Active Living for Rural Children
Community Perspectives Using PhotoVOICE

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Background: Active living integrates physical activity into one's daily routine. Current understanding of active living among children and their families living in rural communities is limited. A community perspective is critical to understand the contextual factors that influence children's physical activity in rural areas.

Purpose: The purpose of this study was to identify the perceived environmental factors that support or hinder physical activity among rural children to develop testable hypotheses to inform future interventions for reducing unhealthy weight gain and preventing chronic diseases associated with physical inactivity.

Methods: PhotoVOICE was used to explore active living opportunities and barriers for children living in four low-income, rural U.S. communities. In 2007, parents (n=99) and elementary school staff (n=17) received disposable cameras to document their perspective. Using their photographs and narratives, participants developed emergent themes during a facilitated group discussion. In 2008, study authors used the Analysis Grid for Environments Linked to Obesity (ANGELO) framework to categorize the themes.

Results: Microenvironment themes include physical (e.g., natural features, topography); sociocultural (e.g., isolation); policy (e.g., time for school recess); and economic (e.g., funding for physical activity programs). Macroenvironmental themes related to the built and natural environments and transportation infrastructure.

Conclusions: This study identified rural environment elements that community members perceived as influencing children's physical activity patterns. Certain aspects were unique to rural areas, whereas other urban and suburban factors may be generalizable to rural settings. PhotoVOICE was a useful participatory research method to gain insight into perceived factors affecting rural children's physical activity behaviors.
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Introduction

Active living integrates physical activity into one's daily routine.[1] Although active living research has increased,[2] emphasis has primarily been on urban populations. Because characteristics relevant to physical activity vary according to physical landscape, built environment design, social norms, and culture,[3] findings from urban and suburban studies may not be relevant or transferable to rural areas.[4–6] Compared to their urban counterparts, rural U.S. residents experience a higher prevalence of physical inactivity and obesity.[7,8] The economies and cultures of rural communities have recently shifted toward more sedentary lifestyles,[9] which may be attributed to several demographic and societal trends.[10,11] Understanding the contextual elements that promote active lifestyles is needed to help rural children achieve the recommended 60 minutes of physical activity/day.[12,13]

Qualitative research can help to identify rural environmental factors that influence physical activity behavior,[14] develop hypotheses for existing physical activity patterns,[5] and find opportunities for children to engage in regular physical activity to support a healthy weight.[15,16] It may also provide insight about environmental percep-

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tions for further study.[17] The field of active living research has developed rigorous methods for measuring the physical environment, but it is less advanced for assessing human perceptions of the environment. Research suggests that perception may mediate the association between objective measures and health outcomes,[18] and that objective data convey only partial information to understand contextual factors influencing physical activity.[19]

Learning from community members about their environments will help inform public health practice.[19,20] Participatory research methods[21,22] confront a fundamental problem of traditional, nonparticipatory community assessment: what professionals, researchers, specialists, and outsiders believe is important may not be congruent with community members' perspectives.[17,23–25] The purpose of the present study was to identify the perceived environmental factors that support or hinder physical activity among rural children to develop testable hypotheses to inform future interventions for reducing unhealthy weight gain and preventing chronic diseases associated with physical inactivity through a qualitative, participatory research approach.

Methods

Study Sample

The current study was conducted in the spring of 2007 by Tufts University and Save the Children (www.savethechildren.org), a nonprofit organization working in impoverished U.S. rural communities. It was part of a larger mixed methods research project to explore activity-friendly rural environments for children. The sampling frame consisted of Save the Children's rural U.S. partner schools (children in grades K–5) categorized by region: Central Valley of California (n=11 schools); Mississippi River Delta (n=15 schools); Southeast (n=9 schools); and Appalachia (n=48 schools). Rural was defined according to the National Center for Education Statistics locale codes, which are based on the specific conditions of schools and refer to very small geographic areas and circumstances, such as population density and size.[26] Locale codes are often homogenous in small areas and generally provide the most accurate type of community where students reside.

One school from each region was selected to participate using a random-digit sequence. Study staff met with school principals to secure their support. Table 1 provides demographic characteristics for the participating towns and schools. After obtaining support, recruitment flyers (translated into Spanish for California) were sent home with all elementary school–aged children. A total of 99 parents (88% female; n=25 in CA, n=27 in MS, n=20 in SC and n=27 in KY) participated in the study. Teachers and school staff were recruited via word of mouth, with a total sample of 17 (n=4 each in CA, MS, and SC, and n=5 in KY). Each participating parent received a $100 gift card, and school staff received a $50 gift card because they participated in only the qualitative phase of the study. The current study was approved by the IRB at Tufts University, and all participants signed consent forms.

PhotoVOICE

PhotoVOICE was chosen because it is a qualitative, participatory engagement approach that uses a specific photographic technique to explore community members' perspectives.[27] Disposable cameras allowed study participants to document their communities and use their images with accompanying personal stories to share local knowledge and expertise to facilitate community change.[28,29]

Two workshops separated by group (parents vs school staff) for each school were held 1 week apart during after-school hours. The first detailed the study purpose and objective of the PhotoVOICE process. PhotoVOICE is a naturalistic method intended to have minimal instruction; however, to provide a clear understanding of the technique, a trained facilitator (the first author) led a brainstorming session about factors influencing children's physical activity patterns at home, during school, and in their community and how to visually document these factors. Parents were to photograph factors at home and in the community while school staff photographed the school setting. Instructions for conducting this technique in an ethical and sensitive manner (no faces photographed) were provided. The facilitator demonstrated the process with photographs from a pilot PhotoVOICE project. Participants received a tutorial on using a disposable film camera (27 exposures) and were given 1 week to take their photographs and return their camera to a drop-

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Table 1. Demographic profile of participating communities

Location characteristics	Appalachia (KY)	Central Valley (CA)	Mississippi River Delta (MS)	Southeast (SC)
Town[a]				
Population size (n)	1,738	3,466	2,102	1,220
Household income (median)	15,923	25,313	17,972	26,937
School[b]				
Free–reduced lunch (%)	100	100	100	91
Enrollment (n)	196	472	319	399
Ethnicity (%)	100 C	93.7 H	99.7 B	94.0 B

[a]U.S. 2006 Census Data
[b]National Center for Education Statistics. Urban\Rural Classification Systems (nces.ed.gov/)[26]
B, black/African American; C, white/Caucasian; H, Hispanic

off box at each school. A local photo facility developed the photographs.

During the second workshop, also held during the afterschool and evening hours in a designated classroom, participants' photographs were returned. The facilitator instructed each participant to select 3–5 photographs that best represented their perspective. Participants documented this on the back of each photo by explaining why they took it and what it represented. The facilitator then invited each participant to describe their photographs with the larger group. The facilitator used a chalk board to create columns representing barriers to and opportunities favoring physical activity for children, and taped each picture that was discussed to the board to reflect participant views and opinions. During the discussion, a third column was added to reflect participants' ideas that represented both an opportunity *and* a barrier. After all participants shared their photographs, the group was invited to share any other experiences or pictures that were not yet represented. This information was added to the appropriate column on the board. The facilitator reviewed the photographs and led a second discussion to identify the themes that the pictures reflected. Because PhotoVOICE is a participatory engagement tool, all themes were participant driven and identified rather than investigator driven. The facilitator helped the group achieve consensus and participants were asked to confirm whether the photographic wall accurately reflected their collective views. The entire session was documented through extensive notes and by retaining all photos. The sessions held in California were bilingual (Spanish/English) and conducted by the facilitator and a trained interpreter.

In the spring of 2008, the study investigators used the ANGELO conceptual framework[30] to organize the participant-identified themes. This framework arranges themes according to the size (school, community and home) and type of environment (physical, sociocultural, economic, and policy). This framework was chosen because it provides a simple characterization of the various data used in systematic reviews about diet,[31] physical activity,[32,33] and obesity.[34]

Results

A total of 98 parents participated in the PhotoVOICE project and 90 disposable cameras were returned by the required deadline. Two cameras malfunctioned in the field, which resulted in data from 88 different cameras. Of the 17 school staff enrolled, 17 cameras were distributed and returned. The response level for the PhotoVOICE assessment was 92% for the parent groups and 100% for the school staff groups. In all, 441 photographs were discussed.

Table 2 provides an example of the emergent themes related to the community setting. Tables showing the PhotoVOICE themes from the home and school settings can be found in Appendix A (available online at www.ajpm-online.net). Indicator signs illustrate whether the theme was discussed as an opportunity (+); a barrier (–); or both (+/–) depending on the context in which it was discussed. For example, the location of a home was discussed as an opportunity if it was close to the town center, school, or community amenities because it allowed children to walk to school or other destinations. Alternatively, a remotely located home was viewed as a barrier to children's physical activity and active living potential. Figures 1–3 provide examples of participant photographs and accompanying stories shared during the discussions.

Overall, participants identified several barriers and opportunities for their children to be physically active during school, in the community, and at home across all environments. Aspects specific to rural settings also were identified, with the majority representing barriers to children's physical activity patterns. In the community (Table 2), many physical environment barriers were identified such as a lack of sidewalks or shoulders and buffers, heavy commercial truck traffic, unpaved road surfaces, and few indoor recreation destinations (e.g., youth centers). Specific regional features included the natural environment (i.e., hiking in the hills); presence of nearby state parks; and the town being unincorporated. Long distances between home and any other destination were often cited as a barrier. Parents recognized owning a vehicle as an opportunity because they used their car to overcome the barrier of long distances (i.e., for their child to be active, the parent had to drive the child to a park or play space). In certain areas, high gas prices then became an additional barrier for parents to support their child's physical activity. Having adequate green space around the home was viewed as an opportunity whereas community factors like social disorder (i.e., crime, vacant homes, loitering, and gangs) were seen as a barrier.

School location and climate were identified as limiting children's physical activity (Appendixes A and B, available online at www.ajpm-online.net). Climate was viewed as a barrier because weather conditions could be extreme and restricted school space often did not provide adequate indoor alternatives. Results revealed elements related to child physical activity that have been commonly described in the broader literature (e.g., urban/suburban areas). School physical activity policies (i.e., time allowed for physical education); programming; and availability of recreational equipment were consistent themes, whereas other factors such as teacher role-modeling were mentioned in specific communities.

Appendix B (available online at www.ajpm-online.net) illustrates factors supporting physical activity opportunities at home such as having equipment (i.e., bicycles); household policies or rules; parental support (i.e., logistical); presence of siblings; and household pets. Barriers included sedentary leisure screen time and limited fi-

Table 2. Community PhotoVOICE results identifying physical activity opportunities and barriers for children living in rural communities as reported by parents

Environment	Community setting				Representative sample comment from parents
	MS	CA	SC	KY	
Physical	Roads: no sidewalk or shoulder (–)	Roads: no sidewalk or shoulder (–)	Roads: no sidewalk or shoulder (–)	Roads: no sidewalk or shoulder (–)	"See this road—there's no space to walk. There are hardly any sidewalks around here so you have to walk in the road."
	Traffic (–)	Traffic (–)	Traffic (–)	Traffic (–)	"Trucks! This is what you see going past my house every day. And they go fast!"
	Destination proximity (+/–)	Destination proximity (+/–)	Destination proximity (–)	Destination proximity (–)	"There are some places in town to go to, especially if you live closer to the center you can walk to places." (+/–)
	—	—	—	—	"There's nothing around—you have to drive to get to any store or park." (–)
	Parks/rec areas (+/–)	Parks/rec areas (–)	Parks/rec areas (–)	Parks/rec areas (+/–)	"This is our park. It used to be nice until the gang-bangers came. And it's right next to the train tracks so it's not safe for kids." (–)
	—	—	—	—	There's a park here where children can play, but it's not always a good place to go—especially at night because there's a lot of drug and gang activity here (+/–)
	Climate (–)	Climate (–)	Climate (–)	Climate (–)	"The weather here isn't always nice [too hot, too rainy, too cold] and we have no place to go."
	Street conditions (–)	Street conditions (–)	—	—	"The streets are terrible—there are giant holes everywhere."
	—	—	Road surface (–)	Road surface (–)	"A lot of the roads are dirt so it's hard to do certain activities like rollerblading."
	—	Street lights (–)	—	—	"There are not enough street lights so once the sun starts to go down it's not safe for my kids to play outside."
	—	—	Unused "open" space (–)	—	"This is what you see when you drive around here. They just cut some of the trees down and leave it like this. I don't know why they couldn't do something with this area."
	—	Stray dogs (–)	—	—	"There's a lot of dogs around—some of them are stray and mean. You have to watch out and stay away from them."
	—	—	—	Natural environment (+)	"We live in such a beautiful area. When the weather's nice you can go to the National Park, swim in the creek, or hike in the hills."
Sociocultural	Crime/drugs(–)	Crime/drugs (–)	Crime/drugs(–)	Crime/drugs(–)	"This community has too many drugs for kids to get to and that keeps them away from everything. This is a HUGE barrier!"
	Vacant homes (–)	Vacant homes (–)	Vacant homes (–)	—	"There's a lot of vacant houses that have a lot of drug and criminal activity going on. It's unsafe for kids. And look how close it [vacant home] is to the road."

(continued on next page)

Table 2. *(continued)*

Environment	Community setting				Representative sample comment from parents
	MS	CA	SC	KY	
	Loitering (–)	Loitering (–)	Loitering (–)	—	"This is the park where some of the older kids hang around. It's not safe for my young kids because sometimes the older kids get into fights."
	Trash/debris(–)	Trash/debris (–)	—	—	"There's just debris everywhere. No one is coming to clean it up so it just stays here."
	—	Gangs (–)	Gangs (–)	—	"The gangs here can be bad sometimes. There was a shooting not too long ago. There's just not enough police and because a lot of people here are immigrants no one likes to talk to the police anyway."
	Health promotion (–)	—	—	Health promotion (–)	"There's just not enough information out there for parents or anyone in the community. It's hard to know what's available."
	—	—	Church physical activity programs (+)	Church physical activity programs (+/–)	"This is our church. They run programs for children and sometimes they're more activity-based." (+/–)
	—	Sports participation (+/–)	—	—	"A lot of kids play soccer around here, but that's mostly for the boys. There are more sports teams for boys. There are fewer opportunities for girls."
Economic	Funding for programs (–)	Funding for programs (–)	Funding for programs (–)	Funding for programs (–)	"I wish there were more programs but the community just doesn't have the money."
	Food landscape (–)	Food landscape (–)	Food landscape (–)	—	"Look at all this junk. This is one of the only stores in town and it's nothing but junk. But it's cheap and the kids like it, so it's what they buy."
	Closed hospital (–)	—	—	—	"This hospital closed a while back. We have a new one now but this one is in the center of town. It looks terrible. I wish they would turn it into a community center or something but there's no money to do anything with it."
	—	Unincorporated town (–)	—	—	"The town isn't incorporated so we don't have the money to do certain things."
Policy	Recreation department (–)	—	—	—	"The recreation department limits a lot of activities that can be done in some of the parks."
	—	Locked school yard (–)	—	—	"This is the school yard—you can see all the sports fields. It's right in the middle of town for everyone to see but it has this big gate around it that's locked at night and on the weekends so we can't use it. I wish they would open it for us to use."

Note: The data collection period for this study was April–June 2007. All items reported by the participants are included in the table with a representative example quote. Items were organized using the ANGELO[30] framework in the spring of 2008.

CA, California; KY, Kentucky; MS, Mississippi; rec, recreation; SC, South Carolina; (+), opportunity; (–), barrier; (+/–), both

Figure 1. *"There's a lot of vacant houses that have a lot of drug and criminal activity going on. It's unsafe for the kids. And look how close it is to the road. I don't like my kids walking by here."*
PHOTOGRAPHER: Mother in rural South Carolina, May 2007
SETTING: Community
ENVIRONMENT: Sociocultural
THEME: Vacant homes

nances. In two communities, additional barriers included a full-time working mother. Figure 4 represents the major themes that emerged from the PhotoVOICE process across the four rural regions.

Discussion

This research provides insight into the perceived environmental determinants related to active living for children living in four rural regions of the U.S. The ANGELO framework[30] was used to organize participant-identified aspects of rural settings (e.g., topography, lack of sidewalks, isolation). The common barriers identified across all four regions may be attributed to the study being conducted in similarly disadvantaged rural communities.

Figure 2. *"Our kids can't walk or bike to school. Look at the road, it isn't safe. And some of these kids come from really far away—they spend almost an hour on the bus to get here."*
PHOTOGRAPHER: School staff in Kentucky, May 2007
SETTING: School
ENVIRONMENT: Physical
THEME: Location

Figure 3. *"This is an opportunity for physical activity because this is where several children play together."*
PHOTOGRAPHER: Mother in rural Mississippi, April 2007
SETTING: Home
ENVIRONMENT: Physical
THEME: Physical activity equipment

Many of the parent findings focus on barriers rather than opportunities for physical activity. This may be expected given the existing research on environmental factors influencing physical activity. Studies suggest that travel distance has a negative impact on physical activity levels[35] and this may be especially true for children living in poor rural communities. Other factors mentioned here and supported by previous research include school physical activity policies[33] and parental support for activity,[36] as well as urban design characteristics including aesthetics,[37] safety from traffic,[38] and lack of nearby destinations.[37–41] A lack of sidewalks and high traffic speeds were viewed as barriers to children's physical activity,[42] and walking or cycling to school are known correlates of higher physical activity levels for children.[16,43]

Participants in two communities reported a greater ability to walk to destinations, which may be due to greater street connectivity and a more accessible town center (data not shown).[6] This aligns with research indicating that living in walkable neighborhoods[44] and easy access to recreation facilities[37] are positively associated with physical activity. Planning policies to reward or require more connected village-style development and the routine upgrading of roadways to include shoulders and sidewalks connecting to trip generators (e.g., schools, parks) are appropriate interventions for study even in rural settings. Some residents discussed school consolidation and families owning a motor vehicle as themes. Combined with the identified challenges to walking and cycling, this suggests that improved transportation (e.g.,

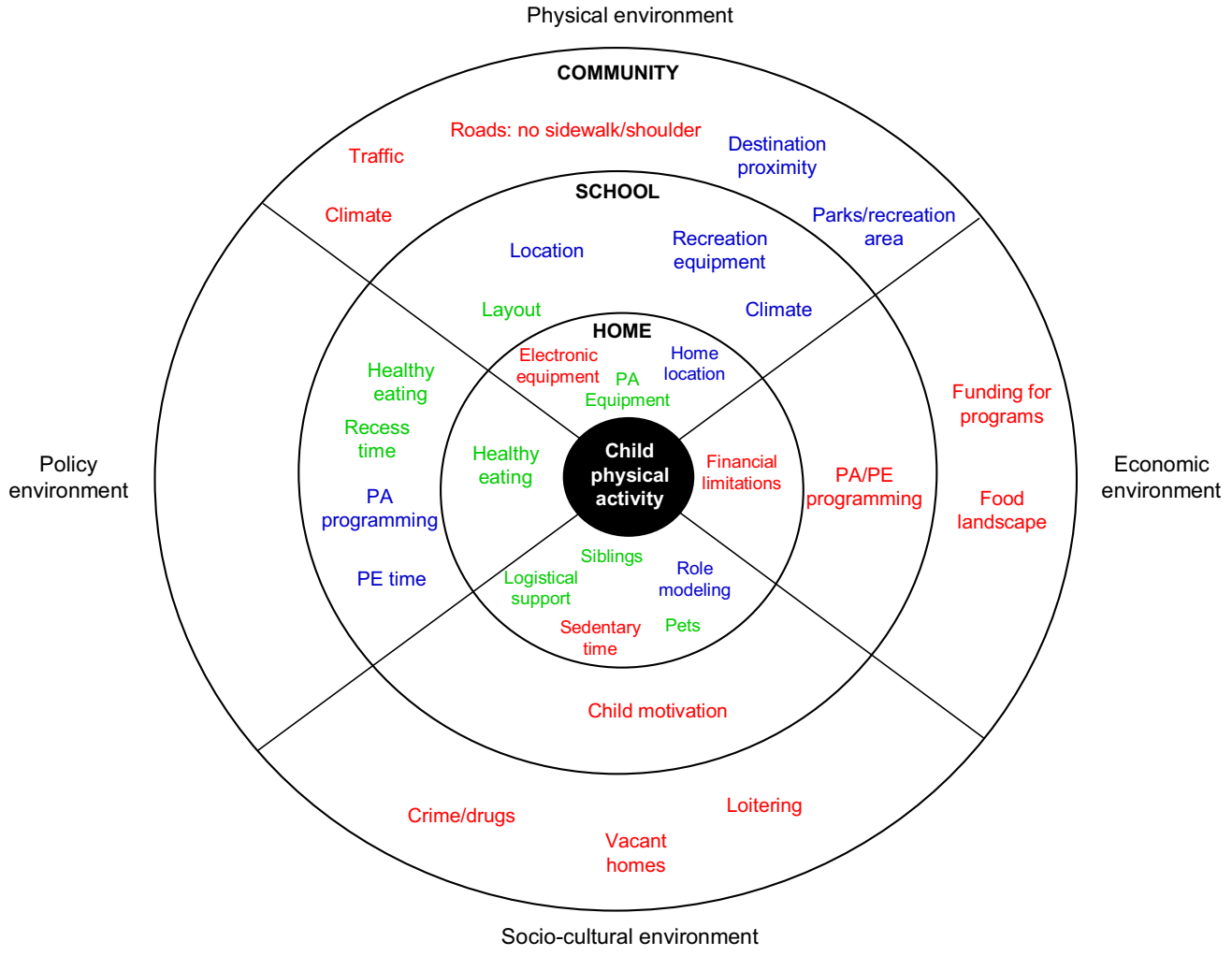

Figure 4. Consistent PhotoVOICE themes across all rural settings and environments in the Mississippi River Delta, Southeast, Appalachia, and Central Valley region of California. Data collected in the spring of 2007; opportunities for child physical activity are green; barriers for child physical activity are red; both opportunities and barriers for child physical activity are blue.
PA, physical activity; PE, physical education

shuttles, car pools) may allow more rural children to reach after-school physical activity programs.[14]

The current research has several notable strengths. First, PhotoVOICE has been utilized in other areas,[29] but only recently to understand the determinants of physical activity behavior.[45] It has the distinct advantage of engaging hard-to-reach (under-resourced, low-literacy) populations. Second, the present study advances understanding of the environmental determinants that rural residents perceive as having an impact on children's physical activity patterns. The literature provides conflicting evidence regarding physical activity and self-report of environmental measures,[46,47] and a recent article noted incongruence between perceived and objective measures of physical activity environments.[48] An earlier study[49] also noted discordance between perceived and objective measures of an environment's walkability, with low-income, low–education level, and overweight participants more likely to perceive high-walkability settings (based on objective measures) as less walkable. This is particularly relevant here as it supports the value of having participants use photographs to visually illustrate their perceptions.

Our study findings also have some limitations. "Rural" may be defined in many ways, and rural communities are not necessarily homogenous entities. Results from the present study apply to the four focal areas and not all rural areas (such as the Southwest U.S. or rural areas in other countries). All four communities met the study's definition of underserved based on children's participation levels in the National School Lunch Program (Table 1). The underlying theme of poverty was discussed as a lack of resources to support community programs or recreational facilities and limited household income to sup-

port physical activity. The study illustrates the challenges to physical activity faced by children in poor rural communities, but findings cannot be generalized to all rural settings. Although the prevalence of poverty is highest for children living in rural communities,[50] not all rural communities are poor.

Future Research

This work suggests three broad areas for intervention and further evaluation. First is the nexus between perceived and actual environmental variables. Knowledge of perceived environmental qualities can further understanding of how the rural environment affects active living, and such knowledge may allow for better evaluation and planning of places that encourage physical activity.[17,51] It may also guide where physical and sociocultural interventions are appropriate and how modifying community perceptions may promote physical activity. Interventions to inform residents and change perceptions (e.g., way-finding signs, active travel mentoring programs to teach safe walking and cycling routes and skills, safety initiatives) should be developed and tested. Second are actual changes to the built environment, including the macro- and micro-environmental levels. Some evidence supports the building of walking trails to increase physical activity for rural residents[52] whereas other factors (such as land use and transportation policies that favor village centers and traditional neighborhood designs or discourage segregated, single-use, low-density neighborhoods, large consolidated schools, and roads lacking shoulders or sidewalks) should be evaluated. Third is studying the provision of programs and facilities for leisure-time physical activity; although identified as a challenge here, it is questionable whether offering these types of programs could increase physical activity levels in rural populations.

Conclusion

This investigation illustrates the unique characteristics of rural communities that may support or hinder children from being physically active. It provides data from local communities to help develop high-quality measures of environmental perception for use in future investigations. PhotoVOICE is an effective participatory research method to gain insight into perceived factors affecting rural children's physical activity behavior. This research identified opportunities for designing effective obesity-prevention interventions,[15] especially in areas where poverty levels are highest.[53] It can help inform other research approaches to fully understand barriers and opportunities to influence children's physical activity to reverse overweight and obesity trends in poor rural settings.

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Appendix

Supplementary data

Supplementary data associated with this article can be found, in the online version, at doi:10.1016/j.amepre.2010.09.013.