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Original Article

Physical Activity among Adolescents in Urban and Rural Area in South Sulawesi, Indonesia: Exploring the Influence of Environmental Factors

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Abstrack

Background: The neighborhood environment can affect the physical activity of adolescents, including the problem of the availability of sports or play facilities, sidewalks for pedestrians, fields, and environmental hygiene problems. The influence of the environment on physical activity (PA) in adolescents between urban and rural areas will have a different effect. Thes study purpose to explore environmental factors that influence adolescent's participation in PA in the context of the urban and rural area environment. **Method:** Snowball sampling technique was used to get ten students from urban and rural areas respectively. Students aged 13 to 15 years were involved in the offline and online interview (by a videocall through WhatsApp) with semi-structured questions guidelines. Interview guidelines consisting of five-item topic questions and each topic has a different number of questions, with a total of 17 questions. This study also involved the photovoice procedures, such as photo-taking, selecting, contextualizing, and codifying themes. NVivo 12 software for qualitative data analysis. **Results:** The findings reveal that while adolescents in rural areas have access to natural resources such as hills and small woods, they are unaware of how to use these resources to promote and engage in PA. Poor natural resource management, a lack of awareness, a lack of sidewalk infrastructure, distance, road safety, and a lack of PA facilities were all issues that limited teenagers' participation in physical activity. Meanwhile, adolescents in urban area with abundant, safe, and clean facilities, as well as a diverse sports community were more likely to stay at home to play with the gadget. **Conclusion:** It is proposed that health promotion and physical activity instruction for teenagers in metropolitan areas is urgently needed, with a particular focus on limiting the use of gadgets and improving intervention-related safety. Basic amenities such as play places and pedestrian infrastructure are required in a rural region to promote adolescent PA. Any intervention should make use of natural resources, which are less expensive, environmentally friendly, and long-lasting.

INTRODUCTION

World Health Organization reports that inadequate or insufficient physical activity is the fourth leading risk factor for death and disability. It can be estimated that 6% of total deaths or about 3.2 million deaths each year can be attributed to lack of physical activity (World Health Organization 2016). In addition, there is a myriad of evidence that physical inactivity is an important contributor to non-communicable diseases (NCDs) such as; heart disease, hypertension, cancer, diabetes, and osteoporosis (Rezende et al. 2014). This is not only a big problem in developed countries but also a big problem in developing countries including Indonesia (Bauman et al. 2012; Mama et al. 2015). In Indonesia, the prevalence of death due to NCDs increased rapidly from 41.7% in 1995 to 59.5% in 2007 (Riskesdas 2018). In addition, the number of obesity cases increases from year to year, especially in adolescents

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aged 13-15 years showing a significant increase from 1.4% in 2010 to 7.3% in 2013 and increasing to 16% in 2017 (Riskesdas 2018).

Insufficient levels of physical activity in adolescents can create behavioral patterns, which will directly affect the health of adolescents and increase the risk of suffering from chronic diseases in adulthood. Thus, initiatives to promote the habit of regular physical activity or exercise in children and adolescents have become the main focus of preventing illness and improving public health (Bouchard, Blair, and Haskell 2012).

Globally more than 80% of the world's youth population is physically inactive (World Health Organization 2018). In particular, Indonesia ranks fifth with the highest prevalence of physical inactivity among ASEAN countries (Peltzer and Pengpid 2016). The latest data shows an increase in the proportion of less activity in adolescents aged > 10 years, from 26.1% in 2013 to 33.6% in 2018 (Riskesdas 2018). For activities of sitting or lying down (sedentary behavior), the latest research reports that Indonesian teenagers spend >8 hours of their free time with relaxed behavior, tend to be silent or carry out activities in a sitting or lying state such as watching television, playing PlayStation or games from a tablet or mobile phone (Pramudita and Nadhiroh 2017).

PA consists of many structured and unstructured forms, including organized sport, recreational activities, motor skill development programs, dance, active transportation such as walking and biking, and work related (Stuntz and Weiss 2010).

Many factors affect the physical activity of adolescents (Yusuf et al. 2021). In addition to cognitive factors, physical environmental factors are also known to be very significant in influencing the physical activity of adolescents (Prins et al. 2011). Therefore, inactive habits will be very difficult to change, especially for teenagers who are left in an environment that does not support behavioral changes (Sallis et al. 2006). From the existing literature, it is reported that some obstacles or limitations of the surrounding physical environment can affect the physical activity of adolescents, including problems with the availability of sports or playing facilities (Swanson et al. 2013), pedestrian walkway, field and environmental hygiene issues (Anguelovski and Alier 2014).

Furthermore, when discussing the influence of the environment on physical activity in adolescents, of course, the physical environment between urban and rural areas will have different effects (Machado-Rodrigues et al. 2014; McCrorie et al. 2020; Sylejmani et al. 2019; Regis et al. 2016). A study on adolescents in Portugal found that adolescents in urban areas were more active than adolescents in rural areas (Machado-Rodrigues et al. 2014; Regis et al. 2016). Meanwhile, other literature reports that adolescents in rural areas are more active than adolescents who are left in urban areas (McCrorie et al. 2020; Regis et al. 2016). This difference is influenced by various factors in the surrounding physical environment, namely, access, security, availability of play and exercise facilities, green open space, and community. However, these factors have different effects on adolescents in rural and urban areas (Rezende et al. 2014; Regis et al. 2016; Saimon, Choo, and Bulgiba 2015; Saimon et al. 2015). This background and the results of previous studies related to physical activity in adolescents in urban and rural areas still produce results that are not firm (equivocal findings).

Meanwhile, in Indonesia, the latest data on physical activity among adolescents is very limited. This has led to the neglect of the problem of lack of physical activity in children and adolescents by policymakers and the public. As a result, intervention programs are very limited in targeting the issue of physical activity in Indonesia. Therefore, with this study, the researcher hopes to be able to understand the perspective of physical activity in this specific population, which is an attempt to prepare effective and efficient physical environmental interventions.

Furthermore, to the best of our knowledge, there are very limited studies that consider and discuss the influence of the physical environment on physical activity habits in adolescents in urban and rural areas. Adolescents in urban and rural areas face different obstacles or problems (unique) in

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terms of how the surrounding environment can affect their physical activity habits. In addition, research related to the influence of the physical environment on the physical activity of adolescents is dominated by survey or cross-sectional research, which causes a lot of information that is not explored or obtained. Therefore, this qualitative research will provide updates on deeper information related to the influence of the physical environment on the physical activity of adolescents. This study aims to explore the influence of the physical environment on the participation of adolescents' physical activity in urban and rural areas.

METHODS

Study Design and subjects

This is qualitative research with a phenomenological approach with photovoice and interview methods to directly involve adolescents in expressing and explaining their experiences and views regarding the surrounding environment on their physical activities. This research was conducted in two different locations that can represent urban and rural districts in Sulawesi Island, Indonesia. First location is in Makassar City (SMP. Athira Bukit Baruga) and rural area in Manuju Village Gowa District (SMP 01 Manuju).

Students were purposively recruited from an urban area in Makassar City and rural in Gowa District in South Sulawesi, Indonesia by the physical activity (PA) teacher. The sample in this study were teenagers aged 13-15 years who were taking grades 8-9 in junior high school (SMP) or equivalent. A total of 20 students participated 10 from urban (5 male, 5 female) and 10 from rural (8 female, 2 male).

Interview

Interviews were conducted before the photovoice method was carried out/taking pictures of the surrounding environment. Meanwhile, for the interview, the researcher used an interview guide consisting of five-item topic questions and each topic had a different number of questions; The concept and meaning of physical activity (3 questions), duration of physical activity (3 questions), the structure of the surrounding environment/facilities supporting physical activity (3 questions), What are the environmental factors (e.g., facilities/activities/people) that influence you to carry out activities physical? (7 questions), and Improvement or improvement (1 question). This list of questions refers to the interview guideline by Saimon (Saimon et al. 2015).

Photovoice

With the photovoice method, researchers provided a camera or cellphone with a camera. Before photo-taking, facilitators explained how to use a camera or cellphone, photography techniques, photography ethics, and exhibit photos (photo cataloging). The procedures were photos (taking), choose (select), conceptualize (contextualizing) and (codifying activities), or code their activities (Saimon et al. 2015).

Photo taking: using a digital camera or cellphone with a camera, each student takes 10-20 photos of the physical environment around the place of residence, which teenagers feel (perceived) to influence their physical activity or desire to play outside the home for the next two weeks. They conducted this activity in their free time and they wrote a diary about the reasons why they took each picture. Selecting: students select 10 photos that best reflect the influence of their surroundings on their outdoor activities. Contextualizing: The trained facilitator conducted 2 focus group discussions to listen, understand and describe the experiences of the participants and the reasons why they chose the photo. An interview guide, including 5 question items (SHOWeD methods), was used to guide the interview (see the

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Appendix). Codifying: The facilitator gives instructions to each group to code and summarize. Based on the group's agreement regarding the theme or issue/problem obtained from the picture.

Data Analysis

The data through the analysis processes by the trained bilingual researchers and two graduate research assistants to transcribed and translated the audio-taped to produce the English transcript. The processes of transcribing and checking, researchers listening and reading existing data (reading between the lines), coding data based on the identification of topics, problems, similarities and differences in information (coding), collecting all existing information based on the same theme (theming) based on the theoretical framework of this research. This data analysis process will be carried out using NVivo software.

Researchers, facilitators, and all informants discussed, coded, and grouped images based on existing themes for checking the reality (actual conditions) between one participant with another participant. Interpretive validity of the research results will be ensured to obtain validation by research participants.

Ethical Clearance

The researcher gave informed consent to the parents or guardians of all students before collecting the data. Supervision from adults or facilitators was carried out to ensure the safety of students when taking photos. This research is authorized by the institution Ethics Commission of the Indonesian Muslim University.

RESULTS

Participants from an urban area in this study determined "physical activity (PA)" as sports activities outdoor such as bicycling, aerobic, badminton, and jogging, as well as indoor sports with sports equipment such as the treadmill. While, youth in a rural area defined PA as sports activities or outdoor games and some activities inside the home such as mopping, sweeping, washing clothes, and cleaning the house. These definitions have limited uptake of PA (<60 minutes a day). The majority of boys in the urban area preferred bicycling, while females like to do jogging. Meanwhile, in rural areas, the boys are more likely to play football and sepaktakraw, and girls preferred to bicycling, badminton, as well as playing hide and seek.

However, most of the participants in the urban area reported that playing with a gadget such as a smartphone or a tablet and as their regular activity in their leisure time. While adolescents in the rural area mentioned that going out with friends and motorcycling as their regular activities.

Environmental Factors and Physical Activity in The Urban Area

Sports facilities inside the house

Nq, 13 yo "My parents have these sports types of equipment. Sometimes I use this for being physically active inside the home"

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Ab, 13 yo "I like to play inside the home with this sports equipment"

Sport facilities outdoor the house

Cal, 14 yo "this is tennis and badminton field near form my house. I feel comfortable and safe to play sport here"

Ns, 14 yo "close to my house there is a tennis field, I like to do sport here because it is so clement, with fresh air"

Ns, 14 yo "the field is so green, wide enough, and safe. I like to play here"

Mni 13 yo "this is beside my home, I always play table tennis, badminton with my family

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Comfortable and Cleanliness of the neighborhood environment

Mni, 13 yo"this is the road around my neighborhood, I go jogging with my family here"

Ang, 14 yo "it is a big road many people and include me and parents sometimes do small running and cycling"

Cal, 14 yo "I love our neighborhood environment. fresh air in the city"

Ns, 14 yo "I like to play in front of my house it is quite big to do aerobic and play badminton"

Environmental Factors and Physical Inactivity in The Urban Area
Lack of pedestrian infrastructure and road safety

Ab, 13 yo "Cycling path is very important. Sometimes I feel unsafe cycling when a lot of cars are on the road, but I don't have any places to cling"

Arm, 13 yo "I always cycling in front of my home, it is wide enough for me"

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Mni, 13 yo "No cycling path and pedestrian path".

Ns, 14 yo "A lot of cars, so sometimes we feel not safety".

Cal, 13 yo "also sometimes the bad smell from the gutter, make me feel uncomfortable to do physical activity"

Smartphone and tablet

Despite the fact that it assumes that teenagers in metropolitan areas have sufficient opportunities for engaging in physical activities both within and outside the home (neighborhood environment). However, the majority of students stated that playing with a smartphone or tablet was more appealing and fascinating.

Mna, 14 yo "I have a bicycle, but I prefer to play with my phone to watch YouTube and playing games"

Cal, 14 yo "in my leisure time I like to study and watching movies or YouTube. It is more than 3 hours".

According to the results of the interviews, the majority of adolescents spend more than 3 hours of their free time indulging in sedentary behaviors.

Arm, 13 yo "4 hours. I never spend my day without playing with my gadget, strolling through social media, and watching YouTube"

Mni, 13 yo "I play social media for 2 or 3 hours every day"

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Mna, 14 yo "more than four hours per day I play with my phone"
Nq, 13 yo "probably a half of my day I play with my gadget"
Ab, 13 yo "2 to 3 hours I watch YouTube and playing with my gadget"
And, 13 yo "playing games for 3 hours"
Ns, 14 yo "sometimes 3 hours sometimes even 4 hours I play social media"

Suggestion: Solution from youth in the urban area

Based on the interviews, it was discovered that adolescents in the urban area wish that the environment in their neighborhood area, particularly the gutter, will be kept clean. Furthermore, the majority of the youth advocate for the construction of new pedestrian and cycling paths to improve safety while participating in physical activities.

Arm, 13 yo "it is better to clean the gutter regularly and keep it closed so we cannot smell it"
Nq, 13 yo "please, build pedestrian and cycling path around the school"
Cal, 14 yo "it is better to provide more open public space near school"
Ns, 14 yo "safety road. Provide pedestrian and bicycling path"

Environmental Factors and Physical Activity in The Rural Area

Poor maintenance of natural resources

Despite the fact that the communities have natural resources such as forests and hills that could support young physical activities, the youth were unable to use them for recreational purposes due to inadequate management or contamination. Fields, forests, and public spaces were exploited as public dumpsites and animal farms, as expressed by adolescents.

AR 15 yo"a lot of cow dung, smell bad, it is make us won't play here and even we play probably only in minutes"
RO 14 yo"I sometimes step on the cow dung, it yuck and stop me to play"
SA 13 yo"I am lazy to play here because of the cow dung. It is making me not comfortable to breath"

TA 14 yo"I don't want to play here, it is not comfortable to smell and play"
SA 13 yo "a lot of cows, it is not safe. I am afraid if the cow hurts me"
IP, 14 yo" I am lazy and not interesting to play here, because of the trash and cow dung"

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RO 13 yo "I am rarely to play here, it is very big but a lot of trash, cow and cow dung. I feel not comfortable to play here, so sometimes I decide just play in front of my home"

NS, 14 yo"to much trash, sometimes it smells bad"

NU 13 yo"we really want to play but, it is muddy we cannot play here"

Lack of pedestrian infrastructure and road safety

The adolescents were well aware that playing in the street was risky. The streets were extremely congested. When adults went to and returned from work, the streets were busier in the morning and evening. As a result, some teenagers avoided engaging in physical exercise such as walking, jogging, or cycling on the streets. Many of them instead of moved around on motorbikes or switched to play gadget such us a smartphone or electronic games.

IP 13yo "I feel unsafe when do jogging or cycling, a lot of cars especially in the morning and evening"
TA 14 yo"It is not safe and dangerous for running or cycling, many cars cross the road near field and sometimes there are really fast"
NA 13 yo "I am afraid a lot cars on the road, so I cycling in the big field"

NU 14 yo "no pedestrian path and cycling path. So feel unsafe"
RO 14 yo" I prefer using motor cycle it fast and no too much energy use, and I have more friend when I use motorcycle"
AR 14 yo "most of my friends use their parents' motorcycle in the evening so I go encourage to use motor cycle as well"

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Lack of communities' facilities for physical activities

There were few suitable and safe community facilities for youth to engage in physical activity.

IP 13 yo "No community that encourage me for doing sport such as badminton club or other"

AR 13 yo "no takraw club, no football club"

DISCUSSION

Environmental factor of youth PA in the urban area

Studies mentioned that there was a significant main effects of the availability of parks and recreation facilities on adolescent's physical activity in urban area (Vogt and Kho 2018). This is because these facilities can encourage youth PA around home. This qualitative study found that even though adolescents in urban area have numerous facilities that can support their PA. However, youth in urban area more likely to spend their leisure time in engaging in sedentary behaviors such as watching YouTube on TV, playing game, and social media with their gadget. The cause might associated with the lack of attention on the quality of PA facilities and/or restricting exposure to the residential area may assist to explain why adolescents more likely to engage with sedentary behavior (Van Cauwenberg et al. 2015). In addition, adolescents are more likely to travel larger distances (>1 km) to attend parks or recreation facilities for PA than they are to visit the closest facility, which may be of lower quality or lack elements that fulfill their needs (Veitch, Salmon, and Ball 2008; Van Hecke et al. 2016). Those who seldom walk to or use neighborhood destinations, on the other hand, may be unaware of their presence or location. Furthermore, be at home may not be the most relevant setting for teenagers' PA because they also participate in PA at school or on the way to school from home (Rainham et al. 2012).

Moreover, lack of pedestrian and cycling path Pedestrian space have the potential to provide a broader range of opportunities to do PA through both active transportation and leisure activities than parks and recreation facilities (Vogt and Kho 2018). Lack of encouragement to use the facilities cause physical inactivity. This pattern of interactions suggests that while the built environment can support youth PA, the relationship may vary according to the perceived level of social support. This is not surprising given that adolescents are not totally independent and may rely on others for encouragement for PA opportunities, particularly outside school hours. Our finding is in agreement with a previous study among US adolescents which found a positive interaction between walkability and social support on PA (D'Angelo et al. 2017). In addition, support for physical activity from siblings/peer positively moderated the relationship between recreational facilities and residential density. Recreation facility (count within 2 km), walkability (1 km and 2 km) and residential density (1 km) had significant positive associations with moderate to vigorous physical activity (MVPA) outside the school hours (Loh et al. 2019).

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Environmental factor of youth PA in the rural area

Poor maintenance of natural resources and pollution, lack of pedestrian infrastructure and inactive transportation and lack of community facilities for PA, identified as four environmental factors that have influenced adolescents' outdoor PA.

Despite having abundant natural resources such as the forest and hills, the adolescents and community did not take advantage of these abundant resources to encourage and engage in PA, as teenagers from other rural areas expressed (Mmari et al. 2014; Saimon, Choo, and Bulgiba 2015). Because rural communities frequently lack basic environmental services like as street cleaning and waste collection, field and public places have been exploited as public dumpsites and sewage disposal sites. This places restrictions on the use of natural resources for leisure purposes. Adolescents who lived in a more attractive environment had a more favorable attitude toward being physically active, according to another study (de Bruijn et al. 2006).

Streets were often used by the adolescents in this study to play football, sepaktakraw, and badminton, or simply to hang out with friends. Despite the fact that studies have shown that street play promotes a sense of independence, spontaneity, and social zones,9 road safety was a prominent concern in our study. In addition, the lack of pedestrian infrastructure has led to many teens riding motorcycles or engaging in indoor media entertainment. Neighborhood streets should include extended "street corners," suitable pedestrian infrastructure (sidewalks), street lights, traffic calming such as raised crosswalks, or enhance the aesthetics of the street to promote street-play and pedestrian safety (Heath et al. 2006).

This study indicated that there are insufficient sports or play facilities in the rural community to support adolescents' PA, as expected. This has led to sedentary behavior such as hanging out with friends, participating in social media activities, and riding motorcycles. Adolescents who routinely report high levels of boredom or simply "hanging around" during their leisure time are more likely to engage in substance use and delinquent behaviors (Caldwell and Faulk 2013). In the United States, studies have shown that the quantity of basketball and tennis courts is related to children's PA levels (Scott et al. 2007).

Limitations

The indigenous participants and research settings were limited to the Makassar tribe, which may not be indicative of other Indonesian rural populations.

Conclusion

It is proposed that health promotion and physical activity instruction for teenagers in urban areas is urgently needed, with a particular focus on limiting the use of gadgets and improving intervention-related safety. Basic amenities such as play places and pedestrian infrastructure are required in a rural region to promote adolescent PA. Any intervention should use of natural resources, which are less expensive, environmentally benign, and long-lasting.

Appendix

Interview Checklist

Item	Question
Concept and meaning of physical activity (PA)	What does physical activity mean to you?
Types of PA engaged	What type(s) of PA do you do during non-school time/free time to keep you healthy?
Duration of PA	Do you think you have enough physical activity?

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	How often you do engage in physical activity? How often do you think adolescents like you should engage in physical activity?
Neighborhood structure/facilities to support physical activity	In your neighborhood, where do you go to be active and healthy? Do you have places to engage in physical activity in your neighborhood? How do you get to these places?
What kind of neighborhood factors (facilities/ events/people influence adolescent PA? (SHOWed method)	You have taken photos around your neighborhood. Tell us more about the photos; What do you **see** here? **Why** did you take this photograph? What do you like/dislike about these places? What is **happening** here? How does this relate to or affect **Our** PA? **Why** does this situation/concern exist? What can we **Do** about it?
Improvement	What are the improvements to be made in the neighborhood to help you become more active?

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Declaration of Conflicting Interest

The author(s) have stated that there is no possible conflict of interest.

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