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# Walking interviews as a qualitative method of assessing environmental noise perception of preschool children

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## ABSTRACT

Studies show that exposure to environmental pollution, such as environmental noise as well as beneficial places like green spaces, affect human health. In particular, environmental noise was found to have an impact on children's well-being and cognitive performance. In this study, a qualitative approach, the walking interviews, is used to assess children's perception of the physical environment in their neighborhood. The walking interviews supplement an in-depth preschool study on children's mental health and cognitive development as part of the EU Horizon 2020 research project Equal-Life (Early Environmental quality and life-course mental health effects). The aim of the walking interviews is to get a better understanding of preschoolers' perception and experience of their living environment. The children are accompanied by a researcher and one parent on a 30 to 60-minute walk around in their neighborhood. A relevant aspect is that the children decide where they want to go and guide the parent and the researcher. During this walk, they are asked, for example, what they like or dislike about their neighborhood, whether they play outside and whether they perceive their neighborhood as noisy. To facilitate analysis, the walking interviews are audio-recorded, and the children receive a camera to take pictures of places or environmental features that are most relevant to them. In this paper, the method of walking interviews as conducted in the preschool study is presented and discussed.

Keywords (3-6): Noise, air pollution, combined exposure, children, health, walking interview

## INTRODUCTION

The physical environment, including exposure to environmental pollution, such as environmental noise, as well as beneficial places like green spaces, affect human health. Regarding children, particularly noise was found to have an impact on their well-being and cognitive performance[1-3]. It is known that exposure to multiple physical and social risks in childhood affects the development of children more adversely than exposure to single risk factors only, such as noise[4-6]. Evans and Wachs[5] use the term 'chaos' in order to describe environments "that are characterized by high levels of noise, crowding and instability, as well as a lack of temporal and physical structuring" (p. 5) and that are detrimental to the child's development. On the other hand, contact with the natural environment, such as green space, social contact and support, and physical outdoor activities, are factors providing restoration, a reduction in environmental stress responses (e.g., noise annoyance), and improvement of health and well-being[7-8]. As for effects on children, for example, it was found that higher greenness exposure within 300 m during pregnancy is associated with higher verbal abilities in 4 to 5 years old children[9].

The EU Horizon 2020 project Equal-Life (Early environmental quality and life-course mental health effects) aims to study the combined impact of exposures in children's and adolescents' physical and social environments on their cognitive development and mental health, including mental illness and well-being[10]. For this, the project takes up the exposome approach[11], according to which the exposome is defined as the (non-genetic) totality of human physical and social environmental exposures from conception onwards, complementing the genome.

In Equal-Life, data from European cohort studies on child development and health are used and enriched with now-available data on noise, air pollution, and other – also beneficial - environmental exposures in the residential areas of the cohort participants. The resulting data sets allow re-analysis as well as a meta-analysis of pooled data on the impact of multiple physical and social exposure in life courses on mental health and cognitive development.

Additionally, in-depth studies are conducted to fill research gaps that were foreseen before or identified in literature analysis during the project period.

One of these in-depth studies focuses on 5-7 years-old children in the transition from kindergarten to primary school. This age period is important for cognitive and socio-emotional development later in life[12]. Rapid developmental changes in cognitive and language functions as well as in children's social-emotional competencies especially occur during the first year of schooling, predicting academic achievement and social and cognitive competencies later on[13].

Evidence suggests that cumulative risks are especially harmful in early childhood[5,14]. However, little is known about the combined effects of physical exposures and the children's social environment on the developmental trajectories, in particular during the important phase of the transition from kindergarten to primary school. Therefore, the preschool study aims to fill this knowledge gap, especially because the respective age group is under-represented in the existing EU cohort data sets, and the in-depth study assesses the potential of now-available measures of environmental (physical and social) exposures and developmental outcomes.

In the preschool study, quantitative as well as qualitative methods are applied to measure the physical and social environment of the children and their cognitive development and mental health. Among these methods, walking interviews are conducted with the children to assess their perception of their neighborhood through a qualitative approach.

## THE IN-DEPTH PRESCHOOL STUDY

Within Equal-Life, the preschool study is carried out in Belgium and Germany. The walking interviews described in this paper are only conducted in Germany. Therefore, the following brief description of the main aspects of the study design and measurements of the preschool study refer to the German part of the study.

The preschool study follows a longitudinal design with two times of measurements. The first measurement takes place with 5-6 years old children in preschools. The second one is carried out one year later at the end of the first class in primary school. The first wave took place in the year 2022 in spring/summer before the summer holidays, and the second one year later in 2023. Due to the aftereffects of the Covid-19 pandemic, the willingness to participate was low in 2022. Therefore, it was decided to recruit a second cohort of preschool children in 2023 for the first wave measurements and to conduct the second wave measurements with this cohort in the spring/summer of 2024. For the study, kindergartens in the cities of Hagen, Dortmund, and Bochum from lower (< 55 dB $L_{den}$) and higher (> 60 dB $L_{den}$) road traffic noise exposed areas are selected for the study. In this study, the road traffic noise level $L_{den}$ is regarded as a proxy indicator for exposure to noise and air pollution and used as a criterion for the study area selection.

In the selected kindergarten, the preschoolers and their parents are recruited for the study. Testing of the cognitive development of the participating children is done in the kindergartens with standardized cognitive tests. In a questionnaire, the parents respond to questions on the children's mental health. They further inform about the children's social exposures at home, in the family, and the neighborhood. The assessment of physical exposures includes the ascertainment of housing and neighborhood quality (e.g., housing type, access to playgrounds/green spaces), the estimation of outdoor environmental noise at home and at (pre-)school based on noise mapping, and updated traffic volume data, and indoor noise and air quality measurements during the testing in the kindergarten. In addition, if families volunteer, EEG measurements (mismatch negativity; MMN) are done with the children as several studies in adults and children investigated MMN as a potential indicator of neurological, psychiatric, and neurodevelopmental disorders[15].

Finally, walking interviews are conducted with volunteering children and one parent or legal guardian to investigate the children's perception of the environmental quality of their neighborhood. This qualitative approach supplements the above-mentioned quantitative assessments of the children's physical and social exposures, cognitive development, and mental health. The following section describes the method of walking interviews as applied in this study in more detail.

## THE WALKING INTERVIEW

In the preschool study, the exposure to characteristics of the children's social and physical residential environment is assessed in terms of objective data and in parental retrospective judgments. The standardized survey instruments and test battery do not include the assessment of the children's own perception of their physical and social living environment. This is because, as children move around, do different activities at different times of the day, and are in different moods, it is likely that it is hard for them, in particular for young preschool children, to summarize the perception of the physical and social characteristics of the neighborhood in aggregated, retrospective judgments in a static interview or test situations.

A much less abstract and aggregated level of assessing children's perception of their environment is to ask them to show the researcher the environment rather than describing it[16]

and explaining their attitudes and perception in situ. The method of walking interviews is regarded as an appropriate instrument for this. A walking interview is a technique of data collection 'on the move'[17]. It is particularly developed for capturing "people's attitude and knowledge about the surrounding environment" (p. 850)[17] in order to get a deeper understanding of the "process of making sense of the spatial environment" (p. 35)[18]. Thus, in this study, using walking interviews, the aim is to better understand preschoolers' perception and experience of the environment in the neighborhood of their home.

***The procedure of walking interviews in the preschool study***

Accompanied by a researcher and one or both parents or other care persons, a child (interviewee) walks around in its neighborhood for about 30 to 60 minutes on average with an expected maximum of 90 minutes. This interview duration is comparable with the procedure in previous research. For example, in their study, Ergler et al.[19] conducted walking interviews with preschoolers, where the walks lasted between 20 and 90 minutes.

The walks take place upon appointment in the afternoons or at the weekends. The interview participants meet near the home of the child. The children will be asked to show the important places in their neighborhoods, both liked and disliked. An important aspect of the walking interviews is that the children decide where they want to go and guide the parents and the researcher. That is, the walks are led by the children at their own paces and directions and with different numbers of important features or affordances to show.

At each place, a child shows, the following open questions are asked:

- Why is this place important?
    - What does it like/dislike about this place (best)?
    - How does the place make the child feel (happy, afraid, etc.)?
- In order to encourage further discussion on the way, the child will be asked to point out interesting features.
- Also, what does it like/dislike about the neighborhood in general?
- Why did it pick this route?
    - Is there something special about it?
- If not mentioned by the child, the interview will also contain questions about noise, traffic, and odors/exhaust of cars.

The parents or other accompanying care persons will be asked to walk behind the child and researcher as long as the child is comfortable with this arrangement.

The walking interview is recorded with a recording device the researcher carries close to the child without hindering it in its movements. Due to the child moving and/or playing the recordings won't be complete, but they offer a good basis for transcribing the interviews.

Further, the researcher will note the important features the child describes or points out. In case of interruptions by other familiar persons that are met during the interview, the recording will be stopped until the walking interview proceeds. If the interrupting exchange offers input for the progress of the walking interview, this will be noted in the protocol. Additionally, the break in the recording will be noted in the protocol. The route taken during the walk will be captured by using GIS (Geographic Information System) devices. In order to capture the special places, the children are offered a digital camera for taking pictures. This enables the researcher to fit the special places better with the route taken and also generates a child perspective of this special feature. The photos will only be taken under strict adherence to the protection of the privacy of other people in or around those special places. Interview recordings will be deleted immediately after their transcription.

Conducting walking interviews with children is regarded as "a key step to understanding their life worlds and provides a way for preliterate and preverbal children to demonstrate knowledge and understanding of their spatial world" (p. 1)[19]. So, instead of or in addition to using static interviews, the children are in motion and are able to express themselves through actively pointing out or (un)consciously seeking out important or pleasing parts of their environment due to playing, climbing, watching, feeling, gesturing during the walk. Observing children how they move and engage in their neighborhood gives the opportunity to rate 'well-being affordances,' a "combination of attachments to and relationships with their local environments in terms of their material social and cultural characteristics" (p. 6)[19]. In their study with children aged 3-5 years, Ergler et al. [19] found that "Visual attractiveness and physical involvement contributed to how they experienced and made their neighborhoods and formed their sense of place" (p. 12). Also, other factors add to the experience of the lived environment, including the awareness of dangers potentially given due to traffic, nature, or other people. Witten et al.[20] performed walking interviews and focus groups with children aged 9-12 years. They found that the children expressed distress and weren't comfortable when they crossed paths with homelessness and drunkenness. Still, the children also found ways to cope with those situations, one of them is to know how to avoid them altogether. This knowledge leads children to feel 'street smart' and therefore independent of their parents.

### *Walking interviews and comparative methods*

There are similarities between walking interviews and soundwalks. Soundwalks represent a common and standardized instrument for identifying soundscape and its component[21,] with soundscape being defined as "an acoustic environment as perceived or experienced and/or understood by a person or people, in context"[22]. According to ISO/TS12913-2[23], a soundwalk is a "walk that involves listening to sounds occurring in the environment, and that may also involve other sensory experiences".

The purpose of a soundwalk is to deepen our awareness and understanding of the sounds around us and to explore the relationship between sound and space. Soundwalks can be undertaken individually or as part of a group, and they can be guided or unguided. The ISO/TS 12913-2[23] standard provides guidelines for conducting soundwalks and assessing the quality of the resulting data. Three protocols, two alternative questionnaires (methods A and B) and a narrative interview (method C), are proposed for data collection via soundwalks[24]. As soundwalks clearly focus on the perception of the acoustic environment in context, walking interviews follow a broader approach of assessing - while on the move - the perception and experience of the surrounding environment in general, including different senses, impressions/attitudes, and activities. That said, a soundwalk may be interpreted as a specific, soundscape-related version of a walking interview.

Another comparable approach to assessing event-related, acute, or short-term self-reports is the experience sampling method (ESM[25]). ESM is a specific form of a diary study that involves repeated measurements of human beings' daily life experiences, perceptions, or behavior in different acute moments in response to given signals or notifications across a period of time. The repeated assessment of momentary experience, perception, mood, or behavior allows minimizing a recall bias that might occur in retrospective surveys. In contrast to ESM, the walking interview is not restricted to the assessment of momentary moods, perceptions, or attitudes but allows the reflection about the spatial environment beyond the momentary situation inspired by the visited places during the interview.

## OUTLOOK

At the time of the preparation of this paper, the preschool study is ongoing. The semi-structured interview guide of the walking interviews was tested in a pilot walk and slightly modified. The walking interviews will take place in the summer of 2023 and 2024. Results will be presented in future publications.

## CONCLUSION

Within the EU-Horizon 2020 project Equal-Life, a longitudinal (pre-)school study takes place with preschool children aged 5-7 years in their last year in kindergarten and one year later at the end of the children's first class of schooling. Several cognitive tests and parental questionnaires are used to assess the children's cognitive development and mental health in the transition from preschool/kindergarten to primary school. Physical exposure to noise, air pollution in the kindergartens, and outdoor and neighborhood quality, including access to a playground and green space, is assessed through measurements, calculations, and (partly) by parental reports. The children's social environment is assessed in the parental questionnaires. EEG measurements are added to the quantitative assessments.

The method of walking interviews is a qualitative approach used to assess the children's perception of their neighborhood's physical and social environment at home, supplementing the quantitative measurements. In this paper, the method of walking interviews as applied in the preschool study is described. Results will be presented in future publications.

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