

Interventions for Improving Physical Activity in Rural Adolescents: A Literature Review

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Research Question

Which interventions have been most effective for improving physical activity for adolescents living in rural American communities?

Abstract

Physical activity is a critical public health focus, particularly for rural adolescents who experience unique barriers to exercise. This literature review examines the effectiveness of different physical activity interventions aimed at rural adolescents in the United States. Ten peer-reviewed studies were analyzed with a focus on physical activity from the database PubMed and Web of Science. Most programs saw a moderate increase in moderate-to-vigorous physical activity. Some studies implemented other health behavior topics along with physical activity programs, such as nutritional and mental health education along with stress management with mixed results. Some programs aimed to create programs with low-cost interventions with mixed results. Findings of this study show that interventions designed for rural adolescents can bring results, but current literature suffers from a lack of control groups and interventions designed for demographically specific populations, limiting generalizability for larger populations and areas. These findings suggest that school-based interventions can have a positive influence over physical activity levels in the rural youth, especially when combined with broader health education topics. Future research should focus on long-term programs that represent a more diverse population representing the American public.

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Introduction

A combination of demographic, environmental, economic, and social factors place rural Americans at a greater risk for obesity (CDC, 2024a). The prevalence of obesity have become increasingly prevalent in rural communities and can be associated with a lack of regular physical activity. In response, public health initiatives have prioritize promoting healthier behaviors, with heavy emphasis being placed on educating the adolescent population on the importance of physical activity and proper dieting. Teaching these behaviors at a young age can have a significant influence on shaping behaviors as habits formed in adolescence persist into adulthood. Encouraging physical activity has become an important goal in reducing the long-term chronic diseases and promoting greater overall wellness.

Approximately 1 in 5 U.S. children and adolescents are classified as obese (CDC, 2024b). When further broken down, rural adolescents have a higher rate of being overweight (25%) than urban (19%) and small-city adolescents (17%), signifying a need to address this issue at a young age. (Joens-Matre et al., 2008). When evaluating childhood obesity rates in terms of ethnicity, Hispanic (26.2%) and non-Hispanic Black (24.2%) children have the highest prevalence of obesity. When looking at income level, obesity prevalence is 25.8% among children with an income level of 130% or less of the Federal Poverty Level (CDC, 2024b). Childhood obesity can lead to type II diabetes, high

cholesterol, and cardiovascular disease, among numerous health complications (Crouch et al., 2023). In addition, adolescents do not typically meet the recommended amount of daily exercise, further amplifying this effect. The CDC recommends adolescents ages 6-17 receive 60 minutes or more of MVPA daily (CDC, 2024c). However, only 26.1% of this population group receives this recommendation. When broken down further, girls (17.5%) were less likely to receive adequate PA when compared with boys (35.3%) highlighting a discrepancy in gender (Virani et al., 2020). These disparities showcase a need to identify interventions that improve physical activity.

While many interventions have been shown to encourage physical activity, few have prioritized rural populations. The current research tends to prioritize interventions that best benefit urban and suburban populations. These studies assume that rural populations have equal and adequate access to the infrastructure and resources that more developed, populated communities may have. Rural areas tend to face barriers to physical activity through a lack of sidewalks, gyms, and parks, (Crouch et al., 2023) and may face a lack of funding and availability for school and community programming during school days (Education, 2025).

The purpose of this literature review is to examine how different interventions and strategies intend to close the physical activity level gap that adolescents in rural community's face. The literature review intends to identify which strategies show the most promise while also examining how geographical, socioeconomic, and environmental factors influence the outcome of these interventions. Understanding the sparse research on this topic will better help understand how to assist these areas so that we can create an

inclusive intervention that benefits them. Ultimately, the aim of this study is to explore and identify the existing interventions that increase physical activity and exercise for adolescents living in rural communities.

Methods

The literature was obtained from two databases, PubMed and Web of Science. PubMed is an open-access database that specializes in biomedical, life science, and public health literature. Web of Science is a database containing over 22,000 peer review articles. Both databases were searched using specific keywords and inclusion criteria discussion. This is reflected in *Figure 1*. 4 articles were pulled from PubMed, and 6 articles were pulled from Web of Science.

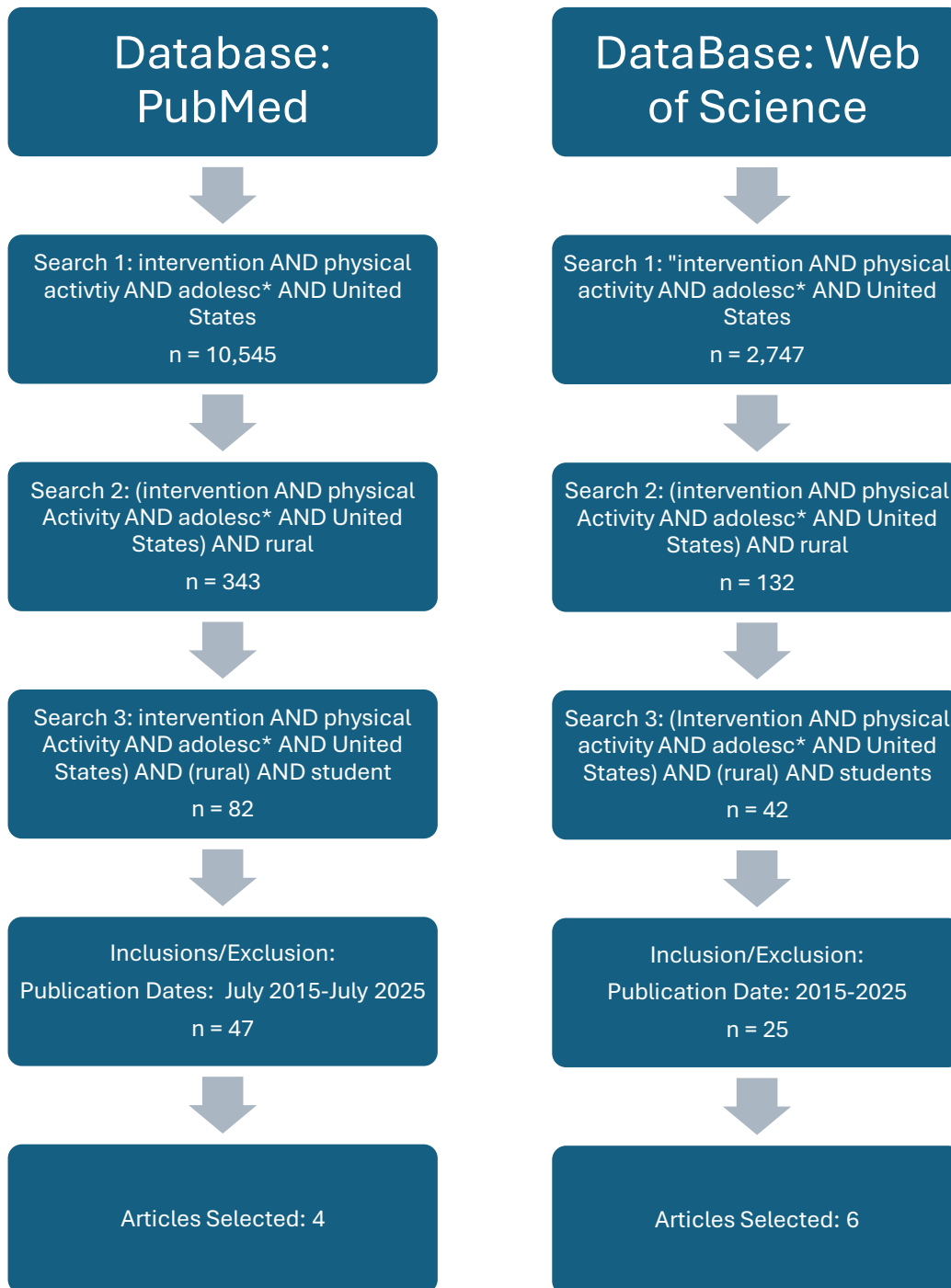
The first PubMed search used “intervention AND physical activity AND adolesc* AND United States”. This search set up the preliminary boundaries for the articles and resulted in 10,545 articles. The second search was “(intervention AND physical activity AND adolesc* AND United States) AND rural”. The addition of “AND rural” significantly narrowed the results down to 343 articles. The third search included the previous terms but added “AND student” which further narrowed the results to 82. Restricting publication dates to between July 2015 and July 2025 produced 47 entries. Four articles were selected for this literature review.

The first Web of Science search utilized a similar pathway with “intervention AND physical activity AND adolesc* AND United States” resulting in 2,747 results. The following search added “AND rural” which reduced the results to 132 articles. The third search

included “AND students” which led to 42 results. To match with PubMed’s search process and to include topical, relevant information for the research question, an inclusion criterion was again utilized to only include studies from the past 10 years. This led to the final sample of articles to reduce to 25 entries with 6 used in this literature review.

Only one inclusion criteria was included in this search process. As stated earlier, all articles reviewed must be published between 2015 and 2025, ensuring up-to-date, relevant data is presented.

Fig. 1 Article Selection Process



Results

The 10 articles selected for this literature review showcase different interventions used to address improving physical activity for rural adolescents. From these articles, a few trends stick out from the more successful programs. The current data available shows that implementing interventions within schools, combining other healthy behaviors such as nutritional and mental health skills, and limiting costs are key to improving physical activity and healthy behaviors. See *Table 1*. For a more detailed summary of the articles reviewed.

School-Based Interventions

Most of the interventions partnered with schools to improve physical activities. Adolescents spend large portions of their days in school with them receiving around half of their moderate-to-vigorous physical activity (MVPA) during schools hours, making it an important space to encourage healthy behavior (Forseth et al., 2025). Intervention targeting improving physical activity during the school day saw success. One study targeting educator training over a 2-year period saw an increase in students receiving adequate MVPA rise from 51.1% to 67.3%. This study trained physical education educators to use the Sports, Play and Active Recreation for Kids (SPARK) curriculum within their classrooms. (Belansky et al., 2016). Another 3-year physical activity intervention targeting a middle school in a rural West Virginia county saw participants receiving 60 minutes of MVPA rise from 27.8% to 40.6% (Jones et al., 2020). Researchers found other physical fitness improvement gains other than just increases in MVPA from school-based interventions. One study observed lowered systolic pressure post-intervention, signaling improved

cardiovascular health and fitness (Watkins et al., 2024). The relationship between improvements in physical activity levels and school-based intervention programs showcases the importance of using schools as an important gateway for community-wide progress.

Integration of Broader Health Behaviors

Some studies found success in combining physical activity interventions with other health promotion behaviors. One such intervention combined physical health lessons with healthy lifestyle behavior lesson. Post-intervention, respondents reported having improved anxiety and lifestyle behaviors, in addition to the COPE program teaching them new skills, with parents echoing a similar sentiment (Hoying et al., 2016). Some interventions implemented healthy eating as elements of their programming. One such study targeting a 3-year intervention promoting physical activity and healthy eating did not see a rise in participants eating the necessary servings of fruits and vegetables (Jones et al., 2020). Yet, another study reported participants exhibiting improved nutritional knowledge in post-intervention surveys, but it did not evaluate whether participants made changes. (Watkins et al., 2024), Mental health impacts, such as confidence, motivation, and enjoyment were noted to have improved with participants enjoying programs that allow for autonomy and flexibility. This allowed for improved participation and increased levels of PA in the study (Palmer et al., 2024). Establishing a connection between physical activity and broader health promotion behaviors appear to have mixed overall results, emphasizing a further need to explore their relationship in programming.

Low-Cost Interventions

Some studies made it a point to institute low-cost interventions. Rural communities can lack the necessary funding to address improvements to physical activity and physical activity infrastructure. One such study had the total cost of their intervention's equipment to be around \$1,500-\$1,700. This study purchased new playground equipment and observed a noticeable impact on PA levels. (Yu et al., 2021). Using these cost-efficient strategies led to an overall increase in MVPA across the board. Other studies utilized pre-existing infrastructure to reduce costs. One study utilized a county's parks to host events and promotions, which actually saw a decline in park usage post-intervention (Banda et al., 2017).

Table 1. Detailed Summary of Articles Reviewed

	Author(s)	Year	Article Title and Journal	Purpose of Article	Sample Info	Type of Research	Research Findings	Limitations of Article
1	Banda, J. A., Hooker, S. P., Wilcox, S., Colabianchi, H. Kaczynski, A. T., Hussey, J	2017	The Effects of a Park Awareness Campaign on Rural Park Use and Physical Activity <i>Journal of Public Health Management and Practice</i>	To evaluate the effects of an intervention designed to promote physical activity through 1 month of park events and promotions in a rural South Carolina county.	6 community parks within one South Carolina county participated 629 people observed at the 6 community events	Experimental design study	The study found that park usage decreased 13% post-intervention after park promotion events ceased.	A control group was not utilized.
2	Belansky, E. S., Cutforth, N., Kern, B., Scarbro, S.	2016	Disseminating Evidence-Based Physical Education Practices in Rural Schools: The San Luis Valley Physical Education Academy <i>Journal of Physical Activity and Health</i>	To assess the effectiveness of a two-year intervention designed to improve moderate-to-vigorous physical activity (MVPA) by training educators in rural, low-income elementary schools in Colorado	22 teachers initially participated, 17 teachers participated in the program to completion These 17 teachers were scattered among 15 schools 76.5% PE certified, 58.8% female, 35.3% held master's degrees	Implementation study	The study found an increase in MVPA from 51.1% to 67.3% of students receiving the recommended amount. Time spent on fitness drills and vigorous activity increased while classroom management time and unstructured play/fitness time decreased over the span of 2 years.	The program instituted cost around \$1.2 million, making it an expensive proposition for low-income counties and communities to replicate.
3	Eichner, J. E., Folorunso, O. A., Moore, W. E.	2016	A Physical Activity Intervention and Changes in Body Mass Index at a Middle School With a Large American Indian Population, Oklahoma, 2004-2009	To study if adding a middle school opportunity for vigorous exercise (MOVE) program to a physical education class could decrease body mass index scores.	182 students enrolled in the class, only 66 completed both semesters (46 boys, 22 girls). Pre-intervention, 10/66 students	Experimental study	The study found that the BMI z scores of MOVE boys dropped from 0.8 to 0.7. Girls in MOVE had their BMI z score hold steady at 0.7. Non-participating boy and girl students found	The study solely focused on BMI scores and did not investigate other factors such as behavior or motivation.

			<i>Preventing Chronic Disease</i>		categorized as overweight, 19/66 categorized as obese. 57.6% American Indian, 19.7% White, 15.2% Latino, 6.1% African American, 1.9% Asian.		their BMI z score to have increased.	
4	Forseth, B., Carlson, J. A., Ortega, A., Steel, C., Lancaster, B., Fitzpatrick, L. K., Jiang, Q., Davis, A. M.	2025	O the places rural children will go... to get physical activity: a cross-sectional analysis <i>BMC Public Health</i>	To understand and analyze where rural, overweight children engage in MVPA and sedentary behavior.	44 children between 2 nd and 4 th grade from 8 elementary schools in rural Kansas All participants are classified as overweight/obese Study claims to that participants were recruited to match the area's representative demographics	Cross-sectional study	The study found that the participants averaged 41.4 mins/day of MVPA with 18.2 min/day obtained at school, 9.4 min/day in their community, and 8.5 min/day at home. Participants averaged about 6.7 hour/day sedentary with most of that time spent at home and then at school. Males typically received more MVPA than females with the highest discrepancy found while out in the community.	The study has a small sample size with just 44 participants. This is an observational study, so it cannot determine a causal relationship. Additionally, this study took place in rural Kansas and may not reflect other rural communities.
5	Hoying, J., Melnyk, B. M., Arcoleo, K.	2016	Effects of the COPE Cognitive Behavioral Skills Building TEEN Program on the Healthy Lifestyle	To evaluate the effectiveness and efficacy of a 15-session intervention targeting healthy lifestyle behaviors,	102 8 th grade students enrolled in a required physical education class were enrolled, but	Pilot intervention study	The students self-reported that anxiety and healthy lifestyle behaviors improved significant post-intervention. 92% of	The study did not utilize a control group and utilized a small sample size (n=24).

			Behaviors and Mental Health of Appalachian Early Adolescents <i>Journal of Pediatric Health Care</i>	physical health, and mental health for rural adolescents in Appalachian Ohio.	only 29 participated with 24 completing the study. 14 males, 15 females		participants also reported finding that the program, COPE, taught them new stress management and positive self-talk skills. Parents of participants reported finding COPE beneficial with 63% reporting positive changes in their child's behavior. BMI change was not found to have been statistically significant.	The study may not be generalizable to entire population, with the demographics being 100% white participants in rural Appalachia.
6	Jones, E., Zuest, L., Bulger, S., Elliot, E., Cho, K., Lilly, C.	2020	Initial Findings of a Multicomponent School Health Intervention in Rural Appalachia: The Greenbrier CHOICES Project <i>Health Education & Behavior</i>	To evaluate the effects of a 3-year school intervention study that targets physical activity, healthy eating, and weight management on middle school students in a rural West Virginia county	4,633 6 th , 7 th , and 8 th grade students randomly selected to join the program (2,289 males, 2,344 females), 315 opted out across the 3 years	Experimental study	The study found that post-intervention, participants receiving 60-minutes of daily MVPA rose from 27.8% to 40.6%. The percentage of participants meeting two or more daily servings of fruit and vegetables (36.7%) did not generally see a rise throughout the intervention BMI was tested every year and found small increases in the percentage of students in the	This intervention was designed for an Appalachian County and may not be generalizable for other regions and school. A control group was not utilized making it difficult to understand if there is a causal relationship between the intervention and results.

							healthy weight zone (55.3% → 55.6%), in addition to a small decrease in participants classified as overweight or obese (44% → 41.4%)	
7	Palmer, K., Robbins, L. B., West, P., Ling, J., Kao, T. A., Pathak, D., Smith, A. L.,	2024	Perspectives of Rural High School Students Involved in a Multi-Component, After-School Physical Activity Intervention	To explore the perceptions that students had after completing a 10-week after-school physical activity intervention that took place in a rural Midwestern County.	The 10 participants come from an earlier sample of 19 students that took part in a physical activity intervention study which took place in two rural high schools in the Midwest 3 males and 7 females were studied. 9 are Caucasian and 1 is African American	Qualitative thematic analysis	The study found that upon completion of the intervention, the participating students appreciated the autonomy-supportive environment which gave a variety of exercise options for the participants to choose. They also reported increased motivation, confidence, and enjoyment from the intervention.	The data was collected from an extremely small sample size with all already having been somewhat active prior to the intervention.
8	Watkins, J. M., Brunnemer, J. E., Heeter, K. N., Medellin, A. M., Churchill, W. C., Goss, J. M., Hobson, J. M., Wener, N. E., Weaver, R. G., Kercher, V. M. M., Kercher, K. A.	2024	Evaluating the feasibility and acceptability of a co-designed physical activity intervention for rural middle schoolers: a pilot study <i>BMC Public Health</i>	To evaluate the effectiveness of a physical activity intervention designed for students at a rural Midwestern middle school.	24 6 th and 7 grade students all attending the same school 58% female, 42% male 94.4% White, 2.7% Black, 2.7% American Indian	Prospective feasibility study	The authors found that after the physical activity intervention began, physical performance increased. Participants scored higher in the post-intervention fitness assessments. Systolic pressure was observed to be	This study contains a very small sample size. The racial demographics of the sample are not representative of the overall population. A control group was not used.

							lower, indicating improved cardiovascular fitness. Post-intervention surveys showed that student's nutritional knowledge had increased.	
9	Vogeltanz-Holm, N., Holm, J	2018	Changes in Body Mass Index During a 3-Year Elementary School-Based Obesity Prevention Program for American Indian and White Rural Populations <i>Health Education & Behavior</i>	To evaluate the effectiveness of a 3-year obesity prevention study that focuses on rural White and Native American elementary age students in North Dakota	465 students participated with 308 students sampled across 8 schools all over North Dakota 7/8 schools reported being predominately white with the last school reporting a 98% American Indian population	Intervention study	The implementation of the CATCH program resulted in white students showing statistically significant decreases in zBMI while American Indian students saw their zBMI hold steady. Obesity prevalence declined from 15.9% to 12.7%.	A control group was not utilized and physical activity was not analyzed.
10	Yu, H. Kulinna, P. H., Mulhearn, S. C.	2021	The Effectiveness of Equipment Provisions on Rural Middle School Students' Physical Activity During Lunch Recess <i>Journal of Physical Activity and Health</i>	To evaluate the effectiveness of a physical activity intervention that adds physical activity equipment for middle schools in the southwestern United States.	135 students enrolled at school #1, 379 enrolled at school #2 (514 total). School #1 demographics: 54% white, 35% Hispanic, 4% Asian, 4% 2 or more races, 3% other School #2 demographics: 52% white, 34%	Observation study using baseline-intervention design	Adding the intervention led to an increase of MVPA across the board in both schools, all grades, and both genders. Interviews were conducted among select stakeholders' post-intervention revealed that the experience made them more motivated and created positive changes in student behavior.	The sample size for the interview participants was low (n=6). A control group was not utilized.

					Hispanic, 11% American Indian, 3% 2 or more races			
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Discussion

To address the disparity in rural adolescent's access to physical activity, it must be understood which interventions are most effective in tackling this challenge. The aim of this literature review was to evaluate the effectiveness of existing interventions to improve physical activity and exercise for rural adolescents.

The most common trend among the studied articles is the partnership between established interventions and schools (Belansky et al., 2016; Eichner et al., 2016; Forseth et al., 2025; Hoying et al., 2016; Jones et al., 2020; Palmer et al., 2024; Watkins et al., 2024; Yu et al., 2021). The existing literature focused on schools as students receive a significant portion of their day-to-day physical activity on school grounds (Forseth et al., 2025). This suggests the need for future interventions and initiatives to focus their programs on maximizing the time spent for adolescents to receiving proper physical activity during the school day and through after-school activities. This also heightens the importance of partnering with schools and school boards to ensure proper collaboration and coordination of the selected intervention (Vogeltanz-Holm & Holm, 2018).

Limitations

A common reoccurring limitation from the studied articles was a lack of control group, which made it difficult to identify a causal relationship between the independent variable and the observed outcomes. Another reoccurring limitation was that every study

was done in small pockets of demographically specific areas of the United States. None of the studies tested interventions for rural populations on a national scale, instead employing interventions that impact specific subregions of the country such as Appalachia, the Midwest, or the Southwest. This stems from these specific regions possessing higher rates of poverty (PovertyUSA, 2019). This limits the generalizability of the findings, making it difficult to determine a national protocol for developing an intervention.

Implications

This review highlights the potential for school and community-based interventions to improve physical activity levels among rural adolescents. Approaches that target peer leadership, school-day integration, and use minimal equipment to reduce costs showed promise in the selected studies. To maximize this, further research should evaluate long-term outcomes and policies that work to improve physical activity levels.

Further Research

There are opportunities to explore more interventions to improve physical activity. There is a need for future intervention to include control group for comparisons. Larger trials help to confirm effectiveness and assess the sustainability of these programs. There is also a need for more interventions to include racially diverse communities that fit the needs of underserved community members. Finally, low-cost intervention models need to be explored to increase the feasibility for rural communities to implement programming with their schools without requiring excessive funding and resources that communities may struggle to find.

Further Practice

To further practice and promote physical activity among rural adolescents, further practice should focus on creating low-cost, flexible strategies that tailor to a community needs. Educators can attempt to incorporate small-scale activity breaks designed to give kids a stimulating break from class. This has been shown to assist students in getting to the 60-minute MVPA guideline (Fuel Up, 2019). Including students in the design of interventions can increase engagement and the participation rates of an intervention, as well as improving their reception (Palmer et al., 2024). Additionally, school staff should continue to receive proper, topical training on new programs and interventions that aim to improve PA and MVPA levels for their students (Belansky et al., 2016).

Further Policy

Future policy should aim to mandate physical education time in K-12 schools. Illinois is the only US state to currently mandate daily physical education for all schools with 30 minutes of school time dedicated to physical activity at all levels of education. Considering adolescents receive around half of their MVPA time in schools (Forseth et al., 2025), mandating and ensuring that students and adolescents, especially older ones, must receive a prescribed, consistent amount of time for physical activity could significantly improve their overall activity levels and help them meet the national 60 minute guideline. Internationally, Finland schools have utilized their “Schools on the Move” program to improve PA levels for their adolescents. This program created organized physical activities within their schools, such as extending recess time and setting up more after-school clubs

and activities and had invested in developing new equipment and facilities while engaging students and staff to ensure program participation and satisfaction (Blom et al., 2017). This program has contributed to Finland's childhood obesity rate of 15.8%, lower than the United States' average of 21.66% (World Obesity Federation Global Obesity Observation, 2024).

Conclusion

Improving physical activity for rural adolescents is a crucial focus for public health to achieve its goals. This literature review evaluated 10 peer-reviewed papers that studied different interventions to raise levels of physical access and exercise in communities across the United States. This study found school-based implementation, combining programs with other health lifestyle behaviors, and low-cost programming to have a positive impact on reaching this goal. These findings can be used by policymakers and officials to guide legislation and initiatives to make state-level and national-level changes that help adolescents in rural communities. More research should be done to identify additional strategies that can deepen our understanding of this issue.

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