathan, N.; Reddy, S.; Srivastava, M.B. Participatory sensing. In Proceedings of the WSW'06 at SenSys '06, Boulder, CO, USA, 31 October 2006.
8. Lam, E.W.M.; Chan, D.W.M.; Wong, I. The Architecture of Built Pedagogy for Active Learning—A Case Study of a University Campus in Hong Kong. *Buildings* **2019**, *9*, 230. [CrossRef]
9. Wu, X.; Kou, Z.; Oldfield, P.; Heath, T.; Borsi, K. Informal Learning Spaces in Higher Education: Student Preferences and Activities. *Buildings* **2021**, *11*, 252. [CrossRef]
10. Rezvanipour, S.; Hassan, N.; Ghaffarianhoseini, A.; Danaee, M. Why Does the Perception of Street Matter? A Dimensional Analysis of Multisensory Social and Physical Attributes Shaping the Perception of Streets. *Archit. Sci. Rev.* **2021**, *64*, 359–373. [CrossRef]
11. Zeile, P.; Resch, B.; Exner, J.-P.; Sagl, G. Urban Emotions: Benefits and Risks in Using Human Sensory Assessment for the Extraction of Contextual Emotion Information in Urban Planning. In *Planning Support Systems and Smart Cities*; Geertman, S., Ferreira, J., Goodspeed, R., Stillwell, J., Eds.; Lecture Notes in Geoinformation and Cartography; Springer International Publishing: Cham, Switzerland, 2015; pp. 209–225. [CrossRef]
12. Kanhere, S.S. Participatory Sensing: Crowdsourcing Data from Mobile Smartphones in Urban Spaces. In *Distributed Computing and Internet Technology*; Hota, C., Srimani, P.K., Eds.; Lecture Notes in Computer Science; Springer: Berlin/Heidelberg, Germany, 2013; pp. 19–26. [CrossRef]
13. Soares, I.; Weitkamp, G.; Yamu, C. Public Spaces as Knowledgescapes: Understanding the Relationship between the Built Environment and Creative Encounters at Dutch University Campuses and Science Parks. *Int. J. Environ. Res. Public Health* **2020**, *17*, 7421. [CrossRef]
14. Peker, E.; Ataöv, A. Exploring the Ways in Which Campus Open Space Design Influences Students' Learning Experiences. *Landsc. Res.* **2020**, *45*, 310–326. [CrossRef]
15. Schwander, C.; Kohlert, C.; Aras, R. CAMPUSANALYST: Towards a Spatial Benchmarking System for University Campuses. In Proceedings of the 8th International Space Syntax Symposium, Santiago, Chile, 3–6 January 2012.

16. Alnusairat, S.; Ayyad, Y.; Al-Shatnawi, Z. Towards Meaningful University Space: Perceptions of the Quality of Open Spaces for Students. *Buildings* **2021**, *11*, 556. [CrossRef]
17. Farag, A.; Doheim, R.M.; Badawi, S. Assessment of User Happiness in Campus Open Spaces. *J. Public Space* **2019**, *4*, 45–64. [CrossRef]
18. Abdelaal, M.S.; Doheim, R.; Abdelaal, D. A Framework for Assessing The Efficiency Of Outdoor Spaces Within University Campus: A Case Study of Effat University, Jeddah. In Proceedings of the Meamaryat International Conference, Jeddah, Saudi Arabia, 18–20 April 2017.
19. Allcoat, D.; von Mühlenen, A. Learning in Virtual Reality: Effects on Performance, Emotion and Engagement. *Res. Learn. Technol.* **2018**, *26*, 2140. [CrossRef]
20. Xue, J.; Hu, X.; Sani, S.N.; Wu, Y.; Li, X.; Chai, L.; Lai, D. Outdoor Thermal Comfort at a University Campus: Studies from Personal and Long-Term Thermal History Perspectives. *Sustainability* **2020**, *12*, 9284. [CrossRef]
21. Yaylali-Yildiz, B.; Czerkauer-Yamu, C.; Çil, E. Exploring the Effects of Spatial and Social Segregation in University Campuses, IZTECH as a Case Study. *Urban Des. Int.* **2014**, *19*, 125–143. [CrossRef]
22. Shang, H.; Lin, M.; Zheng, Y. The Perception Reshaping Strategy of Campus Public Space. In *Advances in Human Factors in Architecture, Sustainable Urban Planning and Infrastructure*; Charytonowicz, J., Falcão, C., Eds.; Advances in Intelligent Systems and Computing; Springer International Publishing: Cham, Switzerland, 2020; pp. 381–391. [CrossRef]
23. Zhao, X.; Zuo, J.; Wu, G.; Huang, C. A Bibliometric Review of Green Building Research 2000–2016. *Archit. Sci. Rev.* **2019**, *62*, 74–88. [CrossRef]
24. Hjørland, B.; Albrechtsen, H. Toward a New Horizon in Information Science: Domain-Analysis. *J. Am. Soc. Inf. Sci.* **1995**, *46*, 400–425. [CrossRef]
25. Donthu, N.; Kumar, S.; Mukherjee, D.; Pandey, N.; Lim, W.M. How to Conduct a Bibliometric Analysis: An Overview and Guidelines. *J. Bus. Res.* **2021**, *133*, 285–296. [CrossRef]
26. Chen, C. *CiteSpace: A Practical Guide for Mapping Scientific Literature*; Nova Science Publishers: Hauppauge, NY, USA, 2016.
27. Radhakrishnan, S.; Erbis, S.; Isaacs, J.A.; Kamarthi, S. Novel Keyword Co-Occurrence Network-Based Methods to Foster Systematic Reviews of Scientific Literature. *PLoS ONE* **2017**, *12*, e0172778. [CrossRef]
28. Chen, C.; Ibekwe-SanJuan, F.; Hou, J. The Structure and Dynamics of Cocitation Clusters: A Multiple-Perspective Cocitation Analysis. *J. Am. Soc. Inf. Sci. Technol.* **2010**, *61*, 1386–1409. [CrossRef]
29. Yang, C.; Liu, T. Social Media Data in Urban Design and Landscape Research: A Comprehensive Literature Review. *Land* **2022**, *11*, 1796. [CrossRef]
30. Zhou, Y.; An, N.; Yao, J. Characteristics, Progress and Trends of Urban Microclimate Research: A Systematic Literature Review and Bibliometric Analysis. *Buildings* **2022**, *12*, 877. [CrossRef]
31. Chen, C.; Hu, Z.; Liu, S.; Tseng, H. Emerging Trends in Regenerative Medicine: A Scientometric Analysis in CiteSpace. *Expert Opin. Biol. Ther.* **2012**, *12*, 593–608. [CrossRef]
32. Kumar, P.; Sharma, A. Study on Importance, Procedure, and Scope of Outdoor Thermal Comfort—A Review. *Sustain. Cities Soc.* **2020**, *61*, 102297. [CrossRef]
33. Krüger, E.L.; Rossi, F.A. Effect of Personal and Microclimatic Variables on Observed Thermal Sensation from a Field Study in Southern Brazil. *Build. Environ.* **2011**, *46*, 690–697. [CrossRef]
34. Shooshtarian, S.; Iyer-Raniga, U.; Andamon, M.; Ridley, I. Thermal Perceptions and Microclimates of Educational Urban Precincts in Two Different Seasons in Melbourne. In Proceedings of the 49th International Conference of the Architectural Science Association, Melbourne, Australia, 2–4 December 2015; pp. 1194–1202.
35. Yin, J.; Zheng, Y.; Wu, R.; Tan, J.; Ye, D.; Wang, W. An Analysis of Influential Factors on Outdoor Thermal Comfort in Summer. *Int. J. Biometeorol.* **2012**, *56*, 941–948. [CrossRef]
36. Thorsson, S.; Honjo, T.; Lindberg, F.; Eliasson, I.; Lim, E.-M. Thermal Comfort and Outdoor Activity in Japanese Urban Public Places. *Environ. Behav.* **2007**, *39*, 660–684. [CrossRef]
37. Indraganti, M.; Rao, K.D. Effect of Age, Gender, Economic Group and Tenure on Thermal Comfort: A Field Study in Residential Buildings in Hot and Dry Climate with Seasonal Variations. *Energy Build.* **2010**, *42*, 273–281. [CrossRef]
38. Höppe, P. Different Aspects of Assessing Indoor and Outdoor Thermal Comfort. *Energy Build.* **2002**, *34*, 661–665. [CrossRef]
39. Błazejczyk, K.; Jendritzky, G.; Bröde, P.; Fiala, D.; Havenith, G.; Epstein, Y.; Psikuta, A.; Kampmann, B. An Introduction to the Universal Thermal Climate Index (UTCI). *Geogr. Pol.* **2013**, *86*, 5–10. [CrossRef]
40. Pantavou, K.; Lykoudis, S.; Nikolopoulou, M.; Tsiros, I.X. Thermal Sensation and Climate: A Comparison of UTCI and PET Thresholds in Different Climates. *Int. J. Biometeorol.* **2018**, *62*, 1695–1708. [CrossRef]
41. Johansson, E.; Thorsson, S.; Emmanuel, R.; Krüger, E. Instruments and methods in outdoor thermal comfort studies—The need for standardization. *Urban Clim.* **2014**, *10*, 346–366. [CrossRef]
42. Canan, F.; Golasi, I.; Falasca, S.; Salata, F. Outdoor Thermal Perception and Comfort Conditions in the Köppen-Geiger Climate Category BSk. One-Year Field Survey and Measurement Campaign in Konya, Turkey. *Sci. Total Environ.* **2020**, *738*, 140295. [CrossRef]
43. Nastos, P.T.; Polychroni, I.D. Modeling and in Situ Measurements of Biometeorological Conditions in Microenvironments within the Athens University Campus, Greece. *Int. J. Biometeorol.* **2016**, *60*, 1463–1479. [CrossRef]

44. Xue, F.; Gou, Z.; Lau, S.s.Y. Green Open Space in High-Dense Asian Cities: Site Configurations, Microclimates and Users' Perceptions. *Sustain. Cities Soc.* **2017**, *34*, 114–125. [CrossRef]
45. Soares, I.; Yamu, C.; Weitkamp, G. The Relationship between the Spatial Configuration and the Fourth Sustainable Dimension Creativity in University Campuses: The Case Study of Zernike Campus, Groningen, The Netherlands. *Sustainability* **2020**, *12*, 9263. [CrossRef]
46. Haase, M.; Amato, A. An Investigation of the Potential for Natural Ventilation and Building Orientation to Achieve Thermal Comfort in Warm and Humid Climates. *Sol. Energy* **2009**, *83*, 389–399. [CrossRef]
47. Hami, A.; Abdi, B. Students' Landscaping Preferences for Open Spaces for Their Campus Environment. *Indoor Built Environ.* **2021**, *30*, 87–98. [CrossRef]
48. Chen, Y.; Wu, J.; Zou, Y.; Dong, W.; Zhou, X. Optimal Design and Verification of Informal Learning Spaces (ILS) in Chinese Universities Based on Visual Perception Analysis. *Buildings* **2022**, *12*, 1495. [CrossRef]
49. Ibrahim, N.; Fadzil, N.H. Informal Setting for Learning on Campus: Usage and Preference. *Procedia-Soc. Behav. Sci.* **2013**, *105*, 344–351. [CrossRef]
50. Tao, Y.; Lau, S.S.Y.; Gou, Z.; Zhang, J.; Tablada, A. An Investigation of Semi-Outdoor Learning Spaces in the Tropics: Spatial Settings, Thermal Environments and User Perceptions. *Indoor Built Environ.* **2019**, *28*, 1368–1382. [CrossRef]
51. McFarland, A.L.; Waliczek, T.M.; Zajicek, J.M. Graduate Student Use of Campus Green Spaces and the Impact on Their Perceptions of Quality of Life. *HortTechnology* **2010**, *20*, 186–192. [CrossRef]
52. Göçer, Ö.; Göçer, K.; Başol, A.M.; Kıraç, M.F.; Özbil, A.; Bakovic, M.; Siddiqui, F.P.; Özcan, B. Introduction of a Spatio-Temporal Mapping Based POE Method for Outdoor Spaces: Suburban University Campus as a Case Study. *Build. Environ.* **2018**, *145*, 125–139. [CrossRef]
53. Rocha Estrada, F.J.; Ruiz-Ramírez, J.A.; George-Reyes, C.E.; Glasserman-Morales, L.D. Evaluation of a Virtual Campus Adapted to Web-Based Virtual Reality Spaces: Assessments of Teachers and Students. *Front. Educ.* **2022**, *7*, 918125. [CrossRef]
54. Li, X.; Ni, G.; Dewancker, B. Improving the Attractiveness and Accessibility of Campus Green Space for Developing a Sustainable University Environment. *Environ. Sci. Pollut. Res.* **2019**, *26*, 33399–33415. [CrossRef] [PubMed]
55. Wang, R.; Jiang, W.; Lu, T. Landscape Characteristics of University Campus in Relation to Aesthetic Quality and Recreational Preference. *Urban For. Urban Green.* **2021**, *66*, 127389. [CrossRef]
56. Cammack, C.; Waliczek, T.M.; Zajicek, J.M. The Green Brigade: The Educational Effects of a Community-Based Horticultural Program on the Horticultural Knowledge and Environmental Attitude of Juvenile Offenders. *HortTechnology* **2002**, *12*, 77–81. [CrossRef]
57. McFarland, A.L.; Waliczek, T.M.; Zajicek, J.M. The Relationship Between Student Use of Campus Green Spaces and Perceptions of Quality of Life. *HortTechnology* **2008**, *18*, 232–238. [CrossRef]
58. Lu, M.; Fu, J. Attention Restoration Space on a University Campus: Exploring Restorative Campus Design Based on Environmental Preferences of Students. *Int. J. Environ. Res. Public Health* **2019**, *16*, 2629. [CrossRef] [PubMed]
59. Hipp, J.A.; Gulwadi, G.B.; Alves, S.; Sequeira, S. The Relationship Between Perceived Greenness and Perceived Restorativeness of University Campuses and Student-Reported Quality of Life. *Environ. Behav.* **2016**, *48*, 1292–1308. [CrossRef]
60. Loder, A.K.F.; Schwerdtfeger, A.R.; van Poppel, M.N.M. Perceived Greenness at Home and at University Are Independently Associated with Mental Health. *BMC Public Health* **2020**, *20*, 802. [CrossRef]
61. Liu, Q.; Zhang, Y.; Lin, Y.; You, D.; Zhang, W.; Huang, Q.; van den Bosch, C.C.K.; Lan, S. The Relationship between Self-Rated Naturalness of University Green Space and Students' Restoration and Health. *Urban For. Urban Green.* **2018**, *34*, 259–268. [CrossRef]
62. Malekinezhad, F.; Courtney, P.; bin Lamit, H.; Vigani, M. Investigating the Mental Health Impacts of University Campus Green Space Through Perceived Sensory Dimensions and the Mediation Effects of Perceived Restorativeness on Restoration Experience. *Front. Public Health* **2020**, *8*, 874. [CrossRef]
63. Gao, T.; Zhang, T.; Zhu, L.; Gao, Y.; Qiu, L. Exploring Psychophysiological Restoration and Individual Preference in the Different Environments Based on Virtual Reality. *Int. J. Environ. Res. Public Health* **2019**, *16*, 3102. [CrossRef]
64. van den Bogerd, N.; Dijkstra, S.C.; Seidell, J.C.; Maas, J. Greenery in the University Environment: Students' Preferences and Perceived Restoration Likelihood. *PLoS ONE* **2018**, *13*, e0192429. [CrossRef]
65. Grahn, P.; Stigsdotter, U.K. The Relation between Perceived Sensory Dimensions of Urban Green Space and Stress Restoration. *Landsc. Urban Plan.* **2010**, *94*, 264–275. [CrossRef]
66. Garau, C.; Annunziata, A.; Yamu, C. A Walkability Assessment Tool Coupling Multi-Criteria Analysis and Space Syntax: The Case Study of Iglesias, Italy. *Eur. Plan. Stud.* **2020**, 1–23. [CrossRef]
67. Sung, H.; Lee, S. Residential Built Environment and Walking Activity: Empirical Evidence of Jane Jacobs' Urban Vitality. *Transp. Res. Part D Transp. Environ.* **2015**, *41*, 318–329. [CrossRef]
68. Kellstedt, D.K.; Spengler, J.O.; Maddock, J.E. Comparing Perceived and Objective Measures of Bikeability on a University Campus: A Case Study. *SAGE Open* **2021**, *11*, 1–10. [CrossRef]
69. Afrooz, A.; White, D.; Parolin, B. Effects of Active and Passive Exploration of the Built Environment on Memory during Wayfinding. *Appl. Geogr.* **2018**, *101*, 68–74. [CrossRef]
70. Iftikhar, H.; Shah, P.; Luximon, Y. Human Wayfinding Behaviour and Metrics in Complex Environments: A Systematic Literature Review. *Archit. Sci. Rev.* **2021**, *64*, 452–463. [CrossRef]

71. Lee, J.; Shepley, M.M. College Campuses and Student Walkability: Assessing the Impact of Smartphone Use on Student Perception and Evaluation of Urban Campus Routes. *Sustainability* **2020**, *12*, 9986. [CrossRef]
72. Middleton, J. Sense and the City: Exploring the Embodied Geographies of Urban Walking. *Soc. Cult. Geogr.* **2010**, *11*, 575–596. [CrossRef]
73. King, S.B.; Kaczynski, A.T.; Knight Wilt, J.; Stowe, E.W. Walkability 101: A Multi-Method Assessment of the Walkability at a University Campus. *SAGE Open* **2020**, *10*, 1–9. [CrossRef]
74. Debener, S.; Minow, F.; Emkes, R.; Gandras, K.; de Vos, M. How about Taking a Low-Cost, Small, and Wireless EEG for a Walk? *Psychophysiology* **2012**, *49*, 1617–1621. [CrossRef] [PubMed]
75. Alexander Erath, R. Bike to the Future: Experiencing Alternative Street Design Options. Available online: https://blogs.ethz.ch/engagingmobility/2016/09/12/bike-to-the-future/ (accessed on 22 May 2022).