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A scoping review protocol for “Built Environment Barriers and Facilitators to Physical Activity in Indian Cities: A Scoping Review”

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ADMINISTRATIVE INFORMATION

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INTRODUCTION

Review question / Objective This scoping review addresses three main questions: 1. What Built Environment characteristics/features act as barriers and facilitators to Physical Activity in Indian cities? 2. What assessment tools were used for measuring Built Environment influences on Physical Activity in Indian urban areas? 3. What knowledge gaps exist in the domain of Built Environment and Physical Activity in Indian cities, and what is the future research scope? A scoping review method was adopted as it helps map the literature on emerging or evolving topics, identify the gaps (Mak & Thomas, 2022), and summarize and disseminate research findings (Peters et al., 2015). We followed the systematic scoping review process and predefined the protocol based on PRISMA-ScR (Preferred Reporting Items for Systematic reviews and Meta-Analyses extension for Scoping Reviews) Guidelines, and checklist (Tricco et al., 2018). We did not register the scoping review protocol, To the best of our knowledge.

Background Worldwide, the prevalence of inactivity is increasing as more individuals are failing to meet the World Health Organisation's (WHO) recommended weekly physical activity (PA) levels; If the trend continues, by 2030, nearly 60% of adults will be insufficiently physically active worldwide (Strain et al, 2024). The inactivity prevalence in India has sharply increased from 22.3% in 2000 to between 40 to 49.9% in 2022 (Strain et al, 2024), indicating that nearly 50% of India's population is not engaging in the WHO recommended amount of weekly PA (Podder et al., 2020; R.M. et al., 2014). In India, the urban population is less physically active than the rural population. (R.M. et al., 2014). It is expected that India's urban population will grow from 32% in 2014 to 50% by 2050 (Bocquier, 2005), and the estimates say that non-communicable diseases (NCDs) account for 66% of the total deaths in India (World Health Organization, 2022b). Physical inactivity plays a significant role in the development of non-communicable diseases (Katzmarzyk et al., 2022; Santos et al., 2023). Although the burden of inactivity is higher in

countries with high incomes (Cooper, 2018), a larger proportion of physically inactive people reside in low- and middle-income nations (Katzmarzyk et al., 2022), such as India. The prevalence of inactivity can be attributed to the changing patterns of urbanization, transport patterns, and technology (Cooper, 2018). Studies show that PA can reduce the risk of more than twenty-five chronic health conditions (Warburton & Bredin, 2017). Several studies identified the influence of Urban built environment on the physical activity of people. The built environment (BE) includes cities, towns, and neighborhoods (Thompson & Kent, 2017), and it is made up of buildings, streets, infrastructure, green open spaces, etc. (Seyedrezaei et al., 2023) and facilitates live, work, travel, and recreation and other activities (Thompson & Kent, 2017). Several social, physical, and environmental characteristics influence the urban form of cities and, eventually, the physical activity.

Rationale There is a growing interest in PA in urban areas as it is low-cost (Duijvestijn et al., 2023) and an effective way of promoting health (Zhong et al., 2022). Planning and designing urban areas significantly impact PA (Koohsari et al., 2013) and improve public health (Freilich, 1986). Several studies identified the influence of urban BE characteristics on PA (Elshahat et al., 2020; Zhang et al., 2024). BE Features such as walkability (Arifwidodo & Chandrasiri, 2024; Siqueira Reis et al., 2013), residential density (J. Wang et al., 2021; Z. Wang et al., 2019), land use mix (Noordzij et al., 2021; Wei et al., 2016), street connectivity (Jia et al., 2021; Koohsari et al., 2014; Oakes et al., 2007), availability of green open spaces (A. C. K. Lee et al., 2015; Mytton et al., 2012; H. Wang et al., 2019), and PA facilities (Eriksson et al., 2012; Halonen et al., 2015) are some of the common influences of PA in urban areas. Studies also found inconsistencies in the BE influences on PA across the countries because of socio-cultural (Jaeschke et al., 2017; Mathew Joseph et al., 2018), and contextual variations. While high-income countries have extensively explored the built environment's (BE) effect on physical activity (PA), research in low- and middle-income countries, including India, remains scarce and comparatively new. The literature from India has not been comprehensively reviewed to understand the Built Environment barriers and facilitators to Physical Activity. There is a lack of understanding of the scope and limitations concerning various population groups, physical settings, and research methods. Hence, A scoping review is essential for synthesizing the findings of the built environment's influences on

physical activity in Indian cities and identifying the further scope of research.

METHODS

Strategy of data synthesis The authors conducted a thorough search of the literature using three databases, i.e., Scopus, Web of Science, and PubMed, finding reputable papers that are most pertinent to the study of the Built Environment. To identify relevant research articles in the databases, the Authors consulted two professors and one librarian with expertise in identifying articles for the literature review. The authors formulated a combination of keyword search strategies using the Boolean operator and limited the search to articles on Indian cities published till June 2024, with the latest search performed on July 05, 2024, for any recent articles. This review used the keyword combination ("neighborhood" OR "built environment" OR "gated community" OR "public space" OR "urban area" OR "park" OR "street" OR "playground" OR "housing" OR "ward" OR "transport") AND ("physical activity" OR "walkability" OR "exercise" OR "physical fitness" OR "recreation") AND ("India" OR "Indian city" OR "Indian") on all three databases, i.e. Scopus, Web of Science and PubMed.

Eligibility criteria This Scoping review included published research articles till June 2024. An Eligibility/ inclusion criteria with 8 points was formulated to select the relevant articles for the review. 1. Studies that were conducted in urban areas of India. 2. Both cross-sectional and longitudinal studies were allowed. 3. Both literature review and empirical studies were allowed. 4. All study typologies were included (qualitative/quantitative/mixed-method research) as both subjectively and objectively measured BE characteristics had shown a significant association with people's PA in urban areas (C. Lee & Moudon, 2004). For qualitative studies, we followed additional guidelines for quality assessment (Mays, 2000). 5. Studies that measured the participants' self-reported/objective PA were included, as there could be variations in the outcomes (Niestrój-Jaworska et al., 2023; Ogonowska-Słodownik et al., 2022). 6. All age groups and gender were included. 7. Research that discussed how characteristics/features of the BE affect PA in Indian cities. 8. Articles published in the English language.

Source of evidence screening and selection The initial search using the keyword combination provided 1951 articles (1042 articles on Scopus, 372 articles on Web of Science, 517 articles on

PubMed databases, and 20 additional articles identified through other sources). After excluding 565 duplicates, there were 1386 articles left. Both authors individually conducted a title and abstract screening and excluded the articles based on the relevancy of the domain and the work type. The differences were resolved by reviewing the entire paper to achieve a common consensus. At this stage, we eliminated 1303 articles, and 83 articles were selected for full-text review. Both authors independently carried out a full-text review using the established inclusion criteria. With the common consensus on the inclusion criteria, relevancy of the article, and contribution to the research questions, 56 articles were excluded at this stage, and 27 articles were included for evidence synthesis. As this is the first comprehensive review of the characteristics of the BE, we included articles pertinent to understanding how the BE affects PA in Indian urban areas.

Data management The references received from the database search were entered into Microsoft Excel and duplicates were removed. Both authors also manually cross-checked the titles to ensure no potential articles were removed in the process. The authors conducted a title and abstract screening, and the differences were resolved by reviewing the entire paper to achieve a common consensus. Articles selected from the title and abstract review were further taken for full-text review based on the pre-decided /inclusion criteria. Articles identified from the full-text review were thoroughly discussed, and with a common consensus, 27 articles were included in the scoping review. Full texts of the selected articles (after eligibility/inclusion criteria) were further reviewed by both authors, and data were coded to see the general information and specific information for addressing the scoping review questions. We used Mendeley desktop and Atlas.ti platforms to store, review, code the data, and for further reference. We followed PRISMA-ScR guidelines for reporting to improve the quality of the review and eliminate the risk of bias in reporting.

Reporting results / Analysis of the evidence

Both authors systematically analyzed and presented the descriptive summary (using percentages) of each category of data. Sections of the results presented include the demographic characteristics, geographic characteristics of the study areas, Study design (Qualitative/quantitative/cross-sectional/longitudinal/ statistical significance of findings), Physical activity types (Overall Physical activity/Travel physical activity/ Leisure time physical activity/others), Physical activity

measurement tools, Types of built environments investigated (study are types), Built environment measurement tools. We used narrative, thematic, descriptive, and critical appraisal approaches to analyze the data. The results were presented according to PRISMA-ScR guidelines (Tricco et al., 2018). for reporting the general characteristics of the study, we used quantitative and descriptive reporting, such as percentages. We used tables and Sankey diagrams for categorically coding and presenting the inter-linkages. We used narrative and thematic analysis to identify the built environment's influence on each category of age and gender. we used a critical appraisal approach to discuss the results and identify the scope, limitations, critical appraisal approach to discuss the results, identify the scope, limitations and knowledge gaps.

Presentation of the results This scoping review systematically presented the results according to PRISMA-ScR guidelines and recommendations. We followed the standard format of the research paper structure with the introduction, methodology, results, discussion, and conclusion to make it easily understandable for different audiences/readers. We used descriptive and narrative summary methods to systematically summarise the findings under each category so that each section of the results can provide valuable information useful for further analysis and a finding in itself. We identified the built environment influences on different age groups and genders and presented our results according to children, adolescents, adults (Men and women), and older adults. Using the narrative synthesis, the built environment influences on the physical activity of each demographic group were analyzed, and the findings were reported. We used tables to categorize the results and we also used Sankey diagrams to show the interrelationships between the categories of data. Our first table contained the list of selected research articles, the aim of the study, the focused demographic group, and the data sample. The second table consists of data on study design, built environment type, built environment tools, physical activity type, and physical activity tools. The third table showcased data on the statistical significance of built environment and physical activity relationships, study type (qualitative or quantitative), physical activity assessment type (perceived/objective), built environment assessment type (perceived/objective), data analysis methods, and findings related to built environment and physical activity barriers and facilitators. We discussed the findings of the scoping review in light of the existing international research to identify the scope and

limitations and provided future research scope in the context of Indian cities based on the results of this scoping review.

Language restriction This scoping review only included articles published in the English language.

Country(ies) involved This scoping review included the studies conducted on Indian cities or Indian urban areas.

Keywords Physical activity barriers, Physical activity facilitators, Built environment, Public health, Indian urban areas.

Contributions of each author

Author 1 - Nagabhoina Tejendra - Conceptualized the review, methodology, data sourcing, analysis, data representation, data curation, writing, and original draft.

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