ACTIVE TRAVEL STUDIES

Lay summary

Integrating perceptions, physical features and the quality of the walking route into an existing accessibility tool: the Perceived Environment Walking Index (PEWI)

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OVERVIEW

- This study develops the Perceived Environment Walking Index (PEWI) as a practical instrument to integrate multiple dimensions of walkability into a single measure for transport planning and research.
- PEWI combines GIS-based objective walking accessibility (building on the logic of Walk Score®) with 18 indicators covering physical features, route quality and subjective assessments across the category's functionality, safety/security, pleasantness and attractiveness.
- Results from testing PEWI in two urban neighbourhoods in Hamburg suggest that adding these indicators provides a more nuanced and policy-relevant picture of walkability than indices based only on distance or travel time.

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Perceptions of the environment shape individual mobility decisions and represent the 'lived reality' of accessibility and walkability. As long as individuals' perceptions are disregarded, the potential positive outcomes of walking accessibility, such as social inclusion, cannot simply be attributed to good objective walking accessibility, since objective instruments may not capture people's subjective realities of accessibility.

With the overall intention of improving the modal share of walking and therefore enhancing individual well-being and reducing the negative effects of sedentary lifestyles, a wide range of literature from different disciplines and research focuses on newly developed walkability indicators and tests their validity at different spatial levels and with different methods. Despite these considerable efforts, there is often no comprehensive attempt to reconcile objectively determined accessibility conditions with subjective perceptions of neighbourhood residents, who ultimately shape mobility decisions. So, our work can be read as responding to recent calls for more research in this area and the need for consistent methods to collect and integrate several features that affect walking. Since common walkability analyses and instruments try to include perceptions of different population groups without integrating them into practical tools, we investigated multiple relations between different dimensions of the walkability concept, discussed methods for assessing walkability in urban neighbourhoods, and present the development of the Perceived Environment Walking Index (PEWI). Therefore, we integrated and analysed the influence of subjective perceptions of walking accessibility as well as 18 walkability indicators on an existing accessibility instrument by developing an adapted version of the Walkscore, the PEWI. In order to achieve this goal, we used a multi-method study design and identified indicators that give a more nuanced description of the influence of the built environment on the walkability of the target groups (older people and young families) in order to expand small-scale accessibility models. We developed and tested the PEWI in two urban neighbourhoods in Hamburg (Bahrenfeld and Barmbek-Nord) in three steps.

First, we calculated a modified Walk Score® index representing objective walking accessibility. In doing so, we added two facilities to be accessed (pharmacies and general practitioners) and adjusted their weights to reflect their relative importance for the two target groups. This modified index is hereafter referred to as Walkscore.

Second, we developed the PEWI on this basis by integrating the 18 walkability indicators representing physical features as well as the quality of the walking route and subjective perceptions of walking accessibility broken down into the categories 'functionality', 'safety and security' as well as 'pleasantness' and 'attractiveness'.

Subsequent equal weighting of input variables allowed the influence of each indicator to be elaborated and visualised in GIS. The results illustrate how individual perceptions can be integrated with physical features of the environment and qualities of the walking route into a group-specific indicator. The data collection was based on a systematic neighbourhood audit. The subjective perceptions were collected in a household survey.

The PEWI illustrates the local provision of facilities and services taking into account the quality of walking. Comparing the two neighbourhoods shows clear differences. The study area in Bahrenfeld has a low score in the functionality category, that is, dropped kerbs, absence of obstacles, available seating and pavement width. These indicators are particularly important for people with limited mobility, such as older people walking with a frame or stick or young families with a pram or a child's bicycle. The needs of these vulnerable groups must be taken into account to prevent social exclusion and to enable an independent, self-determined life. In the Barmbek-Nord study area, the highest deficit is in the pleasantness category. Noise pollution in the neighbourhood is the highest negative factor influencing walkability. Both districts perform best in the attractiveness category except for perceptions of walking accessibility. In order to find out whether the Walkscore differs systematically from the PEWI, a comparison of mean values was carried out using a t-test which revealed a significant difference between the two. By comparing the Walkscore (adjusted from the Walk Score®) and the PEWI, it can be seen that Barmbek-Nord's PEWI and therefore its walkability drops noticeably from the highest category '*walker's paradise*' (just using Walkscore) to '*very walkable*' (incorporating PEWI) (see Figure 1). In the Bahrenfeld case study, the combined Walkscore rating for objective walking accessibility fell into the '*very walkable*' category. If we take PEWI into account, walkability drops to '*somewhat walkable*'.

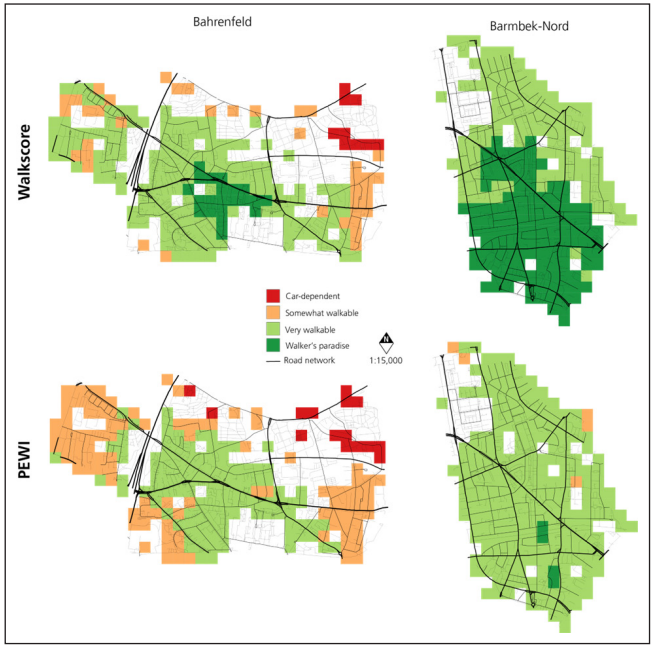

Figure 1: The impact on an accessibility score of incorporating PEWI in the two case-study areas

Using the PEWI in the two study areas leads us to three conclusions. First, using a neighbourhood audit and integrating its indicators into an existing accessibility tool has proven to be a promising, nuanced method to get a more accurate picture of walkability and accessibility. Equal weighting of all indicators except for noise pollution and perceived walking accessibility allows a comparative analysis of the influence of all indicators, both the built environment and the qualities of the walking route. Second, regarding the effects for small-scale accessibility analysis, the PEWI enables detailed deficits to be shown spatially on a micro level and thus walkability to be analysed on a grid level (100m × 100m). The variety of indicators not only allows focus on individual aspects, but also a holistic analysis that includes not just noise pollution and pavement width, but also traffic volume and other attributes, such as the attractiveness of the street space or presence of street greenery. Finally, the difference between Walkscore and the PEWI shows that commonly used indices, focusing only on objective measures such as distances or travel times, are not sufficient to represent the lived reality of accessibility and walkability and cannot incorporate target group-specific perceptions. We conclude that integrating perceptions as well as user-specific needs is highly relevant when studying individuals' travel decisions.

References can be found in the full article.

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