



“A place where I have lost and made friends”: A photovoice study on adolescents’ perspectives on health in a new residential development area in Munich, Germany

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ABSTRACT

Worldwide, the number and proportion of people living in cities continue to grow. Building new districts creates opportunities for designing urban environments that promote the health of their residents from the get-go. In this study, we used the photovoice methodology to explore the perspectives of adolescents on health and well-being in a new urban development area in Munich, Germany. Eleven adolescents aged 13–19 years were recruited in the new residential development area of Freiham on the Southwestern outskirts of Munich. Participants were given ten days to take photographs in the study area, focusing on objects or sceneries they considered to be important for their health. We then conducted qualitative interviews related to these photographs. Interviews were transcribed verbatim and analyzed using thematic analysis. We identified eight recurring themes: emotional well-being, meeting peers, being physically active, growing as a person, safety, waste, development of the urban environment, aesthetics of the urban environment. Adolescents highlighted aspects of mental and social health when assessing the urban environment. Interacting with other young people was an important reason for our participants to visit public places. Public health professionals and urban planners should consider the specific needs of this age group when building new urban areas, and especially provide safe and clean public spaces that adolescents can use for recreation and social interactions.

1. Introduction

Human health is affected by the built environment in multiple ways (Galea et al., 2005). The term built environment has been defined as the entity of human-made buildings and infrastructure that constitutes a setting for all kinds of human activities (Seyedrezaei et al., 2023). Previous research has shown that the built environment can impact, among others, physical activity, the risk of obesity and cardiovascular diseases (Sallis et al., 2012), as well as dietary habits and various mental health outcomes (Tonne et al., 2021). There is evidence that changes to the built environment can improve the physical and mental health of residents (Moore et al., 2018; Stappers et al., 2018). A wide range of features contributing to health-promoting cities have been identified (Rydin

et al., 2012). For example, built environments with high walkability (Westenhofer et al., 2023) and much greenspace (Yang et al., 2021) are associated with benefits for human health.

However, cities should be understood as complex systems, where the built, social and ecological systems interact with each other (Bai et al., 2016). For example, the built environment is shaped by social processes, but at the same time characteristics of the built environment influence how people act in a specific place. Research suggests that compact urban areas with accessibility can promote interpersonal interactions and therefore increase social well-being (Askarizad and Safari, 2020; Mouratidis, 2018). The “Shaping cities for health” Commission by The Lancet and University College London suggested that public health interventions aiming to promote health among urban residents should

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consider how these different systems within a city interact with each other to increase effectiveness (Rydin et al., 2012).

The importance of creating salutogenic neighbourhoods will increase in the years to come, given the current urbanization trends. According to the United Nations, the percentage of people living in cities worldwide will increase from 55% in 2018 to 68% in 2050 (United Nations, 2018). Cities will thus need to expand to accommodate their new residents. From a public health perspective, this creates the opportunity to develop healthy new urban environments from the get-go.

Compared to other age groups, adolescents have differing needs regarding the urban environment (Abdollahi et al., 2023; Fleckney and Bentley, 2021). Adolescence is a critical stage in life accompanied by important changes in physical, mental and social development. One crucial aspect is the development of a social identity, and this process evolves in interaction with other people (Branje et al., 2021). It usually involves a growing autonomy from parents and care-givers, with peers becoming more influential (Mitic et al., 2021). In recent decades, a lot of research has been conducted on how young people experience and interact with the built environment (Freeman and Tranter, 2012; Mmari et al., 2014a). As young people grow up, they increasingly develop more agency with regards to the places or environments where they spend their time. Their independence and mobility are important for psycho-social development and have been associated with positive health benefits, yet the mobility of young people is often hindered, e. g. by parental regulations, lack of appealing places to meet up with peers or safety issues in the neighbourhood (Marzi and Reimers, 2018). The structure of the urban environment has been also associated with positive mental health outcomes in adolescents (Buttazzoni and Minaker, 2023; Mueller and Flouri, 2021).

In the past years, much research has been conducted into how young people can be involved in urban planning (Ataol et al., 2019; Derr et al., 2013; Ergler et al., 2017; Freeman and Cook, 2019), and many good practice examples exist (Freeman and Tranter, 2012; Heinrich and Million, 2016). Nevertheless, in practice, engaging adolescents in urban planning processes is often perceived as a challenge by municipal actors, among others due to the resources and competencies required to do so, and the diversity of the groups involved (Ataol et al., 2019; Sylte et al., 2023). Nevertheless, from a public health perspective, it is an important task to foster participation of adolescents in urban planning, as building salutogenic urban environments for young people can result in significant long-term benefits for population health (Meeus, 2018; Patton et al., 2016; Sawyer et al., 2012).

Participatory research is an established approach in public health to engage various population groups in designing and implementing public health interventions in urban settings, in particular among marginalized groups such as adolescents (Lindquist-Grantz and Abraczinskas, 2020; Wallerstein and Duran, 2010). In participatory research, citizens become active members of the research process, initiating a process of capacity-building and empowerment. This way, participatory approaches also have the potential to reduce health inequities (Ozer et al., 2020; Thompson et al., 2016). Furthermore, they can enable public health professionals to gain detailed insights into the needs of different stakeholder groups, and therefore allow them to tailor public health measures according to their needs, thereby increasing effectiveness and acceptance (Wallerstein et al., 2011).

Photovoice is one method often used in participatory research. The approach was initially described by Wang and Burris in 1997 (Wang and Burris, 1997). In photovoice, participants take photos of their environment on a specific research topic, choosing for themselves which motives they want to capture. According to Wang and Burris, photovoice can, in principle, serve three main goals: (1) enable participants to record and reflect about issues in their community, (2) initiate discussion about these topics, and (3) reach policymakers (Wang and Burris, 1997). In community health research, photovoice has been described as a useful instrument to explore the perspectives of citizens on physical and social environments (Nykiforuk et al., 2011). Photovoice allows participants to

identify issues important to them in their community. Especially when working with adolescents, photovoice is a valuable approach to initiating change, leading to solutions that are meaningful for both professionals and participants (Agner et al., 2023; Royce et al., 2006; Strack et al., 2004; Wang, 2006). Photovoice may help adolescents to develop a positive social identity by facilitating an engagement with their community and supporting them in playing a more active role in society (Strack et al., 2004). However, there are also challenges when using photovoice (Nykiforuk et al., 2011). For one, it is questionable whether participants are representatives of their community. Additionally, the initiation of change is no automatism, if there is no political will to use the photovoice findings.

Previous research has investigated the perspectives of residents on new residential development areas by applying participatory research. Kraftl et al. explored how young people experience living on a new building site across three communities in England (Kraftl et al., 2013). A study by Guinand et al. explored how residents and workers perceived a newly built urban area in Vienna, Austria (Guinand et al., 2021). Still, young people's perceptions regarding urban building sites remain under-researched. This study applied the photovoice method to investigate the perspectives of adolescents on their health and well-being in a new residential development area in the city of Munich, Germany. We sought to explore the needs of adolescents in this specific urban setting and to identify which determinants this group considers as facilitators or barriers to their physical, mental and social health.

2. Methods

2.1. Setting

The study was part of the evaluation of *Präventionskette Freiham*, a municipal public health intervention initiated by the city of Munich. This intervention aims to create an intersectoral network to diminish health-related, educational and social inequalities for children, adolescents and families in the new residential development area Freiham on the southwestern outskirts of Munich. The evaluation concept has been described in more detail elsewhere (Voss et al., 2024). Freiham is a new district that the city of Munich started to construct in 2016. The area comprises 190 ha (1.9 square kilometers), making it one of Europe's biggest construction areas. Prior to 2016, the southern part of the area had already been used as a commercial area. As the city of Munich, located in the Southern part of Germany with currently around 1.6 million residents, has been experiencing rapid population growth, most of the new buildings are planned as apartment buildings, including a high percentage of social housing. Therefore, it is expected that many families from lower socio-economic backgrounds will move to Freiham. In 2019, the first residents moved in. Once completed, around 2040, approximately 25,000 citizens will live in the area. At the time of this study (mid-2023), around 3000 residents lived in Freiham. The area has been designed to comprise a high proportion of greenspaces, including parks and a public lake that residents can use for recreation. Furthermore, Freiham is planned as a compact district where residents can reach most destinations for their daily errands or leisure-time activities by bike or on foot. As another specific aspect of this setting, the municipal administration aimed to establish important infrastructure and institutions right from the beginning. A campus including schools and publicly accessible sports fields opened in mid-2019, even before the arrival of the first residents.

2.2. Research design

The study used a participatory photovoice method to investigate the perspectives of adolescents regarding health topics in the Freiham district. For this study, we referred to the World Health Organization (WHO) definition of adolescence, which includes young people between 10 and 19 years of age (World Health Organization, 2024). We used a

multi-dimensional understanding of health as defined by WHO that considers health as a state of complete physical, mental and social well-being (World Health Organization, 2020). Based on the objectives for applying photovoice described by Wang and Burris (Wang and Burris, 1997), we intended (i) to provide adolescents in the area with an opportunity to reflect on their surrounding urban environment and hereby initiate a process of empowerment, and (ii) to introduce the findings into municipal policymaking by presenting results to representatives of the intervention *Präventionskette Freiham*.

This study was conducted in compliance with the ethical standards of the Declaration of Helsinki (World Medical Association, 2013) and was approved by the Ethics Committee of the Faculty of Medicine at LMU Munich (23–0191).

2.3. Sampling and recruitment

We used local institutions working with adolescents as gatekeepers for recruitment, particularly all secondary schools and a youth center. Additionally, two members of the study team tried to recruit participants by approaching them in public places. We also developed an information flyer that we distributed in the study area and through an online social network (nebenan.de). The flyer was also sent to local institutions for further distribution. Inclusion criteria were (1) being aged between 13 and 19 years and (2) living in the Freiham district or one of the surrounding areas. We applied a purposeful sampling strategy and aimed to include a diverse range of participants regarding gender, age and socioeconomic background. Adolescents were offered a voucher for an e-commerce platform or a drugstore as an incentive for participating.

During recruitment, all potential participants were informed about the study either individually or in small groups. This information included details on the aims of the study, the study process, the study area, ethical considerations for taking photographs in public spaces and the definition of health used in this study. Participants were allowed to take any number of photographs. However, the study team suggested a range between 10 and 50 photographs. Participants were given the opportunity to ask questions in case the task or the goals of the study were unclear. Then, adolescents provided written informed consent if they wished to continue to take part in the study. In the case of participants aged 16 years or younger, their parents or care-takers also had to give their written informed consent.

2.4. Data collection

Data collection took place from May to September 2023. After recruitment, participants were given ten days (usually from Friday until Sunday of the following week) to take photographs in the study area using their smartphone or another device. In case participants had no such device at their disposal, the study team offered to provide a camera. After ten days, all photographs were uploaded to a secure data folder. Study participants were instructed not to depict individuals in the photos, in order to comply with the General Data Protection Regulation (GDPR) of the European Union. The first author checked all uploaded photographs. No photographs meeting the requirement for deletion were identified. Then the first author arranged an appointment with the participants for an interview where they could reflect on the photographs they had taken. Interviews took place either at the participants' school or at the youth center in the area. In both places, the interviews were conducted in a separate room to ensure the confidentiality of the statements made.

All interviews were conducted by the first author. In the interviews, a semi-structured interview guide was used (Supplementary File 1). Participants were shown the photographs they had taken on the notebook of the interviewer and were asked to pick the photograph they wanted to talk about the most. Then, the interviewer asked participants questions about the photograph. These were based on the SHOWed questions, established by Wang and Burris for photovoice (Wang and Burris, 1997).

The interviewer asked each of these questions only in case it made sense in the context of the chosen photograph. After participants were done with one photograph, they were asked whether there was another one they wanted to talk about. This process was repeated until participants declared that there were no further photographs they wanted to talk about. All interviews were recorded with the open source software Audacity and transcribed verbatim using MAXQDA (VERBI Software, 2022). A three-digit numeric code, generated at random via www.randomly.org, was assigned to each participant. Likewise, all names of individuals in the transcripts were pseudonymized by replacing them with a code generated in the same way. The document linking codes and names was stored separately from the transcripts and deleted after finalizing the data analysis.

During recruitment, the first author checked the transcripts of the interviews for recurring themes. We recruited participants, until we found that topics raised in the interviews were clearly repeating and no meaningful new topics emerged, so that we could reasonably assume that limited additional insights would be derived from dedicating resources to recruiting further adolescents.

2.5. Data analysis

Transcripts were analyzed by applying thematic analysis (Braun and Clarke, 2006) using MAXQDA. Thematic analysis consists of six steps: (i) familiarizing with the data, (ii) generating initial codes, (iii) searching for themes, (iv) reviewing themes, (v) defining and naming themes, and (vi) producing the report. Familiarization and generation of codes (steps i-ii) were done by three researchers independently, and ideas and conflicts were discussed in regular meetings. Searching, reviewing and defining themes (steps iii-v) was done by the first author and discussed within the group after each step before proceeding. All quotations in the manuscript were translated verbatim by the first author and checked by an English native speaker.

3. Results

3.1. Participants

Overall, 11 adolescents participated in the study (Table 1). They were between 13 and 19 years old (mean: 14.9 years), with 7 females and 4 males. Participants took between 6 and 32 pictures, with a total of 166 (mean: 15.1 pictures). Three participants took their photographs as a group and uploaded them to a common folder. Interviews took between 9 and 42 min, with a mean of 20 min. While some participants had moved to Freiham just recently, many had been living in the neighbouring districts for a long time.

Table 1
Description of the study participants.

Code of participant	Age (years)	Gender (f=female, m=male)	Number of photographs taken	Duration of the interview (hours: minutes)
300	13	m	21	0:23
191	14	f	18	0:18
230	14	f	21	0:17
360	14	f	18	0:20
502	14	m	16	0:11
732	14	m	16	0:09
763	14	m	6	0:13
863	15	f	32 ^a	0:15
347	16	f	18	0:16
242	17	f	32 ^a	0:32
385	19	f	32 ^a	0:42

^a Participants 242, 385 and 863 had pooled their photographs.

3.2. Identified themes

We identified eight themes that the adolescents brought up in the interviews. These were often interconnected and referred to aspects of the urban environment, behaviour of the participants or health outcomes. A graphical overview of these themes and their relations with each other is presented in Fig. 1. Each theme will be described in the following sections.

3.2.1. Emotional well-being

Participants often highlighted the perceived impact of the built environment and its specific facets on their emotional well-being. This aspect was the most prevalent theme in the interviews. Many adolescents stated that being able to relax – e.g. from pressure at school – and finding enjoyment was important for them. Here, being surrounded by nature and greenness was often considered as critical for finding recreation, whereas background noise, especially from construction sites, was considered a stressor.

“The greenery here, when you go by, then you can relax a bit. There is not so much noise here, sometimes from the construction site, but it is not that bad.” (732)

However, some participants said that the amount of greenspaces declined in the last years due to the growth of the district, and expressed fear that this trend could continue in the years to come. Participants also stated that it mattered to them whether a place gave them a feeling of freedom. Furthermore, being active and spending time with friends and being among other adolescents was stated as crucial for relaxing and finding enjoyment (Photograph 1). Contrary to that, spending time on social media or otherwise on your smartphone was considered to be detrimental to recreation. Some participants said that spending time outdoors was also important to them because they would not use their smartphone during this time. Generally, interviewees complained that their peers or younger children were too often engaged with digital media and considered that an unhealthy habit for mental health.

“When you are on your phone a lot, then you are more the person that’s alone and that stays away from other people, and that might make you lonely.” (385)



Photograph 1. Beach volleyball field where one participant regularly spent time with friends for recreation (242).

3.2.2. Meeting peers

For many adolescents, a key aspect about public spaces was whether they could meet friends there. Being among other adolescents was often expressed as a main motivation for spending time at sports fields:

“This is a place where I have lost and made friends. I have a lot of memories here.” (242)

Some participants preferred to go to places where they knew they could meet a lot of their peers, and would not want to go to places where there were only few others. Most of the places for meeting others were spaces specifically designed for this purpose – sport fields, playgrounds or parks. Unstructured places – open fields or the various construction sites in the area – played a minor role in that regard. One girl had photographed a church where she worked as an altar girl, because she had found new friends there. Overall, friends were considered as important for motivating yourself and as a resource for health and happiness, even for later stages of life.

“When you spend good times with friends, especially in adolescence, you make memories that will make you happy.” (230)

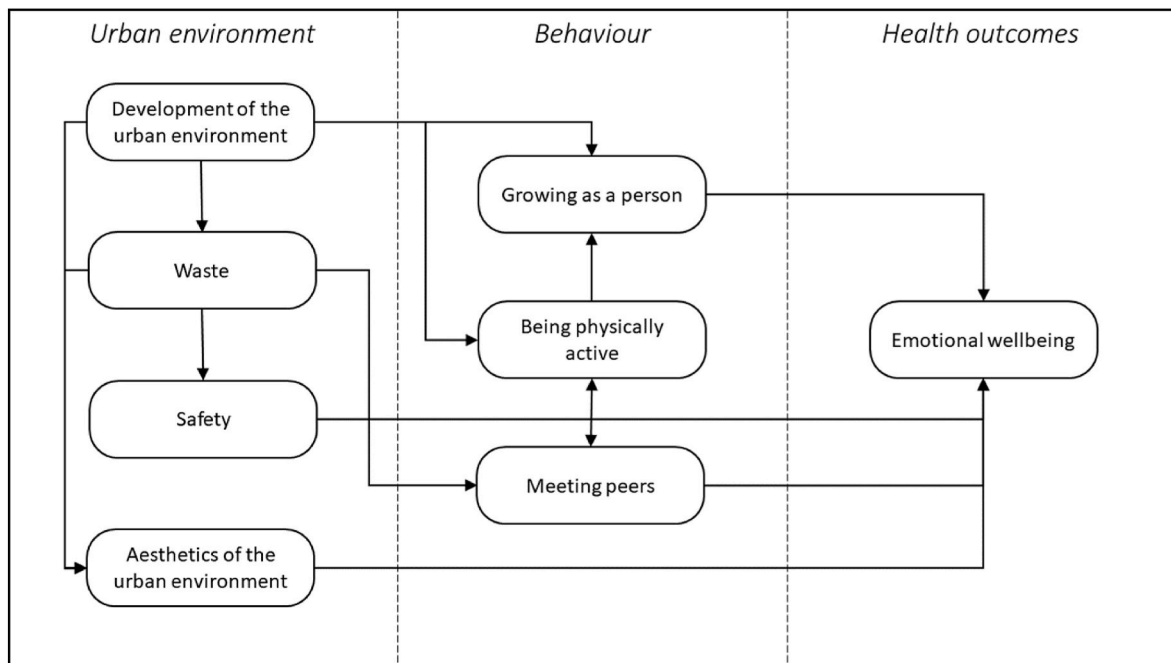


Fig. 1. Thematic map of the themes identified in thematic analysis and their interrelationships.

3.2.3. Being physically active

In the interviews, adolescents often stated that being physically active was important for young people, representing an important aspect of health.

“For me, physical health is one aspect of overall health. That means the more often you train and the better you train, the healthier you will be.” (502)

“As people, we need to move, we need a place where we can let off steam. Especially adolescents (...).” (863)

Many adolescents highlighted as positive that sufficient sport fields had been built in Freiham and the surrounding area where they could be active, either alone or with friends. Physical health was generally considered to be one important benefit of being active and doing sports. Furthermore, adolescents found being physically active to be especially important for younger children, who, as some interviewees remarked, were often not sufficiently active. However, at the same time adolescents also emphasised being active as an opportunity for reducing stress, spending time with friends or simply having fun.

3.2.4. Growing as a person

Participants said that they liked to try out new things and set themselves new challenges. In that regard, they were very positive about there being many places in the new residential development area, especially a skatepark, a mountain bike trail and a chess board, that allowed them to try out new activities and develop as an individual (Photograph 2). One participant stated that it was important for her to try out everything at least once to find potential new hobbies. One interviewee also stated that one might feel fear when standing at a slope in the skatepark, but that it was important to overcome this fear. Another specifically noted that they did not used to do a lot of sports before moving to the area, but that this changed in the new environment:

„I used to live over there. There was no sports field. But since then, I changed school and I became more motivated and less lazy, I became fitter (...) And yeah, through friends, through my school, and from the new move and the new building, I became more motivated and I can do more sports now.” (242)

The quote shows how moving to a different urban environment had effects on multiple dimensions of the participant’s life: In their view, both physical and mental health improved after moving, caused at least partially by the public places that had been provided by urban planning decisions in the Freiham district, and the social interactions with peers that these places fostered. Furthermore, as also indicated in the quote above, some interviewees considered school as an important place where they learn new things so they would be able to find a good job later. One participant stated that she found it important to have teachers



Photograph 2. Chess board on a public square (502).

and other adults as role models.

3.2.5. Safety

Participants described older adolescents or adults engaging in risky behaviours like smoking and drinking at public places as a threat to their safety. On the one hand, empty bottles and broken pieces of glass were considered as potential sources for accidents and injuries. On the other hand, individuals engaging in such behaviours were considered a bad role model that might influence young people to adopt these unhealthy habits. In the interviews, adolescents stated that they would avoid such places and that these people might scare other children.

“Sometimes, there are several drunkards at this place, not just one man or two. They don’t do anything, but I think they might scare the children.” (347)

Adolescents considered the traffic in the area as another major threat to their safety. Especially the trucks that were often present around construction sites were seen as a potential source of accidents.

„Personally, I always go to school by bike, so when there are so many cars and trucks, you get kind of scared that they might not see you. And that’s one stress factor I just don’t need.” (230)

3.2.6. Waste

Many adolescents complained about waste in public places. They considered it to be a problem for the environment, but also for the health and well-being of people who spend time outdoors. One adolescent said that she would regularly clean the places where she spent time herself to protect younger children and create a more appealing setting. Some participants said that they avoided certain places because of the dirt. Furthermore, frustration was expressed about the municipal administration not having provided enough garbage cans for the new residential area, causing a lot of people to dump their waste on the open street (Photograph 3).

“I see a lot of waste on the streets around here. And I say, no, that cannot be healthy for our environment.” (347)

Participants also stated that the various construction sites also caused a lot of waste and dirt, making it less appealing to spend time in the areas surrounding these.

3.2.7. Development of the urban environment

Adolescents felt that the rapid growth of the Freiham district



Photograph 3. Waste next to a garbage can at a sports court (230).

impacted their health in various ways. On the one hand, they understood the need to build new buildings in a growing city. On the other hand, they feared that the air pollution from construction sites had a negative impact on their health. Adolescents also complained about not being able to concentrate because of the noise from construction sites, and some said that this noise had a negative impact on their sleep.

“It is a nice thing that they’re building new buildings for people to live here. But, when you’re already living here, it is a bit annoying.” (763)

Some participants worried that with the expected influx of people, the area might become too crowded. Furthermore, one participant stated that, with the district expanding into the surrounding open fields, places where young people could play were gradually disappearing.

“Having fields is great, because where else can you play? On the streets. But it won’t be that much fun anymore on the streets.” (732)

However, the growth of the district was also considered to open up new opportunities. The construction sites were seen as exciting playgrounds. Furthermore, one participant said that they were looking forward to exploring the courtyards of the newly built apartment blocks (Photograph 4). As described in the sections above, the sports fields that had been built in the Freigham area were also perceived as positive, as they fostered opportunities for interactions with peers. One participant summed up what living in a new residential development area meant for them:

“A new area has advantages and disadvantages. One disadvantage is that there are many construction sites and you cannot sleep at night. But advantages are new friends and new motivation. One year before we moved, I would never have talked like that.” (242)

3.2.8. Aesthetics of the urban environment

Adolescents considered the outer appearance of their surroundings to be an important factor for their well-being. This included both positive aspects, such as the aesthetics of the newly constructed buildings, as well as negative aspects, particularly the presence of waste and graffiti. One adolescent said that she had stopped going to a certain place because of its unpleasant appearance. In this context, another adolescent stated that having to look over piles of waste from construction sites every day was a negative aspect of living in a new residential development area. In contrast, several participants stated that the diversity and the aesthetics of the newly constructed buildings had a positive impact on their own mental health and on the mental health of other residents.

“What I find nice and what always calms me down is that the houses here are built so differently, have different forms and they’re not like these



Photograph 4. Construction site for new residential buildings (300).

blocks over there. And all these colours I also find quite beautiful and relaxing.” (300)

With regards to the aesthetics of the new environment, a similar pattern can be seen as in previous themes: young people tend to seek out places in the area that they – for various reasons – consider to be attractive, and use these places mainly for interacting in a playful way with others and for recreation.

4. Discussion

This study investigated how adolescents perceive the built environment in a new residential development area with regards to their physical, mental and social health. We identified places where adolescents could meet their peers and recreate as important needs. Waste, traffic and noise from construction sites were stated to be barriers for health. While participants remarked how the aesthetics of the new buildings had a positive impact on their well-being, there were also fears that the area might get overcrowded in the years to come. Overall, adolescents highlighted aspects of mental and social health in the interviews. While physical activity was sometimes referred to as a means to improve physical health, it also became clear that participants considered it more important as contributing to mental and social health, by allowing them to meet peers or reduce stress. To the best of our knowledge, this was the first study to investigate how adolescents perceive a new residential development area with regards to health using the photovoice method. Our results align with previous research that found public spaces to be important for young people to engage in social interactions. We conducted this study in a new residential development area, a setting that is generally not well researched from a health perspective.

4.1. Locating findings in the literature

Several topics identified in this study have also been found by previous participatory research with adolescents. In a study that investigated how young people perceive new building sites across three communities in England, participants stated that they were negatively affected by dust and noise (Kraftl et al., 2013). At the same time, young people interacted with construction sites in various ways, e.g. by using them as playgrounds or places to explore. This theme also came up in our study, although it played a minor role compared to the research by Kraftl et al.

In an international photovoice study undertaken in five cities across five countries, many adolescents described the built environment as dirty, and considered waste and pollution to be detrimental to their health and well-being (Mmari et al., 2014b). Safety was also viewed as important, as was the quality of places where adolescents could spend time with friends or engage in recreational activities. In a qualitative study that investigated how local adolescents perceived a new greenway in Vancouver, Canada, participants in focus groups stated that safety was an important facilitator for using the greenway, and meeting there with friends for recreation was a common motive (Sims-Gould et al., 2019). Similarly, playing with friends was a major reason for children and adolescents to visit urban green areas in an Australian study (Ziaesaeidi et al., 2023).

However, several other factors that are well-known to impact the health of young people were underrepresented in the interviews with our participants. In the framework of how the built environment affects children’s health by Abdollahi et al., obesity is described as one important health outcome (Abdollahi et al., 2023). While participants in our study considered it important for young people to be physically active, they did not consider it explicitly as a means of preventing obesity, although they may have done so implicitly. Likewise, the concept of walkability is generally accepted to be one of the most important indicators of how health-promoting an urban environment is

(Baobeid et al., 2021). Most of our participants did not comment on the walkability of the study area, but during the interviews it became clear that they enjoyed being able to move around independently in their neighbourhood. These findings are congruent with the international photovoice study by Mmari et al. in which adolescents also did not describe obesity and physical activity as important to them (Mmari et al., 2014b).

Both in our study and in previous participatory research, adolescents attributed great importance to social interactions with their peers when assessing the urban environment with regards to factors beneficial or detrimental to health. The importance of peers in the development of adolescents is well-known (Laursen and Veenstra, 2021). Shaping and exploring one's own identity is one core task in adolescence, and interacting with peers is one important way to facilitate this task (Allen and Loeb, 2015). Furthermore, having good relationships with peers seems to be a protective factor against anxiety and depression among adolescents (Adedeji et al., 2021). The urban social environment has been described by Galea and Vlahov as one of three main mechanisms how cities affect the health of their residents, with the physical environment and health or social services representing the other two mechanisms (Galea and Vlahov, 2005). A recent scoping review found that social aspects of the environment, especially social networks, are often used as community indicators for mental health (Schoenweger et al., 2023). Indeed, the built environment plays an important role in fostering social interactions (Mouratidis, 2018). Conversely, public places can also be perceived as not inviting to stay, thereby hindering social interactions (Guinand et al., 2021).

The concept "sense of place" describes how individuals perceive a certain place, including the emotions and meanings they attribute to it (Nugroho and Zhang, 2022). We found that cleanliness and aesthetics affected how participants perceived places. Waste and dirt made public spaces unappealing to them, whereas the newly built housing blocks were perceived as aesthetic and positive for well-being due to their colorful and diverse appearance. One participant compared them directly to the older and, in their view, bland looking houses of neighbouring districts, considering these less appealing. Interactions with peers also influenced how participants perceived a place, mostly in a positive way, also allowing young people to challenge themselves. Places like the local skatepark or mountain bike trail were considered as places where young people could develop trust in their abilities, and therefore, as a source of self-confidence and pride.

Our findings highlight that the built environment can enable young people to interact socially, primarily with their peers. As positive social interactions can facilitate health and well-being, we suggest that new urban environments should be planned in a way that foster these interactions.

It is noteworthy that in our study adolescents spent a lot of their time in places that had specifically been planned as places for young people. It turned out to be beneficial that public sports fields had been very early on, as these places were used by adolescents primarily for interacting with their peers. In contrast to the research by Kraftl et al. (2013), construction sites as places for play and exploration were less prominent in our data. Still, they were brought up in the interviews, along with other "disordered places" (Cloe and Jones, 2005) – places not claimed by adolescents – like the open fields referred to by one participant. There is a general trend that places for independent play are becoming rare in urban settings (Freeman and Tranter, 2012).

From a public health perspective, planning new urban environments should reflect on how social and material environments interact with each other – and how they relate to residents' needs. This process should start as early as possible in the planning phase, and should integrate experts from all relevant sectors. Local residents should also be engaged from an early stage. While our study was conducted when the district was already under construction, we would recommend to engage adolescents at an earlier stage of the urban development process and to investigate how this affects the quality of the urban space. The "Shaping

cities for health" Commission has called for experimentation to learn how salutogenic urban environments can be designed (Rydin et al., 2012). We argue that new urban development areas present a natural opportunity for conducting such experiments – and for contributing to more health-promoting urban planning.

Finally, our study underlines the value of using photovoice when researching urban environments, as shown in previous studies. Taking photographs allowed participants to bring up topics that the research team was not aware of, such as the aesthetics of the urban environment. Furthermore, the interviews allowed participants to reflect on their photographs and articulate aspects that would not have been apparent from the photographs themselves. While the photographs showed objects of the physical environment, the interviews were able to uncover the social environments these motives were embedded in. One participant stated at the beginning of the interview that they had been unsure whether mental health topics could also be photographed and thought that the project would be mainly about physical health. However, by talking about their pictures, that participant reported on the mental and social health aspects of the places on the photographs. Furthermore, participants emphasised in the interviews that during the study they had reflected on their neighbourhood in a way that they had not done before. However, as this was not the focus of the study, it is unclear whether this reflection was just a short-term effect, or whether it resulted in a process of empowerment. Also, while results of the study were reported to stakeholders of *Präventionskette Freiham*, at this time it remains uncertain whether these results will lead to changes in the district itself.

4.2. Strengths and limitations

This study had several strengths. Study design, data collection and data analysis were planned and implemented by a team of researchers experienced in qualitative methods, and described according to the Standards for Reporting Qualitative Research (SRQR) (O'Brien et al., 2014). We applied a thorough recruitment method, using schools, a youth center and other local institutions as gatekeepers to recruit participants, while also using a social online network for directly talking to and recruiting adolescents. During thematic analysis, each step was discussed within a team of three researchers, and the extracted themes were discussed in a workshop with the larger research group to increase the validity of the findings.

However, there were also limitations to this study. The majority of participants were recruited at two institutions, three at a local youth center and five at one school, despite having adopted a comprehensive recruitment strategy that included contacting all relevant schools in the Freiham area. This may be explainable by the fact that trust is an important factor in participatory research, and we as researchers were therefore dependent on gatekeepers to support us. This significant reliance on only two institutions may have limited the diversity of perspectives covered. As eight participants were 13–15 years old at the time of the interviews, there are only few perspectives of older age groups included in our sample (and no participants representing earlier adolescence). However, when analyzing transcripts of the conducted interviews, we found no clear difference in the themes that the older adolescents brought up compared to those of the younger ones, and the main themes were generally very consistent across all interviews. Still, it is possible that we may have identified new topics by recruiting more participants. Also, to follow the European General Data Protection Regulation, participants were instructed to avoid depicting individuals in the photos. As places were important for our participants in part due to the presence of other people, excluding photographs showing these may have limited the scope and the meaning of the pictures taken.

Despite the potential of photovoice to initiate change in communities, this change does not happen automatically. According to the social ecological model, a widely used framework in public health, health promotion interventions are more likely to be successful when they affect different levels, from individual factors to policies (McLeroy

et al., 1988). This means that researchers should not only aim to start an empowerment process in target groups, but they also need to plan how to engage decision-makers. This is especially important in municipal health promotion, as decision-making processes in communities are often complex and take time. Our research was embedded in the evaluation of a municipal public health intervention where the research team cooperated with the municipal administration. While this allowed us to communicate results to decision-makers, it is currently uncertain whether or in what ways this will induce change. This limitation of the study could have been reduced by engaging authorities more directly in the research process.

5. Conclusions

This study explored the needs of adolescents regarding their health in a new residential development area. Adolescents we spoke to expressed a desire for safe and clean public places for recreation and social interactions, with waste and noise pollution from construction sites considered to have a negative impact on their health. With cities continuing to sprawl globally, there is a need to develop urban environments that are beneficial to the health of their residents. This research may help urban planners and public health to plan new municipal areas according to these needs right from the start, and to try and minimize negative aspects that cannot be avoided completely. Moreover, despite the specific setting of this study, previous participatory research with adolescents suggests that providing urban environments with sufficient public spaces that young people can use for recreation and social interactions is a task that urban planners and public health experts should also take into account when improving already established neighbourhoods.

CRedit authorship contribution statement

Stephan Voss: Writing – original draft, Project administration, Methodology, Investigation, Formal analysis, Data curation, Conceptualization. **Julia Bauer:** Writing – review & editing, Validation, Formal analysis. **Caroline Jung-Sievers:** Writing – review & editing. **Graham Moore:** Writing – review & editing, Supervision. **Eva Rehfuess:** Writing – review & editing, Supervision. **Laura Corinna Wagner:** Writing – review & editing, Validation, Investigation, Formal analysis. **Michaela Coenen:** Writing – review & editing, Supervision, Funding acquisition.

Ethics approval and consent to participate

The study was conducted in accordance with the ethical guidelines in the Declaration of Helsinki. Ethical approval was obtained by the Ethics Committee of the Medical Faculty at LMU Munich (23–0191). All study participants, and their parents in the case of participants under the age of 16 years, gave informed consent to participate in this study.

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Competing interests

CJS, ER, JB, MC and SV are members of the research team and have been engaged with stakeholders of Präventionskette Freiham, a municipal public health intervention that aims to provide equity regarding health and education for children and adolescents in the Freiham district in the city of Munich, Germany. GM and LW report no conflict of interest.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <https://doi.org/10.1016/j.healthplace.2024.103384>.

Data availability

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

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