Annex 1

(All reviewed studies are fully cited in Tables 1 and 2. In the subsequent tables, these studies are referenced as needed, but their full citations remain available in Tables 1 and 2)

1. Initial analysis

The methodology used in this research is twofold. Initially, a general systematic review was conducted, aiming to investigate studies and research activities that examine the convergence of three pivotal terms: 'movement,' 'daylighting,' and 'architecture.' 'Movement' in architecture referred to the physical actions of users or occupants within a built space, while 'daylighting' in this context denoted the behavior of sunlight within a building and the resulting dynamic patterns it created daily, seasonally, or annually. Consequently, this review focuses on human responses to daylighting conditions in space, which can also be seen as user activities influenced by daylighting patterns. To ensure precision and comprehensiveness, the term "activity" was introduced as an alternative to "movement" in the search strategy (Fig. 1). It's essential to note that the choice of keywords for Scopus and Web of Science differed, aiming to obtain more precise and refined results (refer to phase 1 in Fig. 1). Furthermore, the selection of these keywords for review was guided by their frequent occurrence in discussions of movement within the relevant literature, as identified through a thorough scan of the topics, abstracts, and keywords in the primary search results. To elaborate further, two different search strategies but with main similar keywords have been applied to conduct the systematic review. The search strategy in the WOS database includes extra keywords such as 'behavior', and 'space. In addition, instead of 'movement pattern', 'physical activity', 'daylighting patterns', and 'building' in Scopus database, the terms 'human movement, 'occupant activity', 'sunlight', and 'interior' has been used in WOS data base. The reason to apply a slightly different search strategy other than the one in Scopus database was to not only narrow down the vast amount and sometimes irrelevant results, but also to add variety to the sources of the study.

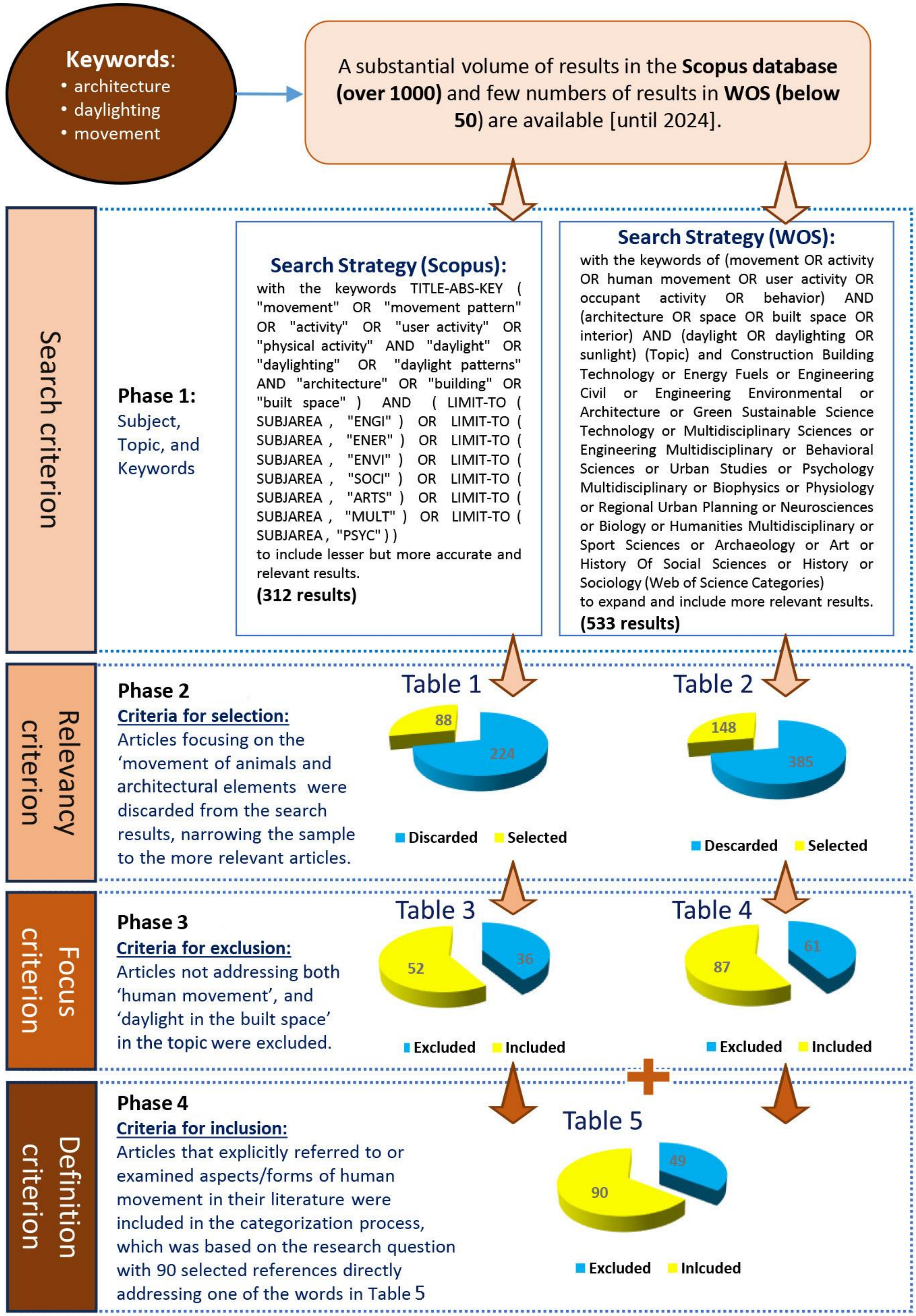

Fig. 1. The first systematic review approach involved multiple screening phases. In Phase 1, the screening was conducted by reviewing only the title and abstract of each paper. Phases 2 and 3 employed skim-reading for a more detailed assessment, while Phase 4 utilized scan reading techniques for an in-depth evaluation.

Table 1. References in Scopus database. Red and purple colors indicate irrelevant papers to the scope of review. Blue color is for the results that have analyzed a form of movement in the methodology section. Black color is for relevant results (the word 'relevant' is added to the bottom of the reference to emphasize on the relevancy)

Reference	Criteria for inclusion/exclusion
1. Pandya, S. V., & Brotas, L. (2014, December). Tall buildings and the urban microclimate in the city of London. In *30th international PLEA conference* (pp. 1-8).	In a study on tall buildings and urban bioclimates, **daylight availability** and overshadowing, and **vehicular & pedestrian movements** and activity patterns at street levels among 4 other environmental factors were studied
2. Ratajczak, K., Bandurski, K., & Płóciennik, A. (2022). Incorporating an atrium as a HAVC element for energy consumption reduction and thermal comfort improvement in a Polish climate. *Energy and Buildings*, *277*, 112592. **Relevant**	**Attractiveness of a central atrium for a social meeting place**
3. Huang, T. Y., Huang, P. Y., & Tsai, H. Y. (2022). Automatic design system of optimal sunlight-guiding micro prism based on genetic algorithm. *Developments in the Built Environment*, *12*, 100105. **Relevant**	**Sunlight-guiding micro prism based on the user's location**
4. Arango-Díaz, L., Hernandez, Y. A., Gallego, H. W., & Piderit-Moreno, M. B. (2022). Differences in perception of daylighting sufficiency related to the geographical location in the context of university classrooms. *Journal of Green Building*, *17*(2), 181-209.	differences in perception of daylighting sufficiency to perform typical reading and writing activities in cities with different latitudes
5. Koohsari, A. M., & Heidari, S. (2022). Subdivided venetian blind control strategies considering visual satisfaction of occupants, daylight metrics, and energy analyses. *Energy and Buildings*, *257*, 111767. **Relevant**	**the positions of the occupants and their activities were determined to be important parameters in deciding the most suitable blind strategy**
6. Fu, Y., Wu, Y., Gao, W., & Hui, R. (2022). The Effect of Daylight Illumination in Nursing Buildings on Reading Comfort of Elderly Persons. *Buildings*, *12*(2), 214.	Reading behavior of elders in nursing buildings
7. Sepulveda-Gil, G., Gonzalez-Trevizo, M., & Garcia-Gonzalez, A. (2022, July). Design of passive protection elements in buildings through the implementation of generative design. In *2022 7th International Conference on Smart and Sustainable Technologies (SpliTech)* (pp. 1-4). IEEE.	correct development of activities in interior spaces
8. Jens, K., & Khoudi, A. (2022). Using computer-vision sensors to study the impact of window views on occupancy and self-assessed productivity in flexible working environments: an intervention study. *Intelligent Buildings International*, 1-13.	**post-occupancy data. user experiences and human behaviour**
9. Fakhari, M., Fayaz, R., & Asadi, S. (2021). Lighting preferences in office spaces concerning the indoor thermal environment. *Frontiers of Architectural Research*, *10*(3), 639-651 **Relevant**	**Satisfaction with lighting level and the type of activity**
10. Parigi, D. (2021). The Parigi mechanism: A novel 1-DOF mechanism and its application as a kinetic reciprocal system (KRS) adaptive facade. *Nexus Network Journal*, *23*(3), 629-646.	Movement of louvre
11. Yang, H., Guo, B., Shi, Y., Jia, C., Li, X., & Liu, F. (2021). Interior daylight environment of an elderly nursing home in Beijing. *Building and Environment*, *200*, 107915.	**activity spaces, satisfaction with daylit environment**
12. Zhang, T., Baasch, G., Ardakanian, O., & Evins, R. (2021, June). On the joint control of multiple building systems with reinforcement learning. In *Proceedings of the Twelfth ACM International Conference on Future Energy Systems* (pp. 60-72).	building simulator that generates traces for the movement of occupants. Occupancy data
13. Lee, D., Cho, Y. H., & Jo, J. H. (2021). Assessment of control strategy of adaptive façades for heating, cooling, lighting energy conservation and glare prevention. *Energy and Buildings*, *235*, 110739.	movable shading device
14. Ahmed, E. B. (2021). Utilizing dynamic shading system to achieve daylight performance according to LEED standards V. 4: case	Shades movement

study, university classrooms in Egypt. *HBRC Journal*, *17*(1), 177-200.	
15. Zeibo, J., Mishra, M. K., Panda, A. R., Mishra, B. S. P., & Mallick, P. K. (2021). Pedestrian Trajectory Prediction in Crowd Scene Using Deep Neural Networks. In *Advances in Power Systems and Energy Management: Select Proceedings of ETAEERE 2020* (pp. 277-288). Springer Singapore.	tracking the movements of humans in a crowd
16. Kristo, S., & Kristo, X. (2021). Architectural Atmospheres: From Interior Towards Exterior. In *Handbook of Research on Methodologies for Design and Production Practices in Interior Architecture* (pp. 343-367). IGI Global.	Architectural atmospheres
17. Hosseini, S. M., Mohammadi, M., Schröder, T., & Guerra-Santin, O. (2020). Integrating interactive kinetic façade design with colored glass to improve daylight performance based on occupants' position. *Journal of Building Engineering*, *31*, 101404.	kinetic façades, triggered by **sun timing and occupants' positions**
18. HARERI, R., & ALAMA, A. (2020). Lighting Design in Two Mosque Typologies in the City of Jeddah, Saudi Arabia. *WIT Transactions on The Built Environment*, *197*, 125-137.	use of light in the mosque's interior, and the essential impact this has on psychological, physiological, and behavioural responses
19. Samadi, S., Noorzai, E., Beltrán, L. O., & Abbasi, S. (2020). A computational approach for achieving optimum daylight inside buildings through automated kinetic shading systems. *Frontiers of Architectural Research*, *9*(2), 335-349.	3d and 2d movement of the shading system
20. Flores-Villa, L., Unwin, J., & Raynham, P. (2020). Assessing the impact of daylight exposure on sleep quality of people over 65 years old. *Building Services Engineering Research and Technology*, *41*(2), 183-192. **Relevant**	how daylight exposure affects people in terms of **Physical activities** and sleep quality
21. Wu, Y., Kämpf, J. H., & Scartezzini, J. L. (2019). A survey study of occupants? visual satisfaction on an automated venetian blind based on sky luminance monitoring and lighting simulation. In *Proceedings of the ISES Solar World Congress 2019 and IEA SHC International Conference on Solar Heating and Cooling for Buildings and Industry* (pp. 685-692).	Shading device movement
22. Nasybullina, R., Slastenin, P., & Fadeev, A. (2019). Designing lightspace in contemporary architecture. In *E3S Web of Conferences* (Vol. 110, p. 01013). EDP Sciences. **Relevant**	**Lightspace design with time modeling (light dynamics, and movement of people in place)**
23. Ergan, S., Radwan, A., Zou, Z., Tseng, H. A., & Han, X. (2019). Quantifying human experience in architectural spaces with integrated virtual reality and body sensor networks. *Journal of Computing in Civil Engineering*, *33*(2), 04018062. **Relevant**	The study of **Human experience** in architectural space according to the design features such as the existence of **daylight**. Methods used are the fusion of VE with biometric sensors. Previously, the experience of architecture and daylight have been measured qualitatively based on Evidence-Based Design (EBD) by Post-Occupancy Evaluation (POE) including photograph documentation, interview, observation.
24. Nezamdoost, A., Mahic, A., & Van Den Wymelenberg, K. (2018, October). A human factors study to update a recently proposed manual blind use algorithm for energy and daylight simulations. In *IECON 2018-44th Annual Conference of the IEEE Industrial Electronics Society* (pp. 789-794). IEEE. **Relevant**	User behavior and blind movement
25. Naboni, E., Ricci, A., Ponzo, C., & Gaspari, J. (2018). Development of an Adaptive Passive Façade: A replicable approach for managing multiple design solutions. In *Smart and Healthy Within the Two-Degree Limit* (pp. 353-358).	Louvre movement
26. Fieldson, R., & Sodagar, B. (2017). Understanding user satisfaction evaluation in low occupancy sustainable workplaces. *Sustainability*, *9*(10), 1720.	post-occupancy evaluation (POE) and user satisfaction
27. Choi, S. J., Lee, D. S., & Jo, J. H. (2017). Lighting and cooling energy assessment of multi-purpose control strategies for external movable shading devices by using shaded fraction. *Energy and Buildings*, *150*, 328-338.	Shading device movement

28.	Gao, Y., Dong, J., Isabella, O., Zeman, M., & Zhang, G. Q. (2017, November). Daylighting simulation and analysis of buildings with dynamic photovoltaic window shading elements. In *2017 14th China International Forum on Solid State Lighting: International Forum on Wide Bandgap Semiconductors China (SSLChina: IFWS)* (pp. 52-55). IEEE.	Dynamic photovoltaic window with shading devices
29.	Jamaludin, A. A., Hussein, H., Keumala, N., & Ariffin, A. R. M. (2017). Post occupancy evaluation of residential college building with bioclimatic design strategies in tropical climate condition of malaysia. *Jurnal Teknologi*, *79*(4).	Post occupancy evaluation and living behavior
30.	Grobman, Y. J., Capeluto, I. G., & Austern, G. (2017). External shading in buildings: comparative analysis of daylighting performance in static and kinetic operation scenarios. *Architectural science review*, *60*(2), 126-136.	different dynamic louver movement scenarios
31.	Manurung, P. (2017). Daylighting and architectural concept of traditional architecture: The Tongkonan in Toraja, Indonesia. *A| Z ITU Journal of the Faculty of Architecture*, *14*(1), 111-126.	needs of functions and activities in the design of traditional daylighting
32.	Kaiwen, C., Kumar, A., Xavier, N., & Panda, S. K. (2016, November). An intelligent home appliance control-based on WSN for smart buildings. In *2016 IEEE International Conference on Sustainable Energy Technologies (ICSET)* (pp. 282-287). IEEE. **Relevant**	Adjustable daylighting to the occupant's activity based needs
33.	Antonis, K., & Aris, T. (2017). The impacts of a dynamic sunlight redirection system on the energy balance of office buildings. *Energy Procedia*, *122*, 38-43.	**Daylighting system** with **movable** mirrors and the capability of tracking the **movement of the sun** to project the natural light deep into space.
34.	Adam, M., Ab Ghafar, N., & Mustapha, T. (2016). An Investigation of the Significant Criteria of Vegetation Selection and Planting Arrangement in Designing Urban Nodes. *Journal of Design and Built Environment*, *16*(2). **Relevant**	Daylight intensity and **human and pedestrian activity**
35.	Liu, J., Zhang, W., Chu, X., & Liu, Y. (2016). Fuzzy logic controller for energy savings in a smart LED lighting system considering lighting comfort and daylight. *Energy and Buildings*, *127*, 95-104.	smart LED lighting system is installed can regulate lighting output automatically based on **users' movements**
36.	Xiong, J., & Tzempelikos, A. (2016). Model-based shading and lighting controls considering visual comfort and energy use. *Solar Energy*, *134*, 416-428.	Model based shading strategy in terms of frequency of shade movements and two other criteria.
37.	Guan, Y., & Yan, Y. (2016). Daylighting Design in classroom based on yearly-graphic analysis. *Sustainability*, *8*(7), 604. **Relevant**	**Energy saving design** based on the human activity and occupancy time as well as the dynamics of daylight and movement of the sun.
38.	Afacan, Y., & Demirkan, H. (2016). The influence of sustainable design features on indoor environmental quality satisfaction in Turkish dwellings. *Architectural Science Review*, *59*(3), 229-238. **Relevant**	Satisfaction evaluation of the occupants with **daily living activities** as one of the parameters showed that light dimmers and **control of daylighting systems** through operable windows have high impacts on the satisfaction level
39.	Figueiro, M. G., & Rea, M. S. (2016). Office lighting and personal light exposures in two seasons: Impact on sleep and mood. *Lighting Research & Technology*, *48*(3), 352-364. **Relevant**	Circadian dark-light and **Activity-rest patterns** relative to daylight availability in the space in two different seasons.
40.	Uriarte, U., Hernández, R. J., Zamora, J. L., & Isalgue, A. (2016). Side-view atmospheres under outdoor midday high luminance. *Buildings*, *6*(4), 53.	The studied fully glazed façades tend to provide fraught side-view atmospheres.
41.	Das, A., & Paul, S. K. (2015). Artificial illumination during daytime in residential buildings: Factors, energy implications, and future predictions. *Applied Energy*, *158*, 65-85. **Relevant**	The daytime artificial light requirements could be based on factors such as occupant behavior and daily activity schedule
42.	Darula, S., Christoffersen, J., & Malikova, M. (2015). Sunlight and insolation of building interiors. *Energy Procedia*, *78*, 1245-1250.	Quality of indoor environment and **stimulation of human activity** related to higher levels of illuminance in daylight design of buildings
43.	Park, S., Byun, J., Kang, B., Jeong, D., Lee, B., & Park, S. (2015). Design of an Energy-Aware LED Light System (EA-LLS) for Energy Saving and User Satisfaction through Daylight, Space and	Introduction of an energy aware LED light system to improve user satisfaction based on the analysis of the

	User Movement Analysis in Buildings. *IEICE TRANSACTIONS on Information and Systems*, *98*(10), 1861-1865. **Relevant**	**sun's position, the user's movement, and other environmental factors**
44.	Wanas, A., Aly, S., Farghal, A., & El-Dabaa, R. (2015). Use of Kinetic Facades to Enhance Daylight Performance in Office Buildings with Emphasis on Egypt Climate. *J. Eng. Appl. Sci*, *62*, 339-361.	Enhancement of daylight performance by the use of kinetic façade that suggests an optimum hourly pattern for louvers movement
45.	Kamaruzzaman, S. N., Edwards, R., Zawawi, E. M. A., & Che-Ani, A. I. (2015). Achieving energy and cost savings through simple daylighting control in tropical historic buildings. *Energy and Buildings*, *90*, 85-93. **Relevant**	The relationship of **lighting consumption and the activity of occupants and the use of daylight** inside a building.
46.	Fantauzzi, F., Belardi, P., Asdrubali, F., Schiavoni, S., & Sambuco, S. (2015). Integrated performance simulation of an innovative net zero energy modular building. Building Simulation Applications, 2nd IBPSA-Italy Conference Bozen-Bolzano.	Experiments with shipping container houses with movable furniture to provide different domestic activities during the day and contribution of daylighting. This experiments were conducted to propose net zero energy modular building design.
47.	Saranti, A., Tsoutsos, T., & Mandalaki, M. (2015). Sustainable energy planning. Design shading devices with integrated photovoltaic systems for residential housing units. *Procedia Engineering*, *123*, 479-487.	Comparing the daylight analysis value with human's comfort view of outside and the required energy to optimize the comfort in combination with the energy generated and the best suited space for the **everyday activities.**
48.	Zhou, X., Yan, D., Hong, T., & Ren, X. (2015). Data analysis and stochastic modeling of lighting energy use in large office buildings in China. *Energy and Buildings*, *86*, 275-287. **Relevant**	lighting energy use influenced by **occupant behavior** in buildings. **dynamics of lighting energy use** in buildings model for large office buildings was further developed to represent **diverse occupant activities**, at six different time periods throughout a day automatic daylighting controls
49.	Jin-gang, J., Yong-de, Z., & Shu, Z. (2014). Implementation of glass-curtain-wall cleaning robot driven by double flexible rope. *Industrial Robot: An International Journal*, *41*(5), 429-438.	Movement strategy of a cleaner robot for cleaning the glass-curtain-wall
50.	Carlos, J. S., & Martins, A. M. (2014). Daylight in a Cistercian heritage church in Lisbon, from rural to urban context. *Journal of Green Building*, *9*(3), 116-130. **Relevant**	Activities in a church and daylight conditions
51.	Mavromatidis, L. E., Marsault, X., & Lequay, H. (2014). Daylight factor estimation at an early design stage to reduce buildings' energy consumption due to artificial lighting: A numerical approach based on Doehlert and Box–Behnken designs. *Energy*, *65*, 488-502.	Estimation of daylight factor with regression models concerning the reduction of the use of artificial lighting (due to energy consumption) and **supply of natural light for internal human activities** and working.
52.	Pandya, S. V., & Brotas, L. (2014, December). Tall buildings and the urban microclimate in the city of London. In *30th international PLEA conference* (pp. 1-8).	In a study on tall buildings and urban bioclimates, **daylight availability** and overshadowing, and **vehicular & pedestrian movements** and activity patterns at street levels among 4 other environmental factors were studied
53.	Chaudhary, G., and Jain, T. (2014). Impact and feasibility analysis of an alternate illumination strategy to cut down on energy loads. 2014 International Conference on Efficient Building Design: Materials and HVAC Equipment Technologies, ICEBD-MET 2014, Pages 149 – 155.	improving illumination in workspaces to increase **productivity** and psychological health with natural light. A **heliodon** was used to replicate the movement of the sun
54.	Parise, G., Martirano, L., & Cecchini, G. (2013). Design and energetic analysis of an advanced control upgrading existing lighting systems. *IEEE Transactions on Industry Applications*, *50*(2), 1338-1347. **Relevant**	**Lighting control system** regulating the lights according to the **actual presence of activities** and the **actual availability of daylighting**.
55.	Aghemo, C., Blaso, L., & Pellegrino, A. (2014). Building automation and control systems: A case study to evaluate the energy and environmental performances of a lighting control system in offices. *Automation in Construction*, *43*, 10-22.	For managing the energy consumption **Lighting control systems** are developed based on the **occupancy of the space** and **daylight strategies**. In their research they evaluated the system regarding the potential energy savings by considering the two

	parameters of **monitored annual electric energy consumption** and the **parasitic energy consumption** because of the electric devices.
56. Andersen, M., Gochenour, S. J., & Lockley, S. W. (2013). Modelling 'non-visual'effects of daylighting in a residential environment. *Building and Environment*, *70*, 138-149. **Relevant**	In this study human **movement** is considered as a factor for **studying human circadian system** synchronization according to the amount of available daylight due to the **housing design**.
57. Ámundadóttir, M. L., Lockley, S. W., & Andersen, M. (2013). Simulation-based evaluation of non-visual responses to daylight: proof-of-concept study of healthcare re-design. In *BS 2013: 13th International Conference of the International Building Performance Simulation Association* (No. CONF). **Relevant**	'Appropriately-timed light exposure' is considered to be effective in the stimulation of **alertness and performance** which could be referred to as the **'dynamic behavior' of the non-visual system**. For the evaluation of **daylighting performance**, a simulation-based framework is proposed to study the influence of the **occupant's movements** and activities on simulation results from **light pattern generation methods**.
58. Korolija, I., Marjanovic-Halburd, L., Zhang, Y., & Hanby, V. I. (2013). UK office buildings archetypal model as methodological approach in development of regression models for predicting building energy consumption from heating and cooling demands. *Energy and Buildings*, *60*, 152-162.	**Occupancy density and metabolic rate** are studied as activity-related parameters along with daylight and solar control measures in **energy performance simulation**.
59. Chiogna, M., Frattari, A. (2013). Lighting control system: Energy efficiency and users' behavior in office buildings. Building Simulation Applications. Volume 2013-January, 1st IBPSA Italy ConferenceBozen-Bolzano, Pages 131 – 139. **Relevant**	Automation scenarios of **lighting control systems** that incorporate **user behavior** are studied for establishing a realistic baseline of the actual lighting energy consumption.
60. Janečková, L., Bošová, D. (2013). Daylight in interiors. Structures and Architecture: Concepts, Applications, and Challenges - Proceedings of the 2nd International Conference on Structures and Architecture, ICSA 2013, Pages 971 – 975.	Providing visual comfort for the user is subject to proper **visual activity** inside the interior because of the uniformity of daylighting and daylight factor
61. Nute, K., Weiss, A., Kaur-Bala, J., & Marrocco, R. (2013). The animation of the weather as a means of sustaining building occupants and the natural environment. *Int. J. Environ. Sustain*, *8*, 27-40.	In some sources, the animated movement of natural elements like daylighting is studied. **wind-animated indoor daylighting** is proven to have a calming effect on the occupants, but at the same time, the **natural movements** would act to get the level of occupant's alertness lower.
62. Wyns, B., Ionescu, C., Neamtu, D., De Keyser, R., De Maeyer, J., & Michielssens, M. (2012, May). An efficient closed loop control system to follow, capture and redirect daylight. In *2012 13th International Conference on Optimization of Electrical and Electronic Equipment (OPTIM)* (pp. 1058-1064). IEEE.	**tracking the behavior of a closed-loop control system** to follow, capture and redirect daylight has been studied.
63. Dixit, M. K., & Yan, W. (2012). BIPV prototype for the solar insolation calculation. In *ISARC. Proceedings of the International Symposium on Automation and Robotics in Construction* (Vol. 29, p. 1). IAARC Publications.	Building Integrated Photovoltaic (BIPV) movement according to the time and location information for the solar insolation calculation.
64. Van Den Wymelenberg, K. (2012). Patterns of occupant interaction with window blinds: A literature review. *Energy and buildings*, *51*, 165-176. **Relevant**	Patterns of **occupant interaction** with window blinds: A literature review
65. Sakarellou-Tousi, N., Lau, B. (2011). The visual environment in the vernacular dwellings at Mount Pelion, Greece. PLEA 2011 - Architecture and Sustainable Development, Conference Proceedings of the 27th International Conference on Passive and Low Energy Architecture, 13 July 2011 through 15 July 2011, Pages 849 – 854,	Investigation of the correlation between 'seasonal **migratory living patterns'**, 'occupant's social activity background', and the '**quest for light**'. **Sunlight and daylight behavior** availability and behavior are investigated inside the building.
66. Wang, N., & Boubekri, M. (2011). Design recommendations based on cognitive, mood and preference assessments in a sunlit workspace. *Lighting Research & Technology*, *43*(1), 55-72. **Relevant**	Changing the daylighting design guidelines to include **human activity** as a key design criterion as another physical parameter. This human activity is investigated as '**occupants' emotional, attitudinal, and cognitive responses** to various sunlight conditions.

67.	Bellazzi, A. (2010). Regulation and Control of Indoor Environment Daylight Quality-A Case Study. In *COBRA 2010-Construction, Building and Real Estate Research Conference of the Royal Institution of Chartered Surveyors*.	Establishment of the **minimum luminance value** correlated to specific activities.
68.	Yunus, J., Ahmad, S. S., & Zain-Ahmed, A. (2010, December). Analysis of atrium's architectural aspects in office buildings under tropical sky conditions. In *2010 International Conference on Science and Social Research (CSSR 2010)* (pp. 536-541). IEEE.	Improvement of **daylight performance** in atrium office typologies by consideration of **atrium usage/activity** among two other parameters of study.
69.	Wilke, D. A. (2010). Research low to zero net energy building. 39th ASES National Solar Conference 2010, SOLAR 2010, Volume 7, 17 May 2010 through 22 May 2010, Pages 5599 – 5623.	Development of a basis for **low to zero net energy building** in which 'Lighting control employs daylight and movement sensors with task lighting'.
70.	Dubois, C., Demers, C., & Potvin, A. (2009). Daylit spaces and comfortable occupants: A variety of luminous ambiences in support of a diversity of individuals. In *Proceedings of the PLEA*. **Relevant**	Study of the luminous condition of a real space, and the perceived comfort by the users through behavior mapping, written surveys, photography and digital image analysis.
71.	Wang, N., & Boubekri, M. (2009). A PROPOSAL FOR A BEHAVIORAL APPROACH TO DAYLIGHTING DESIGN. *Light & Engineering*, *17*(1). **Relevant**	"how daylighting affects our behavior and how architects might design accordingly." This research is about the study of **user's reactions** to the luminous space and **adjustment of their activities** accordingly.
72.	Beckers, B., & Rodriguez, D. (2009). Helping architects to design their personal daylight. *WSEAS Trans. Environ. Dev*, *5*(7), 467-477.	Discovering **Personal daylight** of architects based on aesthetic expression, geometrical control and environmental conscience
73.	Rezaee, R., Vakilinejad, R., & Shahzadeh, M. (2009). The"Shavadun" As An Ecological Solution For Architecture In A Hot Climate. *WIT Transactions on Ecology and the Environment*, *120*, 303-313.	In **traditional** Iranian architecture, some forms, elements, materials, and techniques of daylighting are used to create comfort. They are spaces designed for users to **'escape'** from the hot days. In some references this behavior is referred to as 'user migration'. (Rizi, 2022)
74.	Maxey, L. C. (2008). Flexible sunlight—the history and progress of hybrid solar lighting. *Emerging Environmental Technologies*, 83-104.	Introduction of **daylighting** strategies in non-residential buildings wherein the majority of the **activity** occurs during the day helps to reduce the **electrical lighting load** which leads to **energy saving**.
75.	Barr, V. (2008). Inside the daylectric design studio. Lighting Design and Application: LD and A, Volume 38, Issue 11, Pages 64 – 68. https://www.scopus.com/inward/record.uri?eid=2-s2.0-77954435423&partnerID=40&md5=722efc29529d50e7a1a43243ec42995e **Relevant**	**'Daylectric'** is a term introduced by () which refers to the 'fine art of combining daylight with electric light'. The objective of the design studio course in this research was to **bring activity** to the area in which Daylectric is practiced.
76.	Porteus, C. (2008). Shaping light and air. *Engineering & Technology*, *3*(9), 52-55.	The use of daylight without glare and solar overheating is the subject of this study. In this article, it is stated that the **dynamic patterns of sunlight and shade** could be emotionally satisfying if glare and overheating does not intervene with **activities**.
77.	Bruse, M. (2007). Simulating human thermal comfort and resulting usage patterns of urban open spaces with a multi-agent system. In *Proceedings of the 24th International Conference on Passive and Low Energy Architecture PLEA* (Vol. 24, pp. 699-706). **Relevant**	Study of the **attractiveness** of open public spaces by simulation of the thermal comfort of the pedestrians using multi-agent system (MAS) in different climate conditions. Sunlight and the mix of sun and shade play an important role in those climates. The **individual routing decisions**, and pedestrian motions have been simulated in this study.
78.	Lee, J. S., & Kim, B. S. (2007). Development of the nomo-graph for evaluation on discomfort glare of windows. *Solar energy*, *81*(6), 799-808.	In this study the difference between **ocular activity** of **Caucasian and Asian people** is considered in the development of a method for the evaluation of the **glare** from a daylit window.
79.	Fonseca, I., Porto, M. M., Fanchiotti, A., & Gonçalves, A. (2006). Natural Light and Environmental Stress. *23rd PLEA proceedings, Geneva, Switzerland*.	**Biological clock** and the relationship between **human activity and daylight**

80. Alzoubi, H. (2005, August). Optimizing Building Envelopes Performance by Using Photovoltaic Cells. In *3rd International Energy Conversion Engineering Conference* (p. 5626).	Daylight system that controls the movement of the blinds according to the dynamic position of the sun.
81. Koblarz, Ph., Taylor, B. (2005). Hrmonic convergence. *Fabric Architecture*Volume 17, Issue 3, Pages 52 – 55.	'Shadow screen' is the name of a **sculpture** made of a fabric that is animated by the **dynamics of daylight and the movement** of the observers.
82. Cheung, H. D., & Chung, T. M. (2005). Calculation of the vertical daylight factor on window facades in a dense urban environment. *Architectural Science Review*, *48*(1), 81-91.	"**Daylighting supports human activities** with energy savings and provides positive effects to human health."
83. Leslie, R. P. (2003). Capturing the daylight dividend in buildings: why and how?. *Building and environment*, *38*(2), 381-385.	**"Daylighting supports human activities** and health and reduces energy demand". "research suggests health, **productivity**, and economic benefits from daylighting"
84. Steemers, K. (1994). Daylighting design: Enhancing energy efficiency and visual quality. *Renewable Energy*, *5*(5-8), 950-958.	Emphasizing the importance of daylight in carrying out **activities** inside a building.
85. Ne'eman, E. (1984). A comprehensive approach to the integration of daylight and electric light in buildings. *Energy and Buildings*, *6*(2), 97-108.	Activity pattern is one of the important factors in designing an effective daylighting or integrated lighting within an interior space.
86. Shanus Michael D., Windheim Lee S., Riegel Robert J., Davy Kyle V. (1984). Lighting Design and Application: LD and A. Volume 14, Issue 3, Pages 30-34, 36-40	Daylighting requires a great deal of deep understanding of human activity within the building envelope.
87. Hunt, D. R. G. (1979). The use of artificial lighting in relation to daylight levels and occupancy. *Building and environment*, *14*(1), 21-33. **Relevant**	The **switching patterns** of the lights in the continuously and intermittently occupied spaces and its relationship with the **daylight availability** and levels.
88. Bell, J. A. M. (1973). Development and practice in the daylighting of buildings. *Lighting Research & Technology*, *5*(4), 173-185.	Daylight alone does not have the potential of providing enough illuminance for most of the **activities**.

Table 2. References in the WOS database

1. Nováková, P., & Vajkay, F. (2019). Factors influencing the value of daylight factor. In *MATEC Web Of Conferences* (Vol. 279, p. 03009). EDP Sciences. **Relevant**	Daylight factor and **visual activity**
2. Jens, K., & Khoudi, A. (2022). Using computer-vision sensors to study the impact of window views on occupancy and self-assessed productivity in flexible working environments: an intervention study. *Intelligent Buildings International*, 1-13. **Relevant**	The effect of the shading system on the **occupancy duration and counts,** and perceived **productivity**. Role of view and daylight on user **experience** and human **behavior**.
3. Sankaewthong, S., Horanont, T., Miyata, K., Karnjana, J., Busayarat, C., & Xie, H. (2022). Using a Biomimicry Approach in the Design of a Kinetic Façade to Regulate the Amount of Daylight Entering a Working Space. *Buildings*, *12*(12), 2089.	Kinetic façade using biomimicry approach
4. Coşkuner Pamuk, A., Taştemir, İ. A., & Arpacıoğlu, Ü. (2020). A comparative study on daylight performance of Konya mosques built in Anatolian Seljuk and Ottoman period. *ICONARP International Journal of Architecture and Planning*.	light factor and daylighting design criteria and **worshipping activities**
5. Pohl, J. (2011). Daylight Design Principles. Building science: concepts and application. Page 105-124. ISBN: 978-0-470-65573-3. https://www-1webofscience-1com-1x0yi0laf0022.han.bg.pg.edu.pl/wos/woscc/full-record/WOS:000336994500008	Controlled beams of **daylight** may add a **desirable degree of movement** to the **corridors and circulation spaces** that withhold the **transitory actions** of occupants
6. Hu, W., & Davis, W. (2021). Toward a Connected System—Understanding the Contribution of Light from Different Sources on Occupants' Circadian Rhythms. *Applied Sciences*, *11*(21), 9939.	**Occupant's activity** and **daylight entry to the eyes** to evaluate the circadian effects of light. "Light that enters humans' eyes and impacts circadian rhythms may come from various sources, including the **sun, electric lighting systems, and self-luminous displays**"
7. Azmi, N. A., Kandar, M. Z., & Toe, D. H. C. (2017). Daylight optimization for green office building: a study of west facing	**Daylight optimization or Optimum natural lighting for the required activities** in order to prevent

window design and configuration. *Advanced Science Letters*, *23*(9), 9177-9182. **Relevant**	discomfort due to excessive lighting or physical and psychological consequences due to poorly lit spaces
8. Villalba, A., Monteoliva, J. M., Rodríguez, R., & Pattini, A. (2018). A dynamic performance analysis of passive sunlight control strategies in a neonatal intensive care unit. *Lighting Research & Technology*, *50*(2), 191-204. **Relevant**	"**Appropriate layout of the space** for **different uses** according to surrounding building design and the characteristics of the local luminous climate can increase the **useful daylight illuminance**, while avoiding the incidence of direct sunlight at all times"
9. Moazzeni, M. H., & Ghiabaklou, Z. (2016). Investigating the influence of light shelf geometry parameters on daylight performance and visual comfort, a case study of educational space in Tehran, Iran. *Buildings*, *6*(3), 26.	Daylight simulation during **space occupation hours**
10. Nasrollahi, N., & Shokri, E. (2016). Daylight illuminance in urban environments for visual comfort and energy performance. *Renewable and sustainable energy reviews*, *66*, 861-874.	Daylighting as a passive energy-saving strategy helps to increase the liveliness, and performance of the occupants.
11. Das, A., & Paul, S. K. (2015). Artificial illumination during daytime in residential buildings: Factors, energy implications and future predictions. *Applied Energy*, *158*, 65-85. **Relevant**	"Factors like **changing sky luminance patterns**, **occupant behavior** influenced by age and eyesight, **daily activity schedule**, among other factors influence the requirement of **artificial illumination during daytime**.
12. Omar, O., García-Fernández, B., Fernandez-Balbuena, A. A., & Vázquez-Moliní, D. (2018). Optimization of daylight utilization in energy saving application on the library in faculty of architecture, design and built environment, Beirut Arab University. *Alexandria engineering journal*, *57*(4), 3921-3930. **Relevant**	Analysis of the existing **situations of daylighting**, artificial lighting, and **the user behavior** to propose a daylighting design in a library.
13. Yi, Y. K., Yin, J., & Tang, Y. (2018). Developing an advanced daylight model for building energy tool to simulate dynamic shading device. *Solar Energy*, *163*, 140-149.	**Dynamically tunable material** that changes its location to provide comfort for the occupants in accordance with the environmental conditions such as daylight.
14. Ma, J., & Yang, Q. (2022). Optimizing Annual Daylighting Performance for Atrium-Based Classrooms of Primary and Secondary Schools in Nanjing, China. *Buildings*, *13*(1), 11.	**Atrium** design is important because of its **accommodability for diverse activities**, therefore, **daylighting performance** of this public space gains more importance.
15. Darula, S., Christoffersen, J., & Malikova, M. (2015). Sunlight and insolation of building interiors. *Energy Procedia*, *78*, 1245-1250.	**Higher illuminance levels** are important for **stimulation of human activities**
16. Himmelstein, P., & Appelbaum, B. (2000). The paradox of artificial lighting in historic structures. In *The conservation of heritage interiors: preprints of a conference symposium 2000, Ottawa, Canada May 17 to 20, 2000= La conservation des intérieurs patrimoniaux: les prétirages de la conférence symposium 2000, Ottawa, Canada du 17 au 20 mai 2000* (pp. 157-160). **Relevant**	Lighting design in the **historic structures** in the form of **museums** is the subject of this study. The **original activities** inside the building were occurred close to the **windows** due to the incoming daylight, while, in the form of museum, the **'original daylighting schemes'** need to be reproduced while direct daylighting schemes needs to be reduced for preserving the collection.
17. Nasybullina, R., Slastenin, P., & Fadeev, A. (2019). Designing lightspace in contemporary architecture. In *E3S Web of Conferences* (Vol. 110, p. 01013). EDP Sciences. **Relevant**	In a study about the sensorial perception of the building relative to daylight, the idea of '**lightspace**' is introduced. Lightspace design techniques are proposed based on space, light, and time modeling. In the **modeling of time**, the dynamics of light, building transformation, and the **movement of people** in the place are considered.
18. Mohelnikova, J. (2007). Daylighting of attic rooms by dormers. *Leukos*, *3*(4), 249-258. **Relevant**	Comfort and illuminance for **visual activity** has been studied in attic rooms in respect with the dimension, and position of the dormer.
19. Andersen, M. (2015). Unweaving the human response in daylighting design. *Building and Environment*, *91*, 101-117. **Relevant**	Study of daylighting with respect to the **human physiology and` behavior**. In this study, the complexity of **human response** in daylit space with respect to the dynamic nature of daylight such as **stochastic weather patterns** and **sun course** is considered to discuss daylighting design strategies.

20.	Alwetaishi, M. (2021). Use of Underground Constructions Enhanced with Evaporative Cooling to Improve Indoor Built Environment in Hot Climate. *Buildings*, *11*(12), 573.	When there is discussion about user activity in the daylit space, the term '**user productivity'** would follow on.
21.	Ponzio, C., Ricci, A., Naboni, E., Fabbri, K., & Gaspari, J. (2018). Development of an Adaptive Passive Façade: A replicable approach for managing multiple design solutions. In *PLEA 2018—Smart and Healthy within the Two-Degree Limit, Proceedings of the 34th International Conference on Passive and Low Energy Architecture, Hong Kong, China, 10–12 December 2018* (Vol. 1). Troy, MI, USA: PLEA.	The passive movement of louvres according to the daylight and thermal conditions.
22.	Heydarian, A., Pantazis, E., Wang, A., Gerber, D., & Becerik-Gerber, B. (2017). Towards user centered building design: Identifying end-user lighting preferences via immersive virtual environments. *Automation in Construction*, *81*, 56-66. **Relevant**	A study on the **end-user lighting-related behavior** in was conducted to compare the preference of users for simulated daylight and electrical lighting.
23.	Dogan, T., & Stec, P. (2018). Prototyping a façade-mounted, dynamic, dual-axis daylight redirection system. *Lighting Research & Technology*, *50*(4), 583-595.	Dynamic behavior (movement of the shelves according to the sun position) and direct-reflection daylight redirection **architectural element** to increase daylight availability and energy saving.
24.	Parsaee, M., Demers, C. M., Lalonde, J. F., Potvin, A., Inanici, M., & Hébert, M. (2020). Human-centric lighting performance of shading panels in architecture: A benchmarking study with lab scale physical models under real skies. *Solar Energy*, *204*, 354-368. **Relevant**	Human-centric design by studying the relation of the **behavior of the shading panels** with the **biological response of the human eye** (including image-forming and non-image forming)
25.	Hourani, M. M., & Hammad, R. N. (2012). Impact of daylight quality on architectural space dynamics: Case study: City Mall–Amman, Jordan. *Renewable and Sustainable Energy Reviews*, *16*(6), 3579-3585.	Dynamic daylight variations at different locations of an **atrium** could create **dynamic space** and sufficient quantities of measured daylight for **atrium activities** which ultimately contribute to increase the **emotional and aesthetical aspects** of the architectural space.
26.	Bunthof, L. A. A., Kreuwel, F. P. M., Kaldenhoven, A., Kin, S., Corbeek, W. H. M., Bauhuis, G. J., ... & Schermer, J. J. (2016). Impact of shading on a flat CPV system for façade integration. *Solar energy*, *140*, 162-170.	**Sun tracking** shading device
27.	Malet-Damour, B., Bigot, D., Guichard, S., & Boyer, H. (2019). Photometrical analysis of mirrored light pipe: From state-of-the-art on experimental results (1990–2019) to the proposition of new experimental observations in high solar potential climates. *Solar Energy*, *193*, 637-653.	the **transportation of daylight** inside a building using **daylight guide system tubular daylight guide system (TDGS)**
28.	Pracki, P., Aslanoglu, R., Kazak, J. K., Ulusoy, B., & Yekanialibeiglou, S. (2022). Analysis of residential lighting in Poland: results from a winter term survey. *Bulletin of the Polish Academy of Sciences. Technical Sciences*, *70*(6).	Satisfaction level with daylighting in the **residential living space** and occupant's **perception of daylighting conditions** in the living areas.
29.	Rosemann, A., & Kaase, H. (2005). Lightpipe applications for daylighting systems. *Solar energy*, *78*(6), 772-780.	Hollow **daylight guide system** using heliostat and lightpipe
30.	Reinhart, C. F., & Wienold, J. (2011). The daylighting dashboard–A simulation-based design analysis for daylit spaces. *Building and environment*, *46*(2), 386-396. **Relevant**	**Occupant behavior model** (based on the **use** of lighting switch and shading device and the pattern of the **occupants' interaction** with the manual and automatic lighting controls and shading devices) has been considered together with the annual daylight glare probability profile to account for shading strategy and visual comfort conditions.
31.	Hammes, S., & Weninger, J. (2023). Measurement data on the window opening behavior and climate in a strongly daylit office building. *Data in Brief*, *46*, 108794.	Manual user interaction with daylighting device: **window opening behavior** in daylit office buildings has been considered along with the environmental variables to present a measurement data.
32.	Lee, J., & Boubekri, M. (2020). Impact of daylight exposure on health, well-being and sleep of office workers based on actigraphy, surveys, and computer simulation. *Journal of Green Building*, *15*(4), 19-42. **Relevant**	Well-being and sleep quality of **office workers** by the consideration of **daylight exposur**e and the use of **actigraphy** to assess the **cycles of activity and rest** over two weeks.
33.	Pan, W., & Du, J. (2022). Effects of neighbourhood morphological characteristics on outdoor daylight and insights for sustainable	To reach the goal to create a healthy city including **outdoor daylighting behavior** and energy use, the

	urban design. *Journal of Asian Architecture and Building Engineering*, *21*(2), 342-367. **Relevant**	relationship of urban **morphological patterns** such as the sky view factor, mean building height, ground surface albedo, and vertical uniformity with the **outdoor pedestrian daylighting** performances was investigated. **daytime pedestrian illumination** that affects heat and visual comfort would determine the **occupants' choices of location, duration of stay, and activities to participate in**.
34.	Heydarian, A., Pantazis, E., Carneiro, J. P., Gerber, D., & Becerik-Gerber, B. (2016). Lights, building, action: Impact of default lighting settings on occupant behaviour. *Journal of Environmental Psychology*, *48*, 212-223. **Relevant**	Study of the **occupants' rate of lighting adjustments** in office space and occupant's behavior in terms of **daily interaction with daylighting systems** to suggest a 'default setting technique' for more energy efficient choices of interaction.
35.	Phuong, N. T. K. (2018). Luminance distributions in the tropical sky conditions. *Magazine of Civil Engineering*, (8 (84)), 192-204.	"Many studies have proven the benefits of natural light on health, **activity**, visual well-being and **human productivity**."
36.	Tunahan, G. I., Altamirano, H., Teji, J. U., & Ticleanu, C. (2022). Evaluation of daylight perception assessment methods. *Frontiers in Psychology*, *13*. **Relevant**	Subjective rating of **seat preference** and the study of the **perceived boundary between daylit and non-daylit spaces** in a **library**. "daylight conditions could greatly impact individual mood, behaviour and **cognitive performance**"
37.	Samad, M. H. A., Aziz, Z. A., & Isa, M. H. M. (2017, October). Indoor environmental quality (IEQ) of school classrooms: Case study in Malaysia. In *AIP Conference Proceedings* (Vol. 1892, No. 1, p. 180001). AIP Publishing LLC.	**Daylight and activity** are two important variables affecting **thermal comfort** inside a building.
38.	Konis, K. (2018). Field evaluation of the circadian stimulus potential of daylit and non-daylit spaces in dementia care facilities. *Building and Environment*, *135*, 112-123.	**Rest-activity cycle** and **action spectrum** of people exposed to daylight in **care facilities**
39.	Day, J., Theodorson, J., & Van Den Wymelenberg, K. (2012). Understanding controls, behaviors and satisfaction in the daylit perimeter office: A daylight design case study. *Journal of Interior Design*, *37*(1), 17-34. **Relevant**	The study **of occupant use of daylight** and **daylight control** such as occupant **interaction** with furniture design and layout in daylit perimeter office with post occupancy evaluation.
40.	Zapata, O., & Honey-Rosés, J. (2022). The Behavioral Response to Increased Pedestrian and Staying Activity in Public Space: A Field Experiment. *Environment and Behavior*, *54*(1), 36-57.	The relationship of **daylight hours** in creating safe spaces with the behavioral response of **pedestrian movement and staying activity** in **public space**.
41.	Lolli, N., & Haase, M. (2017). Consequences of energy retrofitting on the daylight availability in Norwegian apartments. *Energy Procedia*, *132*, 903-908.	Investigation of the relationship of **daylight autonomy** with the electrical **use patterns** by the consideration of **occupancy hours and type of activity**.
42.	Cılasun Kunduracı, A., & Kazanasmaz, Z. T. (2019). Fuzzy logic model for the categorization of manual lighting control behaviour patterns based on daylight illuminance and interior layout. *Indoor and Built Environment*, *28*(5), 584-598. **Relevant**	Investigation of the **manual lighting control behavior patterns** as a function of **interior layout**, **daylight illuminance, and distance from the nearest window**.
43.	Lim, G. H., Keumala, N., & Ghafar, N. A. (2017). Energy saving potential and visual comfort of task light usage for offices in Malaysia. *Energy and Buildings*, *147*, 166-175.	Monitoring **lighting usage patterns** to explore **user behavior** toward task lighting and energy saving. The study didn't show any correlation between usage rate and the distance from the daylighting element.
44.	Chan, Y. W. E., Chien, S. C., Soong, B. H., & Tseng, K. J. (2014, April). WSN-based intelligent visual performance management in tropical buildings. In *2014 International Conference on Intelligent Green Building and Smart Grid (IGBSG)* (pp. 1-4). IEEE.	Proposing a **daylight-responsive lighting and shading system** to control both luminaire and blind activities based on the weather condition and **occupants' activities**.
45.	Uckok, I. T., Addington, M., & Felkner, J. (2021, November). The impact of daylight presence on cooling strategies: energy simulations of a test room in Austin, Texas, and Geneva, Switzerland. In *Journal of Physics: Conference Series* (Vol. 2042, No. 1, p. 012118). IOP Publishing.	Daylight exposure has a direct relationship with energy savings in high-temperature conditions because of the cooler temperature perceived by the occupants

46. Alhazzaa, K. (2020). Energy Reduction, Daylight and View Quality Assessment of a Passive Dynamic Facade in Hot Arid Climate. *ICONARP International Journal of Architecture and Planning*, *8*(2), 518-544.	Passive dynamic shading device for contribution to energy reduction, daylight availability, and providing view-out.
47. Amundadottir, M. L., Rockcastle, S., Khanie, M. S., & Andersen, M. (2017). A human-centric approach to assess daylight in buildings for non-visual health potential, visual interest and gaze behavior. *Building and Environment*, *113*, 5-21. **Relevant**	The study **of daylight-driven human response in terms of gaze behavior at eye level** by evaluation in a 3d rendered environment.
48. Favero, F., Lowden, A., Bresin, R., & Ejhed, J. (2023). Study of the Effects of Daylighting and Artificial Lighting at 59° Latitude on Mental States, Behaviour and Perception. *Sustainability*, *15*(2), 1144. **Relevant**	Study of **indoor daylit spaces and their impact on the behavior and amount of activity** of the occupants in the Scandinavian winter time for energy savings and wellbeing.
49. Soni, P., Fetty, B., Salsabila, P., & Rahma, H. (2021). Natural daylighting performance at stilt house in jambi city. *Journal of Applied Science and Engineering*, *25*(1), 223-229.	Providing the **visual comfort standard for activity** by the study of the **characteristics of a window** by considering natural daylighting performance in a stilt house.
50. Shen, H., & Tzempelikos, A. (2017). Daylight-linked synchronized shading operation using simplified model-based control. *Energy and Buildings*, *145*, 200-212.	Movement of the shades to maximize daylight availability while providing occupant comfort.
51. Webb, A. R. (2006). Considerations for lighting in the built environment: Non-visual effects of light. *Energy and Buildings*, *38*(7), 721-727. **Relevant**	The importance of the **design of daylight** according to the **expected tasks** within a space and its impact on **mood and behavior** of occupants and benefits of **Vitamin D synthesis.**
52. Nezamdoost, A., Van Den Wymelenberg, K., & Mahic, A. (2018). Assessing the energy and daylighting impacts of human behavior with window shades, a life-cycle comparison of manual and automated blinds. *Automation in Construction*, *92*, 133-150. **Relevant**	The study of the efficacy of **manual Blind use patterns** by comparing to automatic shading systems.
53. Abidi, S., & Rajagopalan, P. (2020). Investigating daylight in the apartment buildings in Melbourne, Australia. *Infrastructures*, *5*(10), 81.	Improving effect of daylighting on **the user's experience** including "visual comfort, aesthetics, behaviour and perception of space" and the investigation of daylight in **high rise living buildings**.
54. Mashaly, I. A., Nassar, K., & El-Haggar, S. (2018). Mathematical model for designing a light redirecting prismatic panel. *Solar Energy*, *159*, 638-649.	**Daylight redirection system** or fenestration system introduced as prismatic panel to avoid cave effect in buildings
55. Dolnikova, E., Katunsky, D., & Darula, S. (2020). Assessment of overcast sky daylight conditions in the premises of engineering operations considering two types of skylights. *Building and Environment*, *180*, 106976.	The study of skylights in industrial facilities to achieve a standard lighting condition for **activities in working spaces.**
56. Lasagno, C. M., Pattini, A. E., Rodriguez, R. G., & Colombo, E. M. (2011). Developing a modelling factor index for transition spaces: A case study approach. *Architectural Science Review*, *54*(3), 215-224. **Relevant**	The study of **transitional spaces** in order to find favorable conditions for user's visual adaptation.
57. González, R., Pérez, L., Bravo, G., González, E., & Tsoi, E. (2008). Daylighting evaluation of the prototype bioclimatic house (VBP-1). *Revista Tecnica DE LA Facultad DE Ingenieria Universidad DEL Zulia*, *31*(1), 58-70.	It is important that indoor spaces should be improved in terms of daylighting to provide **comfort for human activities.**
58. Sanati, L., & Utzinger, M. (2013). The effect of window shading design on occupant use of blinds and electric lighting. *Building and Environment*, *64*, 67-76.	The study of the **behavior of occupants** in terms of **shading control** of a **light-shelf and a conventional window**.
59. Rockcastle, S., Ámundadóttir, M. L., & Andersen, M. (2017). Contrast measures for predicting perceptual effects of daylight in architectural renderings. *Lighting Research & Technology*, *49*(7), 882-903.	**Perceptual responses** to the daylight
60. Ouahrani, D. (2012). Assessment of climate adaptation of youth club in Tozeur, South of Tunisia. *Energy Procedia*, *30*, 1205-1215.	In an evaluation about the subject of **post occupancy** in a building, two factors including the impact of the daylit space on the **space use** and the impact of the **users** on the building's thermal performance have been investigated qualitatively

61. Panahiazar, S., & Matkan, M. (2018). Qualitative and quantitative analysis of natural light in the dome of San Lorenzo, Turin. *Frontiers of Architectural Research*, *7*(1), 25-36. **Relevant**	study of the **subjective experience** in a baroque style **church** based on luminous measurement technique to analyze **daylight behavior** in the perforated dome.
62. Bellazzi, A., Bellia, L., Chinazzo, G., Corbisiero, F., D'Agostino, P., Devitofrancesco, A., ... & Salamone, F. (2022). Virtual reality for assessing visual quality and lighting perception: A systematic review. *Building and Environment*, *209*, 108674. **Relevant**	A systematic review about the use of **virtual reality** with its immersive and interactive environment to study **daylit spaces** and their impact on **user's behavior and perception**. "Previous research is classified into 1) studies focused on the comparability between lighting conditions in VR and real environments; 2) studies about users' perception and behavior with respect to lighting scenarios in VR; and 3) studies exploiting VR for lighting design"
63. Elliott, L. R., White, M. P., Sarran, C., Grellier, J., Garrett, J. K., Scoccimarro, E., ... & Fleming, L. E. (2019). The effects of meteorological conditions and daylight on nature-based recreational physical activity in England. *Urban Forestry & Urban Greening*, *42*, 39-50.	The study of **daylight** and meteorological conditions on **recreational physical activities** in natural environment such as **parks**.
64. Sun, Y., Liang, R., Wu, Y., Wilson, R., & Rutherford, P. (2018). Glazing systems with Parallel Slats Transparent Insulation Material (PS-TIM): Evaluation of building energy and daylight performance. *Energy and buildings*, *159*, 213-227.	The study **of thermal and optical behavior** of **glazing systems**.
65. Rakha, T., Chen, Y., & Reinhart, C. (2018, September). Do office buildings 'save'energy in the United States due to Daylight Saving Time (DST)? A 50-State simulation-based study. In *Proceedings of the 2018 Building Performance Analysis Conference and SimBuild co-organized by ASHRAE and IBPSA-USA, Chicago, IL, USA* (pp. 26-28).	The investigation of **Daylight-Saving Time (DST)** through 'lightswtich' model to study **user behavior in artificial lighting**.
66. Khidmat, R. P., & Fukuda, H. (2022). Design Optimization of Hyperboloid Wooden House Concerning Structural, Cost, and Daylight Performance. *Buildings*, *12*(2), 110.	A study on the daylight optimization according to the daylight objectives, **unit movement** of the glazing system.
67. The New York Times headquarters daylighting mockup: Monitored performance of the daylighting control system	Daylighting control system
68. Konstantzos, I., & Tzempelikos, A. (2017). Daylight glare evaluation with the sun in the field of view through window shades. *Building and Environment*, *113*, 65-77.	The evaluation of **daylight glare probability** through window shades by involving human subjects while performing **office task activities**.
69. Sari, D. P., & Chiou, Y. S. (2019). Do Energy Conservation Strategies Limit the Freedom of Architecture Design? A Case Study of Minsheng Community, Taipei, Taiwan. *Sustainability*, *11*(7), 2003. **Relevant**	**Energy consumption rate or pattern** is considered as **occupant behavior** when daylight exposure in the space is considered as a factor of energy reduction.
70. Clevenger, C. M., & Rogers, Z. (2016, November). Manual Shade Control Simulation, Algorithm and Impact: Short Paper. In *Proceedings of the 3rd ACM International Conference on Systems for Energy-Efficient Built Environments* (pp. 143-146). **Relevant**	**Human control of shading device and blinds or manual shade control** is considered as **occupant behavior**. in this paper occupant behavior is modeled through analysis in granular algorithms.
71. Jiang, Y., Li, N., Yongga, A., & Yan, W. (2022). Short-term effects of natural view and daylight from windows on thermal perception, health, and energy-saving potential. *Building and Environment*, *208*, 108575.	The effect of daylight from a visual window on the **thermal perception** and energy saving and occupant's tolerance to the thermal environment. **'Occupant's tolerance to the thermal environment'** has direct effect on human's behavior.
72. Salem, D., & Elwakil, E. (2017). Daylighting-based assessment of occupant performance in educational buildings. *Journal of Professional Issues in Engineering Education and Practice*, *143*(1), 04016014.	The study of **occupant's behavioral factors** impacting the suage of lighting in order to develop occupant performance assessment model that investigates the impact of desired lighting factors on the **daylighting in office buildings**. These behavioral factors include 11 factors under the three main categories of environmental, physical, and policy-related factors.
73. Villalba, A. M., Monteoliva, J. M., & Pattini, A. E. (2016). Visual amenity: Shading systems. *Arquiteturarevista*, *12*(1), 71.	As a relative subject to the **people's behavior** and their impression of the indoor space, **visual amenity** (pleasantness or attractiveness of a place) of the daylit

		space provided by shading systems (solar control films, venetian blinds, louvers, and curtains) has been studied in terms of the **proper implementation of the shading systems**.
74.	Kyle Konis, A. I. A. (2013). The influence of occupant behavior on facade solar transmission: discrepancies between observed shade control behavior and simulation-based shade control models. *ASHRAE Transactions*, *119*, M1.	Discussion about the implications of **shading control behavior** for compliance with **green strategies.**
75.	Gilani, S., O'Brien, W., Gunay, H. B., & Carrizo, J. S. (2016). Use of dynamic occupant behavior models in the building design and code compliance processes. *Energy and Buildings*, *117*, 260-271. **Relevant**	The representation of the **dynamic occupant-building interactions** to study energy predictions in the form of stochastic **occupant behavior models**.
76.	Saranti, A., Tsoutsos, T., & Mandalaki, M. (2015). Sustainable energy planning. Design shading devices with integrated photovoltaic systems for residential housing units. *Procedia Engineering*, *123*, 479-487. **Relevant**	Optimization of comfort for the most convenient space for **everyday activity** by trying to integrate flexible shadings for **better use of the external space as a connected space to the internal place**.
77.	Kim, H., & Clayton, M. J. (2020). A multi-objective optimization approach for climate-adaptive building envelope design using parametric behavior maps. *Building and environment*, *185*, 107292.	**Parametric behavior mapping** (PBM) to study dynamic operation scenarios of Climate Adaptive Building Envelope (CABE) by the consideration of maximizing daylight performance.
78.	TIM-PCM external wall system for solar space heating and daylighting	Thermal-optical behavior of external wall system
79.	Yamín Garretón, J. A., Rodriguez, R. G., & Pattini, A. E. (2016). Glare indicators: an analysis of ocular behaviour in an office equipped with venetian blinds. *Indoor and Built Environment*, *25*(1), 69-80. **Relevant**	**ocular behavior of office workers** in terms of office tasks that are **reading from a screen and from a paper, writing, and socializing**. This experiment is to evaluate glare.
80.	Lighting and cooling energy assessment of multi-purpose control strategies for external movable shading devices by using shaded fraction	Defining an algorithm for external movable shading device that allows preferred operation purposes by the users based on the obtained range of allowable shading device movement
81.	Miguet, F., & Groleau, D. (2002). A daylight simulation tool for urban and architectural spaces—application to transmitted direct and diffuse light through glazing. *Building and environment*, *37*(8-9), 833-843.	Model for the **physical behavior of the daylight** based on the level of transparency.
82.	Osorio-Schmied, E. (2021). Light Mantle: Quantifying Daylight Perception in Edward Hopper's Spaces. *Leonardo*, *54*(5), 529-532.	**Performance of daylight** in a certain precinct and its connection with the **sensory memory (registers)**.
83.	Atzeri, A. M., Cappelletti, F., Tzempelikos, A., & Gasparella, A. (2016). Comfort metrics for an integrated evaluation of buildings performance. *Energy and Buildings*, *127*, 411-424.	Movement could be referred to as **actions and operations that would negatively affect the energy efficiency targets** in the absence of visual and thermal **comforts**. This paper discusses the possibility of different **window** and shading configurations in providing the required comfort by solar and daylight gains.
84.	Katsanou, V. N., Alexiadis, M. C., & Labridis, D. P. (2019). An ANN-based model for the prediction of internal lighting conditions and user actions in non-residential buildings. *Journal of Building Performance Simulation*, *12*(5), 700-718.	In a study to model **user actions** and lighting conditions, the **usage of blinds** in a working environment is considered.
85.	Kim, D. D., Lee, E., So, M. G., & Kim, T. (2019). A simplified approach to predict temperature distributions in a mechanically ventilated atrium using a thermal response factor method. *Indoor and Built Environment*, *28*(8), 1018-1030.	The study of the **atrium** as an **architectural daylighting space** in terms of daylight performance by considering thermal behavior.
86.	Almaiyah, S., & Elkadi, H. (2012). Study on the visual performance of a traditional residential neighborhood in old Cairo. *Journal of Urban Technology*, *19*(4), 59-86.	The study of **daylight behavior** in a **pedestrian historic alleyway** and house in terms of a sense of identity and visual experience given by daylight components.
87.	La Garce, M. (2004). Daylight interventions and Alzheimer's behaviors-A twelve-month study. *Journal of Architectural and Planning Research*, 257-269.	The study of the effect of daylighting conditions and effects in a daylit space on the disruptive **behavior of individuals** to propose design criteria for **care facilities**.

88.	Baehr-Bruyère, J., Chamilothori, K., Vassilopoulos, A. P., Wienold, J., & Andersen, M. (2019, November). Shaping light to influence occupants' experience of space: a kinetic shading system with composite materials. In *Journal of Physics: Conference Series* (Vol. 1343, No. 1, p. 012162). IOP Publishing.	The **enhancement of the occupant experience** of the daylit space through shaping daylight by **kinetic blinds** that control the blinds openings.
89.	Gunay, H. B., O'Brien, W., Beausoleil-Morrison, I., & Gilani, S. (2017). Development and implementation of an adaptive lighting and blinds control algorithm. *Building and Environment*, *113*, 185-199.	**Reducing the lighting loads** inside office buildings by applying adaptive lighting and **blind control systems** developed by analyzing the light **switch-on and blind closing behaviors**.
90.	Samadi, M., & Fattahi, J. (2021). Energy use intensity disaggregation in institutional buildings–A data analytics approach. *Energy and Buildings*, *235*, 110730.	Peripheral parameters such as **occupancy load** (number of occupants), **workday**, and **daylight** (in terms of time and intensity) have been considered to address energy use intensity information for institutional buildings.
91.	Anzaniyan, E., Alaghmandan, M., & Montaser Koohsari, A. (2022). Design, fabrication and computational simulation of a bio-kinetic facade inspired by the mechanism of the Lupinus Succulentus plant for daylight and energy efficiency. *Science and Technology for the Built Environment*, *28*(10), 1456-1471.	Designing a **bionic kinetic façade** based on a plant's sun-tracking movement mechanism.
92.	Heydarian, A., Carneiro, J. P., Pantazis, E., Gerber, D., & Becerik-Gerber, B. (2015). Default conditions: a reason for design to integrate human factors. In *Sustainable Human–Building Ecosystems* (pp. 54-62). **Relevant**	Understanding the **default daylighting setting** and its impact on the **rate of adjustment of the shades by the occupants** in order to increase daylight performance and prevent energy loss.
93.	Frontini, F., & Kuhn, T. E. (2012). The influence of various internal blinds on thermal comfort: A new method for calculating the mean radiant temperature in office spaces. *Energy and Buildings*, *54*, 527-533.	**Human behavior as a consequential phenomenon of human comfort** is affected by the daylighting systems and it is necessary to evaluate their impact.
94.	Zacharias, J., Stathopoulos, T., & Wu, H. (2001). Microclimate and downtown open space activity. *Environment and Behavior*, *33*(2), 296-315.	Daylight (or sunlight) as a microclimatic factor would affect human comfort and consequently human behavior in open space
95.	MaríaD, J. D., Martínez-De Dios JuanL, M. C., Antonio, R. J. J., Carmen, M. G., & Alejandro, J. S. (2022). Solar geometry and the organization of the annual cycle through architecture and the funerary landscape in Qubbet el Hawa. *Mediterranean Archaeology and Archaeometry*, *22*(2), 209-235.	Sunlight in ancient **Egyptian tombs** was acting as a **transitional threshold** in letting the light indoors through the doorway, therefore, the longitudinal axes were oriented according to the **solar geometry**.
96.	Kómar, L., & Kocifaj, M. (2019). An accurate prediction of daylight pipe harvesting of interior space. *Applied Sciences*, *9*(17), 3552.	Modeling the behavior of daylight guiding system (or daylight pipe harvesting system) under different sky types.
97.	Fakhari, M., Fayaz, R., & Asadi, S. (2021). Lighting preferences in office spaces concerning the indoor thermal environment. *Frontiers of Architectural Research*, *10*(3), 639-651.	The **type of activity** in office spaces is considered as individual parameter and it has impact on the **satisfaction with the daylighting level**.
98.	Reynaud, E., Pottelette, J., Rabot, J., Rolling, J., Royant-Parola, S., Hartley, S., ... & Schröder, C. M. (2022). Differential effects of COVID-related lockdown on sleep–wake rhythms in adults with autism spectrum disorder compared to the general population. *Autism Research*, *15*(5), 945-956. **Relevant**	**Physical activity and daylight exposure** have been considered as two parameters to study the **sleep-wake rhythms and behavio**r during the **covid** lockdown period.
99.	Zhang, Y., Liu, J., Zheng, Z., Fang, Z., Zhang, X., Gao, Y., & Xie, Y. (2020). Analysis of thermal comfort during movement in a semi-open transition space. *Energy and Buildings*, *225*, 110312. **Relevant**	The study of **thermal comfort during movement** in the **transitional daylit space** considers the dynamic changes in the physiological parameters and **walking activities**. Metabolic rate, heart rates, human body temperature, auditory canal temperatures, thermal sensations, heat storage of the human body, and heat exchange were measured and calculated to conduct the research.
100.	Zacharias, J., Stathopoulos, T., & Wu, H. (2004). Spatial behavior in San Francisco's plazas: The effects of microclimate, other people, and environmental design. *Environment and behavior*, *36*(5), 638-658.	The study of the effects of **moving behavior of people** and **sunlight** as two parameters of spatial behavior and microclimate, respectively, were studied all together with respect to **environmental design** in a case study (San Francisco **Plazas**).

101. Bian, Y., Leng, T., & Ma, Y. (2018). A proposed discomfort glare evaluation method based on the concept of 'adaptive zone'. *Building and Environment*, *143*, 306-317. **Relevant**	The concept of the **'adaptive zone'** has been applied in research to propose a method for the evaluation of **discomfort glare** to reduce and predict it in **office buildings**. The measurements have been conducted by computer modeling and rendering in addition to scene photography to study the impact of the two parameters that define an adaptive zone. These parameters are **view-direction rotation** and **position shifting range** (view-direction shift).
102. Veitch, J. A., & Gifford, R. (1996). Assessing beliefs about lighting effects on health, performance, mood, and social behavior. *Environment and Behavior*, *28*(4), 446-470.	**Daylighting** and social settings that **nurture social behavior** have been considered interpretable components of minor health effects to assess the '**Lighting Beliefs**' of the occupants. This study will help designers to expand their knowledge about the user's concerns about lighting.
103. Pechacek, C. S., Andersen, M., & Lockley, S. W. (2008). Preliminary method for prospective analysis of the circadian efficacy of (day) light with applications to healthcare architecture. *Leukos*, *5*(1), 1-26. **Relevant**	The relationship between **human performance** and the **temporal potential of daylighting** has been studied as a correlation between the human **circadian pacemaker** (referred to as the endogenous clock) and **daily rhythms in physiology and behavior**. This study has been based on photobiology in **healthcare architecture**.
104. Zhu, P., Gilbride, M., Yan, D., Sun, H., & Meek, C. (2017, December). Lighting energy consumption in ultra-low energy buildings: Using a simulation and measurement methodology to model occupant behavior and lighting controls. In *Building Simulation* (Vol. 10, pp. 799-810). Tsinghua University Press.	The study of the probable impact of occupant behavior on energy saving in terms of lighting use. Therefore, **lighting control and daylighting strategies** have been introduced as keys for energy efficiency.
105. Heidari Matin, N., & Eydgahi, A. (2022). A data-driven optimized daylight pattern for responsive facades design. *Intelligent Buildings International*, *14*(3), 363-374.	The assessment of the **visual performance** of a **responsive façade** by the consideration of optimum angle movements according to the hourly daylight patterns.
106. Bournas, I., & Dubois, M. C. (2020). Residential electric lighting use during daytime: A field study in Swedish multi-dwelling buildings. *Building and Environment*, *180*, 106977. **Relevant**	The evaluation of the behavior of the occupants regarding the **lighting use** in **daylight hours** in **residential buildings**. This evaluation was done to examine the effect of the design and orientation of the building on the '**switch-on behavior**' and further suggest **daylight design criteria**.
107. Charpentier, V., Meggers, F., Adriaenssens, S., & Baverel, O. (2020). Occupant-centered optimization framework to evaluate and design new dynamic shading typologies. *PloS one*, *15*(4), e0231554.	In a study to develop an **occupant-centered** optimization, the goal was to reach an optimal **kinematic design for dynamic solar shading** for increasing thermal and visual comfort.
108. Avila Ramirez, D. C., & Arias Orozco, S. (2015). The building envelope and its influence on natural lighting. *REVISTA HABITAT SUSTENTABLE*, *5*(1), 44-53.	At least a minimum percentage of **daylight factor** without interference in **visual activity** is required to accomplish **specific tasks** in **workplaces** according to the different finishes on the interior surface and their assigned photometry and involvement in daylight distribution.
109. Malet-Damour, B., Boyer, H., Fakra, A. H., & Bojic, M. (2014). Light Pipes Performance Prediction: inter model and experimental confrontation on vertical circular light-guides. *Energy Procedia*, *57*, 1977-1986.	The study of Daylight guidance systems to predict the performance of vertical circular light-guides
110. Guzmán, J. R. L., & Ormaza, M. V. (2022, January). Use and Application of Symbolic Solar Lighting in Mayan and Inca Architecture: A Literary Review. In *Proceedings of 2021 4th International Conference on Civil Engineering and Architecture* (pp. 555-563). Singapore: Springer Nature Singapore.	The **symbolic usage** of daylight according to the **solar movement** in **ancient architecture** of Maya and Inca.
111. Hemaida, A., Ghosh, A., Sundaram, S., & Mallick, T. K. (2021). Simulation study for a switchable adaptive polymer dispersed liquid crystal smart window for two climate zones (Riyadh and London). *Energy and Buildings*, *251*, 111381.	Switchable smart window (Polymer dispersed liquid crystal (PDLC))

112. Andersen, M. (2002). Light distribution through advanced fenestration systems. *Building Research & Information*, *30*(4), 264-281.	The study of **the photometric properties of fenestration systems** to understand **daylighting behavior** using a digital imaging-based photogoniometer
113. Yoon, J., & Bae, S. (2020). Performance evaluation and design of thermo-responsive SMP shading prototypes. *Sustainability*, *12*(11), 4391.	The study of the smart materials such as Shape Memory Polymer (SMP) that are **thermo-responsive** and change their property (deformation, shape-changing, and shape memory effect) according to the daylight radiation
114. Sokol, N., Kurek, J., Martyniuk-Peczek, J., Amorim, C. N. D., Vasquez, N. G., Kanno, J. R., ... & Matusiak, B. (2022). Boundary conditions for non-residential buildings from the user's perspective: literature review. *Energy and Buildings*, 112192. **Relevant**	**Boundary condition factors B/C** are different factors shaping the environment that help to understand non-residential buildings concerning **user behavior and lighting** or help to explain occupant's behavior and **the use of space**
115. Hasanzade, M. P., & van Oel, C. J. (2022). Passengers' preferences for architectural design characteristics in the design of airport terminals. *Architectural Engineering and Design Management*, 1-16.	The impact of **cultural and geographical differences** on the **passenger's preference** for the amount of **daylight** from the certain shape of ceiling in a **terminal**.
116. Chyon, G., & Sadar, J. S. (2013). The dematerializing and rematerializing of design. *Craft Research*, *4*(1), 53-72.	By taking **immateriality (sunlight)** in design and experience into account, an artifact has been introduced to **dematerialize and rematerialize the design**. This materializing of immateriality has been formed in the shape of 'a window installation that amplifies the changing light' and it is referred to as **'Liquid Sky'**.
117. Graving, J. M., Bingman, V. P., Hebets, E. A., & Wiegmann, D. D. (2017). Development of site fidelity in the nocturnal amblypygid, Phrynus marginemaculatus. *Journal of Comparative Physiology A*, *203*, 313-328.	Change in the movement and the use of space in the shelter according to daylight hours and shielded daylight in animal navigation behavior
118. Warren, K., Milovanovic, J., & Kim, K. H. (2023). Effect of a Microalgae Facade on Design Behaviors: A Pilot Study with Architecture Students. *Buildings*, *13*(3), 611. **Relevant**	The effect of **Biochromic window** in **Microalgae façade** on **creative and psychological responses** (design behavior of designers or students) in **educational settings** or, in other words, **human behavior in space**.
119. García-Fernández, B., Vázquez-Moliní, D., Fernandez-Balbuena, A. A., & Bernabeu, E. (2012, December). Light output losses of prism light guides. In Optical Systems Design 2012 (Vol. 8550, pp. 811-817). SPIE.	The **transmittance of daylight** into the deep spaces via **Cylindrical prismatic hollow light guides** and the study of the behavior of the prism film in assessing the effectiveness of the **daylight guidance system**.
120. Parise, G., Martirano, L., & Parise, L. (2015). A procedure to estimate the energy requirements for lighting. *IEEE Transactions on Industry Applications*, *52*(1), 34-41. **Relevant**	Estimation of the **energy** requirements of lighting in a building to highlight the improvements of **lighting standards** by consideration of the influence of **daylight exploitation, and occupancy behavior**.
121. Zhang, Y., & Barrett, P. (2012). Factors influencing occupants' blind-control behaviour in a naturally ventilated office building. *Building and environment*, *54*, 137-147. **Relevant**	Study of the variables affecting blind usage (**lowering and raising action**) considering **occupant's sensation and experience of the place** in the **office**. **Solar radiation and solar altitudes** seem to be highly determinant in this case along with seasonal effects when building orientation is considered. Surprisingly, there is a different **blind usage behavior** in **non-office** buildings.
122. Guo, F., Wang, Z., Dong, J., Zhang, H., Lu, X., Lau, S. S. Y., & Miao, Y. (2022). Spatial differences in outdoor thermal comfort during the transition season in cold regions of China. *Buildings*, *12*(6), 720.	Facilitation of **pedestrian outdoor activities** by optimization strategies for thermal comfort based on the consideration of the spatial differences in **building shade** and **sunlight**.
123. Yildirim, K., Akalin-Baskaya, A., & Celebi, M. (2007). The effects of window proximity, partition height, and gender on perceptions of open-plan offices. *Journal of Environmental Psychology*, *27*(2), 154-165.	The height of the partition, and **adjacency of occupants, and access to the window** in the **open-plan offices** are beneficial for office workers by providing them with enough amount of daylight.
124. Gago, E. J., Roldan, J., Pacheco-Torres, R., & Ordóñez, J. (2013). *Renewable and sustainable energy reviews*, *25*, 749-758.	The study of the relationship of **urban activities** that make the adverse effects of **urban heat islands** with **solar radiation and daylight illuminance** by the consideration of **urban morphology** such as pavement surface, albedo, green spaces, etc.

125. Khoo, C. K., & Salim, F. D. (2012). A responsive morphing media skin. PROCEEDINGS OF THE 17TH INTERNATIONAL CONFERENCE ON COMPUTER-AIDED ARCHITECTURAL DESIGN RESEARCH IN ASIA (CAADRIA 2012), pp. 517-526.	Introduction of a **responsive morphing skin** to daylight by morphological and patterned types of transformation.
126. Johannesen, Á., Patursson, Ø., Kristmundsson, J., Dam, S. P., Mulelid, M., & Klebert, P. (2022). Waves and currents decrease the available space in a salmon cage. *Plos one*, *17*(2), e0263850.	The swimming behavior of salmon in their cage in response to daylight and cage deformation
127. Hanyu, K. (2000). Visual properties and affective appraisals in residential areas in daylight. *Journal of Environmental Psychology*, *20*(3), 273-284.	in a study on the **daytime experience** of the **residential area** to find the connotational relationship between visual properties and affective appraisal, activity has been correlated with clarity. **mental and physical/behavioral activities** when referred to as **active** could connote meanings of **arousal** and **physical action, energetic behavior, or movement**, respectively.
128. Gu, N., Watanabe, S., Erhan, H., Haeusler, M. H., Huang, W., & Sosa, R. (2014). Controlling kinetic cladding components in building facades: A case for autonomous movement. In *Proceedings of the 19th International Conference of the Association of Computer-Aided Architectural Design Research in Asia* (pp. 129-138).	Study of the **building façade cladding movement**
129. Şenyiğit, V., & Memduhoğlu, H. B. (2020). End-user preferences in school design: A qualitative study based on student perspective. *Building and Environment*, *185*, 107294.	**Student preferences in the design of classrooms** are determined as brightness (**daylight**) and spaciousness, density (the number of students), flexibility and functionality. In addition, variety in the geometrical structures of the **width of the corridors, sitting areas, and stairs** are determining factors in pupil's preferences. These variables could define the activities of the students in the space and in a way related to the experience of movement.
130. Guy, J. H., Rowlinson, P., Chadwick, J. P., & Ellis, M. (2002). Behaviour of two genotypes of growing–finishing pig in three different housing systems. *Applied Animal Behaviour Science*, *75*(3), 193-206.	The behavior of pigs during indoor daylight hours in terms of spending time for moving.
131. Martirano, L. (2014, May). A sample case of an advanced lighting system in an educational building. In *2014 14th International Conference on Environment and Electrical Engineering* (pp. 46-51). IEEE.	The study of the **control of lighting** according to the actual presence of **activities** and **daylight** availability in **educational** buildings
132. Amorim, C. N. D., Vasquez, N. G., Matusiak, B., Kanno, J., Sokol, N., Martyniuk-Peczek, J., ... & Waczynska, M. (2022). Lighting conditions in home office and occupant's perception: An international study. *Energy and Buildings*, *261*, 111957.	**Cultural difference** would affect the **custom of using lighting** in **home offices** and the way lighting is perceived.
133. Filippín, C., Marek, L., Larsen, S. F., & Lesino, G. (2007). An energy efficient school for a nature disposed population in arid lands of central Argentina. Journal of building physics, 30(3), 241-260.	Passive design strategy of **daylighting** according to the **measured metabolic rate** as one parameter of ISO 7730 standard for an energy efficient **school**.
134. Shepperson, M. (2009). Planning for the sun: urban forms as a Mesopotamian response to the sun. *World archaeology*, *41*(3), 363-378.	The study of the **Mesopotamian ancient urban forms** according to the **meaningful presence of daylight** in the environment and the serious limitation of **human activity** by the **strong daylighting**.
135. De Freitas, C. R. (2015). Weather and place-based human behavior: recreational preferences and sensitivity. *International journal of biometeorology*, *59*, 55-63.	The study of the **beach user behavior** according to the **atmospheric condition** during the daylight hours
136. Lee, D., Cho, Y. H., & Jo, J. H. (2021). Assessment of control strategy of adaptive façades for heating, cooling, lighting energy conservation and glare prevention. *Energy and Buildings*, *235*, 110739.	The study of shading control strategy and movable shading devices.
137. Vigo, D. E., Ogrinz, B., Wan, L., Bersenev, E., Tuerlinckx, F., Van den Bergh, O., & Aubert, A. E. (2012). Sleep-wake differences in heart rate variability during a 105-day simulated mission to Mars. *Aviation, space, and environmental medicine*, *83*(2), 125-130.	The evaluation of **autonomic activities** to study **sleep-wake cycle (rest-activity pattern)** in confined environment by the consideration of **daylight exposure** in simulated **outer space missions**.

138. Zhang, X., Tang, B., Chen, XD., Dong, Y. (2022). Research methods and progress of human factors in architectural lighting. Chinese Science Bulletin, Volume 67, Issue 16: 1771 – 1782. https://doi.org/10.1360/TB-2022-0144	Architectural lighting research according to human factors (such as **physiological** measurements, psychological measurements, **behavior** measurements, and **performance** evaluation) and the **characteristics of dynamic daylight** by the consideration of visual and non-visual effects of daylighting
139. de Montigny, L., Ling, R., & Zacharias, J. (2012). The effects of weather on walking rates in nine cities. *Environment and Behavior*, *44*(6), 821-840. **Relevant**	Research on the **amount of walking** occurring in each locale in relationship with the weather condition and **sunlight** was conducted by observing the **walking rate of the pedestrians** by observation through web-based cameras and air temperatures obtained from stations.
140. Stryker, J. A., Atkinson, J. L., Brown, R. D., Barney, D., Robinson, J. A. B., Duncan, J., & Finegan, E. J. (2019). Behavioral repertoire assessment of Bengal tigers (Panthera tigris) with focus on thermoregulatory behavior. *International Journal of Biometeorology*, *63*, 1369-1379.	Thermoregulatory behavior and shade use in the captive tigers during sunlight hours
141. Krüger, E. L., Piaskowy, N. A., Moro, J., & Minella, F. O. (2019). Identifying solar access effects on visitors' behavior in outdoor resting areas in a subtropical location: a case study in Japan Square in Curitiba, Brazil. *International journal of biometeorology*, *63*, 301-313.	The study of the **behavioral adaptation**s of the visitors and the use **of resting areas in city squares** in regard to the **daylight availability** in sitting areas by time-lapse photography
142. Soh, C. K., Christopoulos, G., Roberts, A., & Lee, E. H. (2016). Human-centered development of underground work spaces. *Procedia Engineering*, *165*, 242-250.	The study of the development of **underground workspaces** to promote wellbeing, and **willingness to work** by the consideration of lack of exposure to outdoor environment and following **sunlight** as a part of human-centered design.
143. Chang, D. D., Storch, E. A., Black, L., Berk, M., Pellis, N., Lavretsky, H., ... & Eyre, H. A. (2020). Promoting tech transfer between space and global mental health. *Aerospace Medicine and Human Performance*, *91*(9), 737-745.	In a study on mental health during **long-duration spaceflight and missions** by considering **different sunlight exposure length** among confinement and microgravity, **physical activity focused mental health** has been cited.
144. Chias, P., Abad, T., & Fernández-Trapa, L. (2022). Light and Architecture: Mannerist Devices in the Monastery of San Lorenzo de El Escorial. In *Architectural Graphics: Volume 2-Graphics for Knowledge and Production* (pp. 175-185). Cham: Springer International Publishing.	The study of **architectural artifices** belonging to the **Mannerist architecture** period designed for **natural lighting** to run **daily activities** in indoor areas.
145. Turrin, M., Yang, D., D'Aquilio, A., Sileryte, R., & Sun, Y. (2016). Computational design for sport buildings. *Procedia engineering*, *147*, 878-883.	The importance of controlling **daylight** and thermal condition in the **sports buildings** to meet performance requirements of **sport activities**
146. Lin, T. P. (2009). Thermal perception, adaptation and attendance in a public square in hot and humid regions. *Building and environment*, *44*(10), 2017-2026.	**Sunlight** as a factor that impacts the **thermal environment** in outdoor **public spaces** influences the **use of and attendance in the space**. They found that not only human energy balance model addresses the influence of the climate on the use of public space but also **behavioral factors**. It can be stated that thermal perception
147. Tafahomi, R. (2022). Revitalization of Cultural Values in Urban Landscape through Street Trees Design. *METU Journal of the Faculty of Architecture*, *39*(1).	The graphical analysis of the sidewalk and street tree design and their impact of them on social and ritual activities such as a place for walking regarding the shading they provide from the sunlight.
148. Obors' ka, S. (2015). To the history of the stained-glass windows art in the context of the man spiritual activities. *NATIONAL ACADEMY OF MANAGERIAL STAFF OF CULTURE AND ARTS HERALD*, (3), 54-59. **Relevant**	The study of the history of **stained-glass windows** and the effect of **sunlight** modified through them in the creation of **spiritual activities** such as the formation of taste and imagination as well as positive mood.

Table 3. classification of the research material retrieved from the Scopus database.

Theme	Objective/result and source	Methodology	Space typology	User typology	Movement parameter	Daylight parameter
Thermal comfort and aesthetics and design quality	Increasing thermal comfort to increase the use of space and attractiveness (Ratajczak et al., 2022).	• IES-VE simulation	University	Academics	• indoor activities • Use of atrium	• Daylight-dependent control system
Visual Comfort	Finding a suitable blind strategy to increase visual comfort and energy efficiency (Koohsari & Heidari, 2022)	• Daylight measurements at different illuminance levels • Interview	Office room	Office workers	• Occupant positions and their activities	• UDI, DAv, sDA, ASE, DGPs, in a space with Venetian blinds
	Avoiding unwanted glare according to the user's location (Huang et al., 2022).	• Optical analysis using simulation and genetic algorithm in python	Room	Room users	• User location	• Automated sun-guiding micro prism
	Improvement of daylight performance and visual comfort by the study of an active strategy of daylighting as a function of user field of vision (UFV) that is a line between occupant and sun positions (Hosseini et al., 2020).	• Parametric Simulation • Climate luminance-based metrics	Virtual Office building	Occupants	• Dynamic Occupant's position • Dynamic attraction points as an intersection between UFV and façade surface	• Colored glass • Daylight performance • integrated interactive kinetic façade with colored glass (IIKFCG)
	Understanding the cultural difference in daylight perception and study activities (Arango-Díaz et al., 2022).	• Illuminance measurements • Survey	Classroom	Students	• Reading & writing activities	• Work plane and vertical Illuminance • Global solar radiation
	Finding the quantitative relationship between the lighting level and lighting preference (Fakhari et al., 2021).	• Survey	Office	Office worker	• Individual parameter: type of the activity	• Lighting level • Window orientation • External obscuration
	Finding an acceptable range of daylight illuminance to provide comfort for reading activity (Fu et al., 2022).	• Electrodermal activity measurement • questionnaire scoring	Nursing institution	Elderly persons	• Reading Activity • State arousal level	• Daylight illumination
	Improvement of the daylight in the interior from walls with a high percentage of the window-to-wall ratio by providing sun-shading protection	• Case study • Simulation	University	Academics	• Activity development in interior space	• Impeccable glare from the sun-shading system

	(Sepulveda-Gil et al., 2022).					
	Study of the satisfaction level with daylighting to improve elderly activity (Yang et al., 2021).	• Questionnaire • Daylight measurements	Nursing home	Elder adults	• Activity spaces	• Sunlight illuminance • Glare
Safety & security	Introduction of trajectory prediction method to track the movement of pedestrians (Zeibo et al., 2021).	• Long short-term memory (LSTM) • Social LSTM • Feature extraction • Image processing	Intersections	Pedestrians	• Pedestrian trajectory • Pedestrian movement: location and speed	• Difference between daylight condition and night lighting
Health and well-being	Narration of the interior to the exterior as a combination of space, light, and internal movements to highlight the idea of experience of an architectural atmosphere (Kristo & Kristo, 2021).	• Narrative • Reasoning	Architectural atmospheres	Humans	• Internal movements	• Daylight penetration
	Observation of the interior design techniques of daylighting to identify the identity of the buildings (HARERI & ALAMA, 2020).	• observation	Mosque	Visitors	• physiological, behavioral, and psychological responses • performance of social activities	• indoor daylighting quality and techniques
	Understanding the relationship between people's physical activity and daylight exposure (Flores-Villa et al., 2020).	• Pittsburgh Sleep Quality Index (PSQI) questionnaire • Morningness–Eveningness Questionnaire (MEQ) • seven-day sleep diary/log activity	House	Elderly occupants	• physical activity and sleep quality	• daylight exposure
	Achieving an ultimate human experience in design alternatives as a combination of physiological, cognitive, and emotional states that define our mental state (Ergan et al., 2019).	• Noninvasive biometric sensors and physiological metrics: Examining skin conductance with GSR, brain activity with EEG, and heart rate with PPG. • Virtual environment	Virtual reality design alternatives	User	• Human response • Mental activity • Heart rate • Task performance in VE • Navigation in VE	• Existence of daylight and connectivity to the nature
Energy optimization	Development of a manual blind control algorithm to predict actual user behavior in	• Field study based on monitoring blind movement or	Mid-rise office buildings	Occupants as active users and not, non-	• Manual blind use • User behavior	• Daylighting • Daylight simulation

	blind adjustments (Nezamdoost et al., 2018).	blind positions recordings.		users, or passive users		
Energy optimization	Measuring the level of the occupant's control over the operation of the building to find out the relationship between occupants' adaptive behavior with building performance (Fieldson & Sodagar, 2017).	• Post occupancy evaluation (POE) • Field survey	Multifunctional building including offices	Office workers, users	• Adaptive behavior	• Subjective measure of daylighting
Aesthetics and design quality	Evaluation of comfort level by post-occupancy study in a building designed with bioclimatic strategy (Jamaludin et al., 2017).	• POE • Field measurements with climatic devices • Questionnaire	Residential college building	University students, residents	• Activity in the room • Room opening usage. • Living behavior	• Natural daylighting
Aesthetics and design quality	The introduction of daylighting strategies in traditional architecture (Manurung, 2017).	• Daylight measurements • Theoretical reviews	Occupants	Traditional house	• Activity-based needs	• Quality and quantity of Daylighting
Energy optimization and aesthetics & design quality	Designing an intelligent house to adjust the comfort level according to the activity needs of the occupants (Kaiwen et al., 2016).	• System design	User	Home-office environment	• Activity-based needs. • Occupancy	• Availability of the natural light
	A design considering smart communication between the variables of users' movements, lighting comfort, and daylight (determination of lighting preference) to regulate and control lighting output by LED system (Liu et al., 2016).	• Fuzzy logic • DALI protocol • Experiments	Users	Office in commercial building	• Users' movements	• Daylight • Controller
	Design a lighting system by the consideration of the occupant behavior and activities, building purpose, and use of daylight (Kamaruzzaman et al., 2015).	• Stimulation modeling • Assessment of the lighting performance	Occupants	Historic office	• Hours of daylight usage • Lighting consumption according to the activity of the occupants	• Illumination levels • Use of daylight

	Development of lighting control systems to manage energy consumption (Aghemo et al., 2014).	• Monitoring annual electricity consumption and parasitic energy consumption Standard methodology	Users	Office building	• Space occupancy	• Daylight strategies
	Designing a system to predict the illuminance level based on the daylight analysis, space information, and user movement to adjust illuminance levels and provide dimming control (Park et al., 2015).	• System design • Control Algorithm • Motion sensor • Energy analysis	User	Building: Parking lot, basement, working area, hallway, and staircase	• User movement • Movement pattern • Sun's movement • User location • Car movement • Frequency of user movement User behavior: reading & writing tasks	• Daylight illuminance level • Position of the sun
Thermal comfort and design quality	The study of the effectiveness of vegetation type in providing comfort for pedestrian movements through the reduction in urban heat island effects (Adam et al., 2016).	• Daylight measurements • Observation of human activity	Pedestrians	Urban nodes intersections	• Pedestrian activity	• Daylight intensity • Vegetation shade
Design quality and Energy optimization	Efficient and accurate evaluation of passive daylight strategies and shading schemes in regions with different dynamics of daylight according to the occupancy time by creating temporal maps to find the most suitable design (Guan & Yan, 2016).	• Temporal map based on occupancy time • Graphic analysis • Daysim calculations	Students	classrooms	• Occupancy time • Human activity	• Dynamic daylight • stochastic weather conditions • movement of the sun
	Improvement of the illumination in the workspaces (Chaudhary & Jain, 2014).	• Experiments on the miniature form of a building • Retrofit development. • Lux measurements • Ring heliodon	Users	Official, and educational buildings	• Productivity	• Illumination • Natural daylight provision • Sun path
Health and wellbeing	Investigation of the satisfaction levels with the daily activity efficiency and lighting quality (Afacan & Demirkan, 2016).	• survey	Occupants	Dwelling	• Daily living activities • Sleep Quality	• Control of daylighting systems • Operable window

	Understanding the circadian regulation made by circadian lighting design affecting mood, and sleep (Figueiro & Rea, 2016).	• Measures of subjective and objective sleep • Self-reports of mood	Working individuals	Office buildings	• Activity-rest patterns	• Daylight availability • Circadian lighting exposure
	The study of the biological clock and the relationship between human activity and daylight in creation of comfort (Fonseca et al., 2006)	• Review	Interior spaces	Occupants	• Human activity	• Natural light pattern Natural light rhythm
Energy optimization and design quality	The study of innovative energy-saver and comfortable building design (Fantauzzi et al., 2015).	• Architectural Experiment • Software simulations • Assessment of energy performance through Energy plus • Lighting design via DIALux	Occupants	Container houses	• Domestic activities • Movable furniture • Use of area	• Daytime • Daylight contribution
Visual comfort and Energy optimization	The study of the experimental shading devices with respect to visual comfort and energy production, and reduction (Saranti et al., 2015).	• Experiment with a physical model	Users	Residential housing units	• Everyday activities • Determination of the best-suited space for visual comfort • Use of external space	• Shading device • Outdoor Daylight
Energy optimization	Development of a stochastic lighting model to generate lighting schedules (Zhou et al., 2015).	• Modeling • Measurement	Occupants	Office building	• Occupant behavior • Occupant schedule • Stochastic energy use	• Outdoor illuminance levels • Area exposed to natural light
	Review of the blind use patterns and user interactions with the blinds (Van Den Wymelenberg, 2012).	• Literature review	Buildings	User	• Patterns of blind use • Human behavior	• Blind control
	The study of the switching patterns of the lights and its relationship with the daylight availability and levels to predict energy consumption (Hunt, 1979).	• Time-lapse photography • Observation	Classroom, office	Users	• Occupation cycle • Switching patterns and activity • Manual control of lighting Continuous and intermittent occupancy	• Daylight availability • Working plane illuminance • Vertical plane illuminance
Energy optimization	The study of a church before and after the	• Comparative analysis	Worshippers	Church	• Liturgical needs	• Solar trajectory

	urbanization of the surrounding area in terms of daylighting conditions within the church affected by the urban area (Carlos et al., 2014).	• measurements			• Main activities	• Levels of available daylight • Daylight conditions
Design quality and Energy optimization	Optimization of daylight potential of architectural form at an early stage of the design by the development of regression models (Mavromatidis et al., 2014).	• Regression models • EcCoGen software development • Genetic algorithm optimization • DIALux	Occupants	Residential and tertiary sector	• Human activities • Working	• Daylight factor • Natural light
Thermal comfort	Understanding the impact of environmental factors such as daylight as well as the movement and activities on the creation of the microclimate conditions (Pandya & Brotas, 2014).	• Literature review • Environmental variables measurements	Pedestrians	Tall buildings, urban climate	• Activity patterns at street levels • Pedestrian movement	• Daylight availability • Overshadowing
Design quality and Energy optimization	Consideration of the Occupants' past living habits and seasonal needs based on the vernacular design and living experiences. Investigation of the correlation between 'seasonal migratory living patterns', 'occupant's social activity background', and the 'quest for light' (Sakarellou-Tousi & Lau, 2009).	• Case study	Mansion, vernacular dwelling	Occupants, Dwellers	• Migratory living pattern	• Luminous environment conditions
Design quality and Energy optimization	Introduction of a lighting control system to reduce energy consumption (Parise et al., 2013).	• Experiment • Standard methodology	Users	Classroom	• Actual presence of activity	• Actual presence of daylight
Health and wellbeing	human movement is considered a factor in studying human circadian system synchronization according to the amount of available daylight due to the housing design (Andersen et al., 2013).	• Simulation • Proposition of workflow • Design alternatives	Occupant	Row houses	• Occupant location • View direction • Biological response • Human movement	• Amount of daylight • Time of lighting
	The re-design of a facility through a Simulation-based framework incorporating the	• Daylight performance evaluation • Simulation	Healthcare facility	Occupant	• Stimulation of alertness • Stimulation of performance	• Daylight intensity • Daylight duration

	dynamic non-visual effects of light and circadian rhythm. The re-design is based on a model that predicts the relative effectiveness of different light patterns (Ámundadóttir et al., 2013).	• Human light response (HLR) Modeling • Light pattern generation methods			• Dynamic behavior and response of non-visual system • Occupant's movement and activities	• Timing of light exposure • Light patterns
Energy optimization	The study of the activity-related and daylight parameters as building characteristics in energy performance simulation (Korolija et al., 2013).	• Simulation model archetype • Energy performance simulation • Stock modeling	Office building	Occupants	• Metabolic rate • Occupancy density	• Daylight and solar control measures • Glazing
	Benchmarking the performance of controlling systems in terms of manual and automatic scenarios (Chiogna & Frattari, 2013).	• Monitoring • Standardization techniques	Office block	Users	• Occupancy duration • Occupant's behavior • Manual operation of controlling systems • Real use conditions	• Indoor illuminance levels • Outdoor illuminance levels • Control
Design quality and health and wellbeing	Design of window openings and light guides in the interior with respect to the human biological rhythm and daylight to improve the interior (Janečková & Bošová, 2013)	• Review • Measurement	Library room	User	• Predominant Visual activity	• Daylight factor • Uniformity of daylighting • Light distribution • Glare prevention • Light reflectivity • Daylight illumination
	The study of the impact of weather-generated natural indoor animation on building occupant stress (Nute et al., 2013).	• Case study	Building interiors	Building occupants	• Alertness • Attention	• Movement of the sun • Wind-animated indoor daylighting • Sun-animated shading
	Design guidelines for daylighting to include human activity as a key design criterion as another physical parameter (Wang & Boubekri, 2011).	• Experiment	Office	Occupants	• Human activity • Occupants' emotional, attitudinal, and cognitive responses	• Sunlight conditions
Design quality and Energy optimization	Improvement of atrium design based on the form, usage, and skylight fenestration (Yunus et al., 2010).	• Survey	Atrium office	Users	• Atrium usage/activity	• Daylight performance
Health and wellbeing	The study of the role of daylighting in the creation of comfortable environments (Dubois et al., 2009).	• Behavior mapping • Written surveys • Photography	Café in university	Occupants	• Visually demanding activities	• Luminous ambiences

		• Digital image analysis • Observation				
Design quality and health and wellbeing	Offering a methodology for the study of daylighting design from user's perspective and design recommendations (Wang & Boubekri, 2009).	• Behavioral study	Luminous environment	Users	• User reactions • adjustments of user activities	• Luminous space
Energy optimization	The study of the traditional daylighting techniques for ecological design (Rezaee et al., 2009).	• Case study	Traditional architecture	Users	• User escape	• Daylighting techniques
Thermal comofrt and health and wellbeing	Study of the attractiveness of urban areas by simulation of the thermal comfort of the pedestrians (Bruse, 2007).	• Multi-agent system (MAS) • Simulation	Open public space	Pedestrians	• Routing decisions • Pedestrian motions	• Sunlight condition • Mix of sun and shade
Visual comfort	The study of visual differences between two ethnicities for the evaluation of glare (Lee & Kim, 2007).	• Nomo-graph • Full scale model	Model	Occupants	• Ocular activity	• Discomfort glare

Table 4. Classification of the research material retrieved from WOS database.

Theme	Objective/result and source	Methodology	Space typology	User typology	Movement parameter	Daylight parameter
Design quality	The study of post-occupancy data to understand the role of daylight in human experience and behavior (Jens & Khoudi, 2022).	• Computer-vision camera • Survey	Working environment	User	• Occupancy duration • Occupancy time • Perceived Productivity	• Daylight • Window blinds
Energy optimization and design quality	Examining the effect of natural light in sacral architecture to improve design and daylighting performance (Taştemir et al., 2020).	• Measurements • 3d Simulation	Mosque	Prayers	• Worshipping activity	• Light factor • Daylighting • Natural light
Energy optimization and design quality	Strategies to control the beams of daylight in the interior would help to decrease pollution and energy savings (Pohl, 2011).	• Review	Interiors, circulation spaces	Transitory and seated occupants	• Directional highlighting • Transition • Writing and reading tasks	• Movable window shades and blinds • Sunlight • Glare
Health wellbeing and design quality	optimization of the circadian effects of lighting in the space through design (Hu & Davis, 2021).	• Real-world data collection	Architectural space	Occupants	• Occupant's activity	• Sunlight • daylight
	Sunlight control strategies according to the daylight behavior to optimize the use of natural light (Villalba et al., 2018).	• Dynamic daylight simulation	Care unit	Newborn babies	• Layout of the space for different uses	• Sunlight
Visual comfort and design quality	Investigation of passive daylighting system to understand its impact on daylight distribution and visual comfort (Moazzeni & Ghiabaklou, 2016).	• Daylight simulation	Educational space	Students	• Space occupation hours	• Light shelf • Natural light
Wellbeing	The discussion of the basic concepts of daylighting in urban environments (Nasrollahi & Shokri, 2016).	• Review	Urban context	Residents	• Liveliness • Performance	• Daylighting • Movement of the sun • Illuminance
Energy optimization	The study of the influence of occupant behavior and housing typology on interior daylighting (Das & Paul, 2015).	• MATLAB-based coding. • Logistic regression • All-weather model	Housing	Occupants	• Occupant behavior • Daily activity schedule • Switch on behavior	• Daytime artificial illumination • Daylight illuminance
Energy optimization and design quality	Daylighting design according to the examination of the architectural	• Hobo loggers monitoring • Daylight analysis by AutoCAD Ecotect software	Library	User	• User behavior • Visual tasks	• Daylighting • Daylight factor • Light guides

	elements (Omar et al., 2018).	• Raytracing simulation				
	Achievement of the optimal design equations and space orientation in school design (Ma & Yang, 2022).	• Usage of the annual daylight metrics • Parametric modeling • Linear regression analysis	Atrium classrooms	Users	• Space efficiency • Activity accommodation	• Daylighting performance
Health and wellbeing	Survey of criteria for the daylighting design of building insolation considering proper circadian rhythm and comfort of occupants (Darula et al., 2015).	• Review	Workplaces, interiors	Occupants	• stimulation of human activities • function of body organs	• illuminance levels • sun radiation
Design quality and conservation	Design of proper lighting in historic museums to both preserve the collection and respect the original activity schemes of the historic building (Himmelstein & Appelbaum, 2000).	• Review	Historic structure, museums, exhibition spaces	Visitors, viewers, inhabitants	• Original activities	• Daylighting schemes
Health and wellbeing and design quality	Introduction of a design idea based on experimental techniques (Nasybullina et al., 2019).	• Experiment • Comparative analysis • Creation of models and schemes	Light Space	People in place	• Sensorial perception of daylit space • Modeling of time • Movement of people	• Dynamics of light
Visual comfort and design quality	Alternative design solutions for getting proper illuminance levels (Mohelnikova, 2007).	• Comparative study • Computer Simulation	Attic room, university building	Users	• Visual activity • Utilization area	• Illuminance level • Dormers • Skylight
Health and wellbeing	Non-visual lighting design regarding task-driven illumination (comfort) and human-driven health (Andersen, 2015).	• Simulation and visualization • Climate-based modeling	Daylit space, Performative space	Human	• Human behavior • Human response • Task-driven	• stochastic weather patterns • sun course
Energy optimization and design quality	The study of the design of underground buildings in hot climates to examine heat transfer (Alwetaishi, 2021).	• real built room • field measurements • modeling • simulation with computer tool EDSL TAS	Underground buildings	User	• Productivity • User activity	• daylight
Wellbeing and design quality	Design of space based on daylighting preference (Heydarian et al., 2017).	• Simulation with immersive virtual reality • Experiment • Quantitative measures • Survey	Virtual office	End-user	• Lighting-related behavior • People performance • Reading speed	• Simulated daylight

					• Comprehension and reading tasks	
Health and wellbeing	Design of adaptive shading panels adaptive to the human eye's biological needs in terms of NIF and IF responses (Parsaee et al., 2020).	• Lab scale physical model • Experiment	Scale model	Occupant	• biological response of the human eye	• shading panel attributes
Health and wellbeing and design quality	Study of space to understand the impact of the visual daylight impact on the esthetical and emotional aspects of architectural space (Hourani & Hammad, 2012)	• Photography recording • Questionnaire	Atrium in city mall	Architects	• Atrium activities	• Dynamic variations of daylight • Daylight quality
Visual comfort and energy optimization	The occupant behavior model has been considered together with the annual daylight glare probability profile to account for shading strategy and visual comfort conditions (Reinhart & Wienold, 2011).	• Review on the computer-based light analysis	Residential space	Occupant	• Occupant interaction pattern • Manual lighting control • Occupant behavior • use of a lighting switch and shading device • pattern of the occupants' interaction	• Annual daylight glare probability • Visual comfort
Energy optimization	Presenting long-term measurement data for energy potential assessments and energy predictions (Hammes & Weninger, 2023).	• Monitoring • Data log	Office building	User	• Window opening behavior. • Manual user interaction • User behavior • Real working condition	• Window • Daylighting device
Health and wellbeing	Research on the impacts of daylight exposure on the sleep quality and well-being of workers (Lee & Boubekri, 2020)	• Actigraphy • Survey • Simulation	Workplace	Office workers	• Activity-rest cycle	• Daylight exposure
Energy optimization	Study and assessment of the urban morphological patterns to investigate their impact on optimizing energy use and daylighting behavior (Pan & Du, 2022).	• Mapping • Field investigation • On-site measurements	Open urban areas	Pedestrians	• Occupant's choice of location • Duration of stay • Participation in activities	• Outdoor pedestrian daylighting performance • Daytime pedestrian illumination • Horizontal illumination level

	Suggest a 'default setting technique' for more energy-efficient choices of interaction (Heydarian et al., 2016).	• Survey • Immersive virtual reality	Office	Occupant, office workers	• Occupant's rate of lighting adjustments • Daily interaction with daylighting systems • Occupant's behavior • Reading Comprehension and speed	• Daylighting systems • Blinds
Wellbeing	Assessment of daylight perception through the behavior of people (Izmir Tunahan et al., 2022).	• Survey • Subjective rating • Measurements	Library	Students	• Seat preference and selection	• Perceived boundary between daylit and non-daylit space • Actual daylight levels
Design quality	Discussion of the daylighting design contributors such as furniture design and layout and occupant interaction to improve the design process (Day et al., 2012)	• POE • Case study	Office	Occupant	• Interaction with furniture • Use of daylight • Human response	• Daylit perimeter • Daylight control
Energy optimization	Modeling of the scenarios of electricity use patterns to investigate the energy efficiency of windows (Lolli & Haase, 2017)	• Modeling • Survey	Apartments	Occupants	• Type of activity • Occupancy hours • Use patterns	• Daylight availability
Energy optimization and design quality	The prediction of light usage and user behavior in relationship with the change in interior layout (Cılasun Kunduracı & Kazanasmaz, 2019).	• Fuzzy logic modeling • Monitoring • Detectors	Offices	User	• Manual Control behavior patterns	• Daylight illuminance • Window distance
Energy optimization	Daylighting strategy and energy use: Understanding the correlation between lighting usage rate with daylight-assisted task lighting (Lim et al., 2017)	• Monitoring	Office	Occupants	• Lighting usage patterns • User behavior • User habits	• Daylight assisted task light
Energy optimization	Articulation of blind control algorithm based on user activity and weather conditions (Chan et al., 2014).	• System development • Mockup	Office	User	• User activity	• Weather conditions • Daylight responsive lighting
Health and wellbeing	The study of the impact of architectural design	• Case study	Indoor environment	Occupant	• Gaze behavior	• Ocular light exposure

and visual comfort	on gaze behavior, visual comfort, and non-visual effects considers the impact of space, time, and sky conditions (Amundadottir et al., 2017).	• 3D rendered immersive environment			• Daylight-driven human response	• Daylight performance models
Health and wellbeing and energy optimization	Examination of the impact of dynamic daylighting condition on the behavior, mood, feeling, and perception, as well as energy saving in Scandinavian winter (Favero et al., 2023).	• Report on pilot study • Measurements	Indoor daylit space	Occupants	• Amount of activity • Behavior	• Daylit space • Lighting perception • Dynamic daylighting conditions
Health and wellbeing	The importance of the design of daylight according to the expected tasks within a space and its impact on mood, circadian rhythm, the behavior of occupants, increased safety, and benefits of Vitamin D synthesis (Webb, 2006).	• Review	Buildings	Occupants	• Sleep/wake cycle • Behavior	• Daylighting
Energy optimization	Understanding the energy impact of blind use by comparing manual and automatic control algorithms (Nezamdoost et al., 2018)	• Case study • Control algorithms • Simulation	Office	User	• Manual blind use • Actual user behavior • Occupied hours	• Daylight shading system
Health and wellbeing and design quality	Investigation of the design impact on receiving standard amount of daylight and illuminance levels for enhancing circadian rhythm, visual comfort, perception of the space, mood, aesthetics, and behavior) (Abidi & Rajagopalan, 2020).	• Field measurements • Daylight simulation	Apartment buildings	User	• User's experience and behavior	• Daylight condition • Illuminance
Visual comfort and energy optimization	Evaluation of the illuminance levels of working halls regarding illuminance requirement for working activities (Dolnikova et al., 2020).	• Measurement • Daylight simulation-radiance	Working environment	User	• Visual classes of Work activities • Industrial activities	• Daylight illuminance • Illuminance uniformity

Safety	Development of modeling factor to assess traditional spaces by the consideration of the morphological-architectural relationship between the space and geographical location (Lasagno et al., 2011).	• Case study • Modeling factor • Measurement • Monitoring	Transitional space, public building	User	• Visual adaptation • Transition • Safe movement	• Cylindrical illuminance • Horizontal illuminance
Energy optimization	The negative impact of manual blind control installed on conventional windows on energy saving. Examination of the impact of interior light shelves on the manual use of blinds showed positive effect on energy saving (Sanati, & Utzinger, 2013).	• Case study	Studio in university	Occupant	• use of blind • occupant behavior • shading control	• light shelf • window • transmitted vertical irradiance
Wellbeing	Prediction of the level of engagement in space for daylight performance assessment (Rockcastle et al., 2017).	• experiment • simulation • subjective ratings • rendering	Architectural spaces	Occupant	• Perceptual response to stimulation • Visual interest • Occupant behavior	• Daylight composition
Design quality	Investigation of the impact of bioclimatic design on the use of buildings regarding the indoor climate affected by daylight (Ouahrani, 2012).	• Simulations • Interview • Statistical analysis • POE	Youth club	Users	• Building use • Use of space • Opening and closing of building	• Illuminance level
Wellbeing and design quality	The study of the spatial experience of the interior space in terms of attractiveness (Panahiazar & Matkan, 2018).	• high-dynamic-range-imaging luminance analysis • subjective response	church	Visitors	• Subjective experience • Walk • Attraction • Spatial experience	• Daylight behavior • Perforated dome • Sacred light • Light values
Design quality	Review on the use of virtual reality for the evaluation of user behavior in the daylit space (Bellazzi et al., 2022).	• Virtual reality	Daylit space	Participants	• User behavior • User perception	• Simulated lighting.
Energy optimization	The investigation of the relationship between MET minutes and daylight hours (Elliott et al., 2019).	• Survey • Interview	Natural environments, parks	People	• Recreational physical activity • Outdoor activity	• Daylight and meteorological conditions • Daylight hours
Energy optimization	Investigation of energy savings during daylight	• Simulation based study	Office	Users	• User behavior • Lighting switch	• Artificial lighting

	saving times (DST) through the study of user behavior (Rakha et al., 2018).					• Daylight saving time
Visual comfort and design quality	The evaluation of daylight glare probability through different fenestration system scenarios by involving human subjects while performing office task activities (Konstantzos & Tzempelikos, 2017).	• HDR imaging • Experiment	Office	Human subjects	• Office activity performance	• Direct illuminance
Energy optimization	The study of Energy consumption rate or pattern by considering the freedom of design in interior layout and exterior according to occupant behavior (Sari & Chiou, 2019).	• Energy modeling • Simulation	Low rise residential building	Occupants	• Occupant energy behavior • Daily activities	• Daylight
Energy optimization	Exploration of an elastic algorithm for shading controls for the modeling of a wider range of occupant behavior (Perwita Sari & Chiou, 2018).	• Daylight simulations • Granular Algorithm	Open office space	Occupants	• Delay in manual control	• Daylight availability
Wellbeing and energy optimization	The study of the visual window in terms of perceptual cooling effect and its proved relationship with lesser adjustments with HVAC system which led to energy savings (Jiang et al., 2022).	• Laboratory experiment • Measurements of, physiological parameters, e.g., arterial oxygen saturation (SpO_2) and heart rate variability (HRV) • subjective questionnaires, e.g., thermal perceptions, emotions	Experimental chamber, with and without window	Occupants	• Thermal perception • Occupant adjustment of HAVC system • Occupant tolerance to the thermal environment • Heart rate variability	• Visual window • Daylight
Energy optimization	The study of the impact of the environmental, physical, and policy-related factors on occupant performance (Salem & Elwakil, 2017).	• Modeling of occupant performance assessment	Workplace, institutional building	Occupants	• Switching pattern behavior • Usage of lighting • Use of window blinds	• Daylighting
	The observation of user interaction with the blinds for behavior modeling that complies with green design and	• Logistic regression modeling • Behavioral modeling • Observation	Workplaces	Occupants	• Blind configuration individual behavior • Shade control behavior	• Blinds

	energy codes (Kyle Konis, 2013).					
	The study of energy predictions in the form of stochastic occupant behavior models (Gilani et al., 2016).	• Modeling • Empirically derived modeling	Office	Occupant	• Stochastic occupant behavior • Dynamic occupant-building interaction	• Daylight performance
energy optimization and visual comfort	and Optimization of comfort for the most convenient space for everyday activity by trying to integrate flexible shadings for better use of the external space as a connected space to the internal place (Saranti et al., 2015).	• Physical modeling • Experiment	Residential building	User, human	• Everyday activity • Use of external space	• Shading devices
Visual comfort	The study of the ocular behavior of in terms of office tasks that are reading from a screen and from a paper, writing, and socializing. This experiment is to evaluate glare (Yamín Garretón et al., 2016).	• Experiment • Simulation • visible spectrum eye tracker	Office	Office workers	• Reading and writing activities • Ocular behavior • Gaze	• Daylight Glare probability • Blinds • Venetian blind
thermal and visual comforts	Proposition of a set of metrics for comfort conditions to be employed in early design stages (Atzeri et al., 2016)	• Simulation • Metrics calculations	Office	Occupant	• Occupant's position • Occupant reaction • Occupant behavior	• Daylighting performance • Global comfort • Window shading configurations
Energy optimization	the usage of blinds in a working environment is considered to model user action (Katsanou et al., 2019).	• Modeling	Working environment	User	• User action • User behavior	• Blinds
Wellbeing and conservation	Daylight modeling of a historic place to study the identity of place and visual experience (Almaiyah & Elkadi, 2012).	• Scaled model • Radiance simulation • Photography	Historic Pedestrian street	Residents	• Visual experience • Visual tasks • Visiting	• Daylight behavior
Safety	The study of the effect of daylighting conditions and effects in a daylit space on the disruptive behavior of individuals to propose design criteria for care	• Scientific observation	Care unit	individuals with probable Alzheimer's disease	• Disruptive behavior	• Daylight control interventions

	facilities (La Garce, 2004).					
Wellbeing and visual comfort	The study of different scenarios of space use by consideration of the pleasantness and comfort to propose an adaptive shading system (Baehr-Bruyère et al., 2019)	• Mockup model • Simulation	Multi-use room in campus	Occupants	• Working activity	• Shading
Energy optimization	Reducing the lighting loads inside office buildings by applying adaptive lighting and blind control systems developed by analyzing the light switch-on and blind closing behaviors (Gunay et al., 2017).	• Algorithm development • Monitoring	Office	Occupants	• Light-switch behavior • Blind use behavior • Adaptive behavior	• Blind
Energy optimization	The monitoring of participant's interactions with the shading systems to study the effect of the default lighting setting on the rate of adjustments (Heydarian et al., 2015).	• Immersive virtual reality	Office	Occupants	• Rate of adjustments • Interactions • Performance of daily tasks	• Available natural light
Thermal comfort	The study of the impact of the position and surface of the blind on the temperature inside the building in terms of comfort and the following behavior (Frontini & Kuhn, 2012).	• Building simulation	Office	Occupants	• Behavior	• Blind coating • Summer temperature
Thermal comfort	The study of the relationship between human comfort, and natural microclimatic conditions in open spaces (Zacharias et al., 2001).	• Measurements • Observations	Business district open space	People	• Presence level • Activity • Behavior	• Sunlight
Thermal comfort	the study of the lighting level satisfaction revealed its relationship with the type of activity and thermal condition has a more direct relationship with overall comfort (Fakhari et al., 2021).	• Survey • Questionnaire • Measurement	Office	Occupants	• Type of activity	• Illumination
Health and wellbeing	Study of the Covid lockdown and the sleep-wake cycle	• Online survey	Lockdown	Autistic persons	• Physical activity • Behavior	• Daylight exposure

	(Reynaud et al., 2022).				• Sleep-wake cycle	
Thermal comfort	Analysis of the effects of walking on thermal comfort in semi-open spaces to develop a predictive thermal comfort model (Zhang et al., 2020).	• Experiment	Transitional space	Subjects	• Body Movement • Walking activities • Metabolic rate • Heart rate • Speed levels	• Direct sunlight
Wellbeing and health	The study of the human physiological responses according to the plaza design and microclimatic condition (Zacharias et al., 2004).	• Behavior mapping • Case study • Regression analysis	Plaza	Plaza-user, open-space users	• Use level. • Moving	• Sunlight • Shade
Visual comfort	Visual comfort predictions according to the occupant behavior in the interior space and three façade types (Bian et al., 2018).	• Simulation with the Grasshopper plugin • Radiance-based visualization	Office buildings	Occupant	• View direction rotation • Position shifting range. • Multi-seat positions • Movable view	• Discomfort glare
Health and wellbeing	The investigation of the relationship between human performance and the temporal potential of daylighting to prescribe a stimulus of circadian rhythm (Pechacek et al., 2008).	• Photobiology • Simulation	Healthcare architecture	Patient	• Daily rhythms in physiology and behavior	• Lighting intensity, timing and spectrum
Energy optimization	The study of the probable impact of occupant behavior on energy saving in terms of lighting use. lighting control and daylighting strategies have been introduced as keys for energy efficiency (Zhu et al., 2017).	• Simulation • Measurements	Office	Occupants	• Occupant control • Occupant schedules • Variation in behavior pattern	• Daylighting strategies
Energy optimization and design quality	The evaluation of the behavior of the occupants regarding the lighting use to examine the effect of the design and orientation of the building on the 'switch-on behavior' (Bournas & Dubois, 2020).	• Survey • Questionnaire • Statistical analysis	Multi-dwelling building	Occupants	• Switch-on behavior • Lighting use	• Daylight hours
Energy optimization	Introduction of factors shaping the environment that helps to understand user needs concerning lighting	• Systematic and quantitative review • User perspective analysis	Non-residential buildings	Users	• Use of spaces • Occupant behavior	• Daylight • Lighting

	to help to explain occupant's behavior and the use of space (Sokol et al., 2022).					
Health and wellbeing	The study of the microalgae façade design on the cognitive performance and mood of students (Warren et al., 2023).	• Experiment • Mood measurement questionnaire • Creativity measurement	Educational setting	Students	• Human behavior • Cognitive performance • Feeling of being active • Productivity	• Biochromic window blind
Energy optimization	Estimation of the energy requirements of lighting in a building to highlight the improvements of lighting standards by consideration of the influence of daylight exploitation, and occupancy behavior (Parise et al., 2016).	• Illuminance sensor	Buildings	Occupants	• Occupancy behavior	• Daylight exploitation
Energy optimization and health and wellbeing	Study of the variables affecting blind usage considering occupant's sensation and experience of the place. Surprisingly, there is a different blind usage behavior in non-office buildings (Zhang & Barrett, 2012).	• Empirical study • Survey • Review • Logistic analysis	High-rise office buildings	Occupants	• Lowering and raising actions in blind usage • Blind operation patterns	• Solar radiation • Solar latitudes • Seasonal effects
Thermal comfort	Facilitation of pedestrian outdoor activities by optimization strategies for thermal comfort based on the consideration of the spatial differences in building shade and sunlight (Guo et al., 2022).	• Long-term observation • Survey • Questionnaire	Outdoor environments	Pedestrian	• Pedestrian outdoor activity	• Sunlight • Shade
Health and wellbeing	In a study on the daytime experience of the residential area to find the connotational relationship between visual properties and affective appraisal, activity has been correlated with clarity (Hanyu et al., 2000).	• Experiment • Subjective study	Residential neighborhood	Participants	• Physical/mental behavior • Behavioral activities • Active • Physical action • Energetic behavior • Movement	• Daytime
Energy optimization	The study of the control of lighting according to the actual presence of activities and	• Case study	Educational buildings	Students	• Actual presence of activity • On-off switching	• Actual availability of daylighting

	daylight availability in educational buildings (Martirano et al., 2014).					
Health and wellbeing and energy optimization	Cultural difference would affect the custom of using lighting in home offices and the way lighting is perceived (Amorim et al., 2022).	• Photography • Survey	Home offices	Occupants	• Custom of using lighting	• Daylighting
Design quality and energy optimization	Passive design strategy of daylighting according to the measured metabolic rate as one parameter of ISO 7730 standard for an energy efficient school (Filippín et al., 2007).	• Monitoring • Simulation • Survey	School	Students	• Metabolic rate	• Daylighting
Wellbeing and conservation	The study of the Mesopotamian ancient urban forms according to the meaningful presence of daylight in the environment and the serious limitation of human activity by the strong daylighting (Shepperson, 2009).	• Historic studies	Ancient residential buildings	Inhabitants	• Human activity	• Daylighting
Wellbeing	The study of the beach user behavior according to the atmospheric condition during daylight hours (De Freitas, 2015).	• On-site observation	Beach	Recreationists	• Beach activity	• Weather condition • Daylight hours
Thermal comfort	Research on the amount of walking occurring in each locale in relationship with the weather condition conducted by observing the walking rate of the pedestrians and air temperatures (de Montigny et al., 2012).	• Web-based camera observation • Air temperature obtained from stations	Locale	Pedestrians	• Walking	• Weather condition • Sunlight
Design quality	The study of the behavioral adaptations of the visitors and the use of resting areas in city squares in regard to the daylight availability in sitting	• Time-lapse photography • Observation	Squares	Visitors	• Sitting behavior	• Daylight availability

	areas (Krüger et al., 2019).					
Thermal comfort	The importance of controlling daylight and thermal condition in the sports buildings to meet performance requirements (Turrin et al., 2016).	• Computational design	Sport buildings	Athletes	• Sport activities	• Daylight condition
Thermal comfort and wellbeing	In the study of the thermal perception and attendance of people in the public space, they found that not only human energy balance model addresses the influence of the climate on the use of public space but also behavioral factors (Lin, 2009).	• Subjective Survey • Physical Measurements	Square	Visitors	• Use of space • Attendance in the space	• Sunlight • Thermal environment
Wellbeing and thermal comfort	The analysis of the sidewalk and street tree design and their impact of them on social and ritual activities such as a place for walking regarding the shading they provide from the sunlight (Tafahomi, 2022).	• Graphical analysis	Street and sidewalk	Pedestrians	• Walking	• Tree shading
Wellbeing and design quality	The study of the history of stained-glass windows and the effect of sunlight modified through them in the creation of spiritual activities such as the formation of taste and imagination as well as positive mood (Obors' ka, 2015).	• Subjective survey • Historical study	Interior	Users	• Spiritual activity	• Stained glass windows • Sunlight effect

2. Results of the systematic review

Through an analysis of the terminology used in the literature, six distinct categories emerge, each grouping related terms accordingly (Table 5).

According to the analysis of this systematic review, criteria for categorization of different types of movement can be proposed based on the relationship between movement, space, and daylight:

- **Similarity or uniqueness in terminology (General criterion):** Categorizing studies based on linguistic or terminological similarities used to describe various types of movement or interactions.
- **Intention of movement:** Grouping studies according to the purpose or goal behind the movement, such as whether it is driven by necessity or the choice of a specific destination or just simply exploration.

- **Scale and time of movement:** Categorizing based on the spatial scale (e.g., individual movement within a specific area versus group movement spanning larger spaces or zones) and the temporal aspect (e.g., immediate movement as short-term actions versus prolonged movement as long-term or continuous behavior).

Table 5. Classification of technical terminology used to describe user movement directly or indirectly in daylighting research, highlighting the vocabulary through which movement dynamics are addressed.

Impact / Type of action	Actions influenced by daylighting in the space	Actions that affect daylighting in the space
User* Experience and Spatial Utilization	Use of space (Villalba et al. 2018)	Domestic activity (Fantauzzi et al., 2015)
	Space utilization (Baehr-Bruyère et al. 2019)	Pedestrian activities (Guo et al., 2022)
	Activity space (e.g. atrium) (Ratajczak et al., 2022) (Yunus et al., 2010) (Hourani and Hammad, 2012)	Sports activities (Turrin et al., 2016)
	Activity development/accommodation (Ma and Yang, 2022)	-
	User activity (Chan et al., 2014)	Work activity classes (Dolnikova et al., 2020) (Fakhari et al., 2021)
	Elderly activity (Yang et al., 2021)	Activity-based needs (Kaiwen et al., 2016) (Manurung, 2017)
	Feeling of being active (Warren et al., 2023)	Everyday activity (Saranti et al., 2015)
	Pilgrimage/Worshipping activity, Spiritual activities (Taştemir et al., 2020) (Obors'ka, 2015)	Occupant daily activities (Sari and Chiou, 2019)
	Performance of social activities (Hareri and Alama, 2020)	Actual presence of movement (Parise et al., 2013)
	Recreational Activity (de Freitas, 2015) (Elliott et al. 2019)	-
	Social and ritual activities (Tafahomi, 2022)	
	Visual experience of movement (Almaiyah and Elkadi, 2012)	
Dynamic User Positions and Spatial Locations	Behavioral adaptation (Krüger et al, 2019)	Occupant locations (Hosseini et al., 2020)
	Pedestrian location and speed (Zeibo et al., 2021)	Occupant positions (Montaser Koohsari and Heidari, 2022) (Atzeri et al., 2016)
	'Occupant's choice of location (Pan and Du, 2022) (Izmir Tunahan et al., 2022)	-
	Position shifting (Bian et al., 2018)	
Walking and Transition	Walking habits (de Montigny et al. 2012)	Pedestrian movement (Adam et al., 2016)
	Movement patterns at the street level (Zacharias et al., 2001) (Pandya and Brotas, 2014)	Safe movement (Lasagno et al., 2011)
	Human physiological responses (Zacharias et al., 2004)	-
	User movement patterns (Liu et al., 2016) (Park et al., 2015) (Andersen et al., 2013)	
	Routing decisions (Bruse, 2007)	
	Act of walking, moving (Panahiazar and Matkan, 2018) (Zacharias et al., 2001)	
	Internal movements (Kristo and Kristo, 2021)	

	Energetic behavior (Hanyu, 2000), liveliness (Nasrollahi and Shokri, 2016)	
Physical Interaction	Adjustment of user activities (Wang and Boubekri, 2009) (Wang and Boubekri, 2011)	Manual interaction with/control of daylighting system (e.g. blinds) (Zhang and Barrett, 2012) (Cılasun Kunduracı and Kazanasmaz, 2019) (Hammes and Weninger, 2023) (Kyle Konis, 2013)
	-	User actions/reactions/interactions with daylighting system (Katsanou et al., 2019) (Salem and Elwakil, 2017) (van den Wymelenberg, 2012) (Heydarian et al., 2015)
		Adaptive behavior, user habits, daily activity schedules, switching behavior, custom of using lighting, stochastic user behavior (Lim et al., 2017) (Rakha et al., 2018) (Gunay et al., 2017) (Bournas and Dubois, 2020) (Martirano et al., 2014) (Fieldson and Sodagar et al., 2017) (Das and Paul, 2015) (Amorim et al., 2022) (Gilani et al., 2016)
Disruptive User-Space Interaction	Occupant migration/escape (Rezaee et al., 2009) (Sakarellou-Tousi and Lau, 2009)	Delay in manual control (Perwita Sari and Chiou, 2018) (Sanati and Utzinger, 2013)
	User interaction with lighting/cooling system (Jiang et al., 2022)	Disruptive movement (la Garce, 2004)
	Metabolic rates (Korolija et al., 2013) (Filippin et al., 2007)	-
Occupation Over Time	Occupancy time/duration (Jens and Khoudi, 2023) (Chiogna and Frattari, 2013) (Guan and Yan, 2016)	Occupation cycle (Hunt, 1979)
	Space occupation hours (Moazzeni and Ghiabaklou, 2016) (Nezamdoost et al., 2018)	-
	Activity-Rest Patterns, The Non-Visual Response, Physical Activity, Daily Activity (Lee and Boubekri, 2020) (Hu and Davis, 2021) (Abidi and Rajagopalan, 2020) (Pechacek et al., 2008) (Figueiro and Rea, 2016) (Amundadottir et al., 2013) (Flores-Villa et al., 2020) (Afacan and Demirkan, 2016) (Fonseca et al., 2006) (Reynaud et al., 2022)	

*In this table, the term "user" is used as a universal reference to signify not only "user" but also "human" or "occupant" which have been used in the literature. For simplicity and consistency, only "user" is shown in the table, serving as an inclusive term for any human agent within a built environment.

Based on the table above (5) in this annex, first category referred to as ‘User Experience and Spatial Utilization’ focuses on how users engage with the space, including the type of activity being performed and the functional use of different areas. It emphasizes how the space serves users' needs in relation to their behaviors and activities within it. The second category, ‘Dynamic User Positions and Spatial Locations’ addresses the user's physical state in terms of their direction, location, position, and speed within a space. It tracks the user's movement and orientation, helping to understand how they navigate and occupy different areas within a built environment. The third category, ‘Walking and Transition’ pertains specifically to the act of movement itself, including walking, transitioning, or shifting from one area to another within the space. It is concerned with how users physically move throughout the environment. Moving on, the fourth category, ‘User Interaction’ refers to how users interact with space elements, particularly those influenced by daylighting. It includes actions like adjusting lighting controls, interacting with windows or blinds, or responding to changes in natural light levels, and their impact on movement and behavior within the space. The fifth category, ‘Disruptive User-Space Interaction’ focuses on the negative consequences of interactions between the user and the space in daylighting studies. It includes disruptions caused by space elements (such as blinds or other electrical devices), which negatively affect energy efficiency or put users at risk, leading to discomfort, unsafe conditions, or even the need to leave the space. This also includes disruptions caused by the user's own actions within the space. Finally, the category ‘Occupation Over Time’ examines the amount of time users spend in different areas of the space. It relates to how long users occupy certain zones, potentially influencing daylight exposure and movement patterns within the space over extended periods. This categorization could result in a better understanding of movement for future categorization and identification of the methods used to address user movement according to scale and level of actions.