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Qualitative Assessment of Facilitators of and Barriers to Physical Activity Policy, Systems, and Environment Change in Rural West Virginia

Christiaan G. Abildso[1], Udday Datta[2], Samantha I. Moyers-Kinsella[2], Daniel Eades[1], Emily Murphy[1], Dana K. Voelker[1], and Sam Zizzi[1]

[1]West Virginia University, U.S.A.

[2]Center for Active WV, West Virginia University, U.S.A.

Abstract

Policy, systems, and environment (PSE) change interventions are an evidence-based approach to take in rural areas of the US to improve physical activity (PA) rates. However, there is a need to understand the unique factors that affect such interventions in rural areas. This study used a descriptive, qualitative design to capture the perspectives of 25 key informants across eight participating counties as part of a federally funded project. After purposive recruiting of participants via community-based coalition meetings and snowball sampling, trained researchers conducted semi-structured interviews via Zoom. Multiple team members developed a hierarchical coding structure of facilitators of and barriers to PA-related PSE change, including policy, systems, environmental, and interpersonal factors. Systems factors, when conceptualized using a resources-based model of public health capacity, were more often mentioned as facilitating or presenting a barrier to PSE change than were interpersonal, policy, or environmental factors. Specifically, the existence (or absence) of organizations and their financial and operational priorities were critical determinants of PA PSE change. The findings from this qualitative descriptive study can be used by rural practitioners to identify key facilitators of community-based PA PSE change to focus on based on the size and scope of the environmental change and may offer guidance for researchers doing similar work.

Keywords: physical activity, rural, policy, built environment, systems change, public health, qualitative research

Increasing the prevalence of the adult population that meet physical activity (PA) guidelines in the United States (US) is critical to the health of the nation (Fulton et al., 2018). Of particular importance is increasing the amount of PA in people who are completely inactive or insufficiently active (Piercy et al., 2018; United States Department of Health and Human Services [USDHHS], 2018). Residents of rural areas in the US are a priority population because of their lower prevalence of meeting the aerobic PA guideline (Abildso et al., 2023), the combined aerobic and muscle-strengthening guideline (Whitfield, Carlson, Ussery, Fulton, et al., 2019), and walking for leisure or transportation purposes than adults living in urban areas (Whitfield, Carlson, Ussery, Watson, et al., 2019). However, research suggests these findings are due to differences in environmental barriers and supports. For example, when an equal number of PA environmental supports for walking are in place, such as sidewalks, trails, paths, and connected destinations, the likelihood of walking among rural and urban adults is similar (Whitfield, Carlson, Ussery, Watson, et al., 2019).

The Community Guide to Preventive Services recommends multiple interventions that combine policy, systems, and environment (PSE) changes as evidence-based approaches to increasing population levels of PA, such as combining transportation system changes with land use policy interventions, combining trail infrastructure and programming activities, multicomponent active travel to school interventions, and point-of-decision prompts (Guide to Community Preventive Services). In rural areas, PSE approaches are influenced by factors unique from urban areas (Barnidge et al., 2013; Umstattd Meyer, Moore, et al., 2016), including limited population size and overlapping social networks (Emery & Flora, 2006; Farrigan et al., 2024), a disbelief in or distrust of policy (Barnidge et al., 2013; Bernhart et al., 2022), cultural values that emphasize individual- rather than social determinants of health (Barnidge et al., 2013; Efird & Griffith, 2025), and limited fiscal resources among public health entities (e.g., local health departments [LHDs]) that emphasize providing clinical services over community-based preventive efforts (Beatty et al., 2020).

Extant research on rural PSE change has focused on efforts that combine healthy eating and PA, and highlighted the outcomes, barriers to and facilitators of implementation in community settings. A 2016 systematic review of Centers for Disease Control and Prevention (CDC)-recommended policy and environmental strategies highlighted the school-based focus of the published PSE research and the organizational barriers (e.g., staff turnover and buy-in, political will) and facilitators (e.g., training, ease of implementation; Umstattd Meyer, Perry, et al., 2016). More recently, research describing PSE efforts by faith-based organizations (Hardison-Moody et al., 2020) and the Cooperative Extension Service (hereafter, "Extension"; Gabbert et al., 2023; Stroope et al., 2025; Washburn et al., 2022) in rural areas have similarly highlighted the outcomes and the organizational barriers to and facilitators of the work. The research findings suggest that workforce PSE training needs and community member capacity limitations presented barriers, whereas the provision of mini-grants and trainings for Extension staff (Gabbert et al., 2023; Stroope et al., 2025) and lay members (Hardison-Moody et al., 2020) helped overcome the capacity barriers.

Established more than a century ago through the nation's Land-Grant Universities (LGUs), Extension serves as a bridge between university research and local communities. With local Extension agents covering nearly every U.S. county, Extension delivers research-informed educational programming to adults and youth (Association of Public and Land-Grant Universities [APLU], 2022). Its core areas include family and consumer sciences, community and economic development, 4-H/youth development and agricultural sciences. Because Extension agents are deeply embedded in the places they serve, they are often trusted partners with firsthand knowledge of local needs and priorities.

In recent years, national frameworks and guidance have highlighted Extension's potential to play a stronger role in advancing public health, particularly in rural areas. Extension's existing strengths in nutrition education and food systems work make it a natural collaborator in health promotion, while its local presence provides infrastructure for PSE change efforts. Recognizing Extension activities as an opportunity to engage in rural PSE change efforts, the Centers for Disease Control and Prevention (CDC) established the High Obesity Program (HOP) to fund Extension recipients to engage in food- and PA-related PSE change in counties with obesity prevalence greater than 40%.

Research on Extension's role in rural PSE change has identified both challenges and opportunities. For example, the diversity of agents' training backgrounds, and programming responsibilities, and Extension's organizational goals can make it difficult to uniformly advance PSE work (Harden et al., 2020; Holston et al., 2021; Smathers et al., 2019). Others have noted the opportunity to strengthen county-level Extension agents' capacity to implement evidence-based direct education with training and technical support (e.g., how to conduct a walk audit) from state-level Extension Specialists as a method for facilitating PSE change (Gabbert et al., 2023; Harden et al., 2020; Harden et al., 2019; Washburn et al., 2022). To support this suggestion, a greater understanding of the key determinants of PA PSE in rural areas is needed to adequately inform training and technical assistance of Extension personnel. Therefore, the purpose of this research was to identify the barriers to and facilitators of PA-related PSE change in rural communities by conducting interviews with key informants with first-hand knowledge of PA-PSE change.

Methods

The study was undertaken using qualitative descriptive methods (Sandelowski, 2000). Specifically, the barriers to and facilitators of PA PSE change were explored through interviews with key informants in eight counties of the West Virginia (WV) HOP project. The project was

acknowledged by the West Virginia University Institutional Review Board (IRB; protocol # 2401910588).

County Characteristics

Sociodemographic and health data for the eight counties from which participants were recruited were used to provide context. Total population, percentage of population living in rural areas, median population age, and the percentage of population in the county aged 65 years or older were retrieved from the 2020 Decennial Census (United States Census Bureau). The percentage of the population living below the poverty level was retrieved from the 2020 American Community Survey, five-year estimates data (United States Census Bureau). Age-adjusted, county-level population health data from self-reported surveillance systems included the prevalences of fair or poor health, obesity using body mass index calculated from self-reported height and weight, and no leisure-time physical activity in the previous 30 days from the CDC PLACES 2022 data release of county-level estimates using data from the 2020 Behavioral Risk Factor Surveillance System (USDHHS). The percentage of the county population with adequate access to exercise opportunities were retrieved from the 2021 County Health Rankings dataset, where "adequate access" is defined as an individual living in a Census block that is within three miles of a recreational facility in a rural area or one mile in an urban area, or living within a half mile of a park regardless of rurality (University of Wisconsin Population Health Institute).

Participants

Purposive and snowball sampling were used to recruit key informants (KIs) over 18 years of age who had experience with or knowledge of PA and food access efforts in their community. An initial list of KIs was compiled using recommendations from the Extension agent and during a coalition meeting conducted in each of the eight counties involved in the WV HOP project. Each interview concluded with a request for additional KIs. Each author recruited KIs from 1-2 counties using an initial email with a description of the project and the interview. Follow-up emails and phone calls were made for non-respondents. An IRB-approved cover letter and scheduling email was sent to interested respondents.

Data Collection

Interviews were conducted using Zoom videoconference software following a semi-structured interview script (Supplementary File 1) adapted from a previous project (Casanave et al., 2021). Following rapport-building, participants were asked about (1) perceived community strengths and concerns; (2) barriers to and facilitators of healthy food consumption; and (3) barriers to and facilitators of PA. The PA questions specifically explored perceptions of PA access, PA-related resources, key challenges hindering access, opportunities for improving access, existing partnerships and those that could be leveraged to support PA. Interviewers were permitted to probe for details. Zoom-generated transcripts were cleaned by the interviewers.

Analysis

Analyses were conducted in Microsoft Excel (Hahn, 2008) using a deductive analytical approach (Bingham & Witkowsky, 2021). The lead author reviewed a sample of six transcripts (one from each interviewer) to establish a coding structure and establish preliminary operational definitions. Next, three coders (C.G.A., U.D., S.I.M) reviewed a sample of three transcripts to test the initial coding structure, assess for intercoder agreement, and identify any additional codes or sub-codes. The initial interrater phase revealed potential overlaps in- or misinterpretations of the operational definitions, such as the need to distinguish between Environment factors (built and natural environments) and Physical Resources (temporary resources) and the need to broaden and clarify the Interpersonal factors definition. Intercoder agreement was repeated until 80% agreement was reached (Krippendorff, 2018). Two rounds of interrater agreement and discussion were completed, after which agreement was 68.9%, 81.7%, and 92.0%, respectively, for the three coded transcripts. Through the coding and discussion, key clarifications included: (1) determining whether the factor was antecedent to a PSE or to individual behavior change (i.e., whether it should be coded or not at level 1); (2) specifying what should be coded as a general PSE factor rather than a food- or PA-PSE factor (i.e., what type of level 1 factor); and (3) how to segment a lengthy statement or combine multiple statements (i.e., how to identify what constituted a single codable segment). The resulting multilevel coding structure and operational definitions are detailed in Table 1.

Table 1. Key Informant Interview coding structure.

Level 1:	
Food PSE	Factor that is a determinant of PSE changes relevant to access to healthy foods.
PA PSE	Factor that is a determinant of PSE change relevant to access to places for PA
General PSE	Factor that is a determinant of any community change, not specific to access to healthy foods or PA
Level 2:	
Barrier	Factor that prevents PSE change
Facilitator	Factor that facilitates/enables PSE change
Level 3:	
Interpersonal factor	Social, cultural, interpersonal, or family factor (e.g., income, modelling, transportation, support). This includes (1) harmony/disharmony between politicians or towns and (2) an influential leader exerting their influence to create (or block) PSE change

Policy factor	Written policy adopted by a government entity or organization
Environment factor	Natural or built environment factor
Systems factor	One of five types of Resources (see Level 4)
Level 4 (only if Systems Factor at Level 3)	
Fiscal Resource	Money or financing needed for a group, entity, or organization to operate
Human Resource	People (e.g., volunteers, implementation staff) needed for a group, entity, or organization to operate
Informational Resources	Data, other informational needs (including city/community plan documents) needed for a group, entity, or organization to operate (not individual knowledge or beliefs), and information communication methods (e.g., newspapers, social media).
Organizational Resource	An entity, including a business or property owner, that exists & facilitates - or doesn't exist and/or hinders/creates a barrier to - PSE change, including programming/programmatic offerings. Cooperation (or lack of) between organizations is included here
Physical Resource	Quantity of something temporary (e.g., food, seeds, PA equipment), not a permanent built environment change

For text to be coded, it must have included a description of a factor antecedent to a food- or PA-related PSE change. For example, a statement like, "we have an easy-to-access trail" would *not* be coded in this study because, in isolation, this statement is reflective of a determinant of PA behavior (i.e., access to a place for PA). However, if the statement also included, "…and that trail was built with materials paid for by the local hospital," it would be coded in this study because the statement describes a determinant (i.e., the local hospital's financial resources) that preceded the PSE change (i.e., building the trail). Text could also be coded if it was indicative of general factors in a community that *could* affect food- or PA-related PSE change, such as reports of broad limitations in the city or county government budget. Thus, in level 1 analysis, statements were coded as Food PSE Change, PA PSE Change, or General PSE Change. Factors identified at Level 1 as relevant specifically to food access were excluded from this analysis in order to align with the purpose of the project.

At level 2 of the coding structure, the factor described in the text was then coded as a PSE Change Barrier or PSE Change Facilitator. Returning to the previous examples, the financial resources of the hospital would be a facilitator, whereas the limited local government resources would be a barrier. Each factor was subsequently coded at level 3 as a Policy, Systems, or Environmental factor. A fourth factor, Interpersonal, was also included in the coding structure based on the initial review of the transcripts demonstrating considerable frequency with which interpersonal factors were mentioned as important to PSE change. This code also includes factors characterized by social, cultural, or familial influences. Systems factors were defined based on the Handler et al. (2001) conceptualization of the structural capacity of the public health system to implement processes as determined by five types of resources – Fiscal, Human, Informational, Organizational, and Physical. Operational definitions of each of these resources, based on the initial deductive rounds of coding are presented in Table 1.

The lead author trained the other coders on the coding structure before all seven were assigned 3-5 transcripts each. One transcript of each of the coders was also coded by one of the three coders that developed the coding structure (C.G.A., U.D., S.I.M) to ensure agreement was greater than 80% (Krippendorff, 2018) and to discuss discrepancies before undertaking additional coding. No coder was assigned a transcript for which they were the original interviewer.

Positionality

Prior to presenting the results, we would like to acknowledge that none of the authors lives in the rural communities in which the participants live, has expertise in their daily experiences, or in the process of creating policy, systems, or environment changes in those contexts. The authors vary in the length of time we have lived in the state where the study took place, including some that were born and raised here. As such, we acknowledge that our own biases influenced our interpretations and analysis to some extent. We dampened any single author's bias by including seven coders in the analysis.

Results

Fifty-eight KIs were identified during the coalition meetings or by the Extension agent. Of these 58, 32 individuals were recruited to participate based on the availability of contact information and in consultation with the Extension agents about the responsiveness and impact of the KIs. Four of the 32 never responded, two expressed interest but failed to complete an interview, one declined, and the spouse of one KI also participated in an interview resulting in 26 individual participants. One transcript was not created in Zoom resulting in a total analytic sample of 25. All eight project counties were represented in the sample, ranging from 1 to 6 coded transcripts per county. The number of KIs per county and selected demographics and health data for the counties represented in the sample are detailed in Table 2.

Table 2. Number of Key Informant Interviews, Selected Demographic and Health Data for the Eight Project Counties

County	KIIs	Population*	Rural Population, %*	Median age, years*	Population below poverty level, %†	Population 65 years or older, %*	Fair or Poor Health, %‡	Adult Obesity, %‡	Physical Inactivity, %‡	% With Access to Exercise Opportunities§
1	6	21,809	100%	44.7	18.8%	21.1%	22.5%	44.0%	32.6%	4.72%
2	3	12,447	100%	47.3	18.6%	24.7%	23.2%	39.9%	32.1%	13.27%
3	2	6,229	100%	48.4	24.5%	24.3%	23.3%	41.7%	32.2%	0.64%
4	2	8,051	100%	46.1	28.2%	21.9%	25.5%	40.7%	34.1%	11.61%
5	1	20,463	100%	43.9	21.8%	20.1%	24.4%	43.3%	35.0%	18.11%
6	2	32,567	72.9%	44.4	26.0%	20.8%	25.4%	45.0%	35.6%	28.55%
7	5	12,376	100%	47.7	14.2%	24.6%	20.0%	40.2%	28.5%	38.72%
8	4	11,959	100%	48.6	19.9%	25.5%	21.7%	41.5%	31.8%	52.00%

*2020 US Decennial Census (retrieved from data.census.gov 5/20/2025)

†2020 American Community Survey, 5-year estimates

‡2022 CDC PLACES data release using 2020 Behavioral Risk Factor Surveillance System (BRFSS) data, age-adjusted prevalence

§2021 County Health Rankings: Percentage of population with adequate access to locations for physical activity." Business Analyst, Delorme map data, ESRI, & US Census Tigerline Files, 2010 & 2019

Overall, systems factors were coded 183 times as a facilitator or barrier whereas policy, environmental, and interpersonal factors were coded 8, 14, and 26 times, respectively (see Table 3). More specifically, PA PSE change facilitators were coded 108 times and barriers only 31 times. General PSE facilitators were coded 58 times and barriers 34 times. A description of each factor as well as illustrative quotes are presented next, first for facilitators and then for barriers. To preserve anonymity, each KI is identified using a code of *County.KINumber* where the county code matches the county number in Table 2.

Table 3. Coding Summary of the Frequency of Factors Mentioned as Barriers to or Facilitators of Physical Activity and General Policy, Systems, or Environment (PSE) Change

		Systems - Resources							
	Policy	Fiscal	Human	Informational	Organizational	Physical	Environment	Interpersonal	Total
Physical Activity PSE Factors									
Barrier	3	10	0	2	7	0	5	4	31
Facilitator	5	19	10	2	62	2	4	4	108
General PSE Factors									
Barrier	0	9	7	1	2	0	3	12	34
Facilitator	0	10	7	8	24	1	2	6	58
Total									
Barrier	3	19	7	3	9	0	8	16	65
Facilitator	5	29	17	10	86	3	6	10	166

Facilitators

Policies. Formal, government policies were never mentioned as facilitators of PA or General PSE change. Though not a formal policy, memoranda of understanding (MOU) with government entities were mentioned as facilitating environmental change, despite taking a long time to complete. To this point, one participant (2.3) explained that the key factor in getting a section of a rail-trail built was the development of an MOU with the state Division of Highways and owners of land-locked property that permitted those land owners to drive vehicles on sections of the rail-trail that provided the only vehicle access to those properties. One respondent (8.1) mentioned a high school track was open to community residents, but no formal shared use policy has been adopted by that school or school district.

Systems Factors. Systems-level factors were mentioned most often as facilitators of PA and General PSE change. Results for each of the five types of systems resources are described.

Systems-Fiscal Resources. There were several different sources of fiscal resources mentioned as facilitators of PA environment change. Sources of funding for park, trail, sidewalk, sports, and other PA facilities included a hospital foundation, county commission, state government (parks, tourism, and transportation departments), Congressionally Directed Spending, local fundraising, private philanthropies, a local economic development authority, and the Appalachian Regional Commission. Mini-grants were mentioned as a way of starting a small project and developing a spark for additional funding. In-kind donations of land and braiding together multiple sources of funding were mentioned as facilitators of larger projects. For example, for a multi-county rail-trail project, one participant described how diversified funding sources were utilized for different aspects of a long-term environment change plan:

> And that study by [consultant], something that foundation and the County Economic Development Authority sponsored. We got [philanthropic foundation] grant and they, the County folks, had a grant, and we had that study performed of what it would take to turn our four towns into trail towns and encourage economic development … We then leveraged that study into a grant from the Appalachian Regional Commission for another project that will be actually kicked off here within the next 30 days … we also sought some other funding from [name] partners to get some of the design construction costs covered for the landscape architects and the engineers to develop plans. (Participant 2.3)

There were also several sources of fiscal resources mentioned as facilitators for general PSE change. These included federal funds (e.g., American Rescue Act, Infrastructure Investment and Jobs Act, American Rescue Plan Act Coronavirus State and Local Fiscal Recovery Funds) used to address other infrastructure issues like broadband expansion and sewer system updates and local tax revenue generated from tourism increases, including new businesses and short-term vacation rentals. Though not directly impacting PA PSE change, these could provide additional revenue to the local government to use for PA PSE change or free up existing resources to use for PA PSE change.

Systems-Human Resources. Human resources were described as facilitating PA PSE change in multiple ways, primarily through the engagement of local volunteers to increase organizational resources and offset the lack of fiscal resources. As one participant (5.1) said, “They have a bunch of volunteers over [there], and I think most of that is done voluntarily. Parks and recreation. They help out a little bit on things, but they don't have the funding to do much.” Volunteers played a vital role in leading programming, providing manual labor for environment change, maintaining PA facilities, and raising funds to build or maintain PA facilities. For example, participants in multiple counties described how local residents were stepping in to help raise funds to build facilities for incomplete projects (i.e., a skate park, a tumbling and gymnastics center at a local park) or to reimagine government-managed parks and recreation facilities as facilities managed by volunteers with users’ donations. Human resources in local organizations were also being augmented with volunteers and AmeriCorps members. Specifically, volunteers created a walking trail at a faith-based community resource center and, in another county, an AmeriCorps Vista member was hired by the Convention and Visitor’s Bureau to “develop a trail alliance and start creating more knowledge of what trails we have, finding a core group of people to keep the trails up and going, you know, to clean, get it cleaned and things like that.” (Participant 8.1)

Similarly, human resources were vital to General PSE changes in that the capacity of local organizations, such as libraries, churches, and non-profits, was augmented by volunteers. Specifically, volunteers conducted community cleanups, served as members of organizational boards of directors, and helped address homelessness and substance use disorder. While these did not directly impact PA, they could free up organizational resources for additional priorities, including PA. As one participant (2.2) stated, “Of course, there's throughout the county, great volunteer base for lots of different organizations. So I would like to mention that first, because without the volunteers, you know, things just don't happen.”

Systems-Informational Resources. Participants mentioned informational resources related to PA PSE change only three times – just once as a facilitator. In that case, a city’s five-year master plan was described as a generator of ideas for locations of bike lanes.

Informational resources, specifically organizational use of social media, local newspapers, and radio stations to share information about events, were mentioned as facilitating General PSE change. Though mentioned as impacting general information, these facilitators could apply to sharing information about PA as well.

Systems-Organizational Resources. Organizational resources were the most frequently mentioned facilitator of PA PSE change, primarily due to a long list of independent organizations described by participants across interviews. Organizations mentioned included schools/school districts, local hospitals and health departments, small businesses, faith-based organizations, county and city governments, libraries, non-profit organizations, medical providers, Family Resource Networks and other coalitions, state parks, senior centers, and trail-focused groups.

These organizations engaged in several PA systems and environment changes, including supporting PA programs by providing necessary trainings to run them, establishing youth sports leagues, building additional amenities at existing PA facilities (e.g., lighting, restrooms, benches, kayak launch that is accessible for people with disabilities), hosting or assisting with relevant events, providing labor to construct or maintain facilities (e.g., to construct sidewalks, green spaces), and allowing creative reuse of abandoned facilities (e.g., car dealership, high school building and sports fields, grocery store) for PA programming. These short-term organizational efforts were used in County 6 to support longer-term changes that have positively impacted culture and, in turn, sustainability for a particular activity. They hosted competitive collegiate and adult tennis tournaments at recently renovated tennis courts to increase participation of local adults and youth in tennis and, as a result, pickleball. Facilitators of large-scale PA environment change also included working across organizations to collaborate on projects, especially those that span multiple jurisdictions (e.g., a regional rail-trail and water trail), and creating robust, long-term plans for communities to follow (e.g., historic downtown walkability plan).

With respect to facilitating General PSE change, local organizations were described as facilitating cross-sector, intercounty, or regional collaboration and communication, resulting in increasing trust in community development activities. Local Health Departments and Family Resource Networks were specifically mentioned in this regard. The trust and collaborations that these groups develop have been transferrable to other initiatives, including PA PSE change; rehabilitating or removing dilapidated structures; and addressing substance use disorder, homelessness, and food insecurity. Such cooperative collaboration on public health issues is vital to mitigating the interjurisdictional and interpersonal barriers that also prevent PA PSE change.

Systems-Physical Resources. Physical resources were rarely mentioned across interviews. When describing these, participants focused on the provision of supplies (e.g., yoga mats) that would eventually wear out or donated spaces to use for free (e.g., vacant grocery store) that could be withdrawn if the owner was able to find a paying tenant.

Environmental Factors. Though infrequent, when participants described environmental factors, they mentioned the beauty of the natural environment as a facilitator of PA environment change. That is, in places of natural beauty, trails were constructed to allow people to hike and appreciate the natural environment. Interestingly, PA facilities and other built environments were identified as a facilitator of further environment change. That is, environment change was both a result of policy and systems change *and* a facilitator of additional environment change. Two examples illustrate this. One participant (3.1) described how the renovation of an abandoned school building into a community center sparked additional built environment change vis-à-vis a walking track and new pool. A second example illustrates the powerful impact of a mini-contract that helped fund the renovation of roughly one-third of an acre abutting empty parcels at the end of the town's main street. The construction of a small splash pad led to the installation of a pavilion, a small climbing wall, community gardens, and a paved path to the river:

> As far as an exciting project, the project at the end of [town name] with little [park name], people are very excited about that they were very excited about, I mean, I was down there this weekend to put the tables under the Farmers Market shelter, and there were kids came to play in. So that has been very much a light of hope within our community, something positive and pretty that came to the main street, which has been a long time since we've seen. So I think that has very much a positive impact. And I think it helps with the community's mindset that people want to invest still in (town name) and that they talked about, like, that someone's interested. (Participant 4.1)

Interpersonal Factors. Interpersonal factors were rarely mentioned as facilitators of PA PSE change and, when mentioned, participants largely focused on the culture around a specific sport or recreational activity. For example, a participant (2.1) in a county that has been part of the development of a roughly 100-mile, multi-county water trail, said "And we've got a lot of people that like to kayak in this county, too. So you know that we're looking at various places to be able to put kayaks in and take kayaks out." The foundation that oversees that trail commissioned a trail town plan that includes design ideas for multiple river access points; 14 already exist.

Interpersonal facilitators of General PSE change included discussion of positive relationships among local politicians, business leaders, and community groups; willingness among political leaders to try novel ideas; and a focus on the common good. For example, one participant (1.3) mentioned the involvement and community focus of the Chief Executive Officer (CEO) of the local hospital as a key to community development. Another participant (7.2) mentioned their county as one of the first two in the state to

develop a comprehensive plan. While these two factors are not specific to PA PSE change, they could lead to such changes. The CEO guides the hospital's community health improvement plan, which included PA-related PSEs (e.g., hospital programming, community events, hospital fitness center policy); the comprehensive plan includes PA-related policies and built environment recommendations.

Barriers

Policies. Formal, government policies were not mentioned as a barrier to PA or General PSE change. However, organizational policies (e.g., hours of operation, minimum age to access a facility) and bureaucratic delays in implementing MOUs or releasing government funding for environmental changes were described as barriers.

Systems Factors. Systems-level factors were mentioned most often as the barriers to PA and General PSE change. Results for each of the five types of systems resources are described.

Systems-Fiscal Resources. The most frequently described systems-level barrier to PSE change was fiscal resources. Specifically, declines in the coal industry, generally poor economic conditions, and increased poverty have led to decreased fiscal resources in local government entities. This issue has manifested as reduced budgets and staffing of, or complete elimination of, parks and recreation departments, resulting in outdated and damaged equipment, the selling of parkland, and relying on volunteers for basic facility maintenance (e.g., grass mowing). As Participant 1.5 stated: "…our county hasn't had good funding for awhile, things have really went downhill. And so, yeah, parks are needing upgrades. And I think if they were upgraded, more people would come to them."

Creative collaboration between entities to keep recreation facilities operating, such as the school board owning a pool that is managed by the parks and recreation department, can also present funding barriers. As Participant 4.1 described: "There's a public pool, it's ran by Parks and Rec, that is owned by the school system. And they say, of course, if the levy doesn't pass, they won't be able to pay the utilities on it."

Even when funding is secured, generating a local match (e.g., 20% for transportation funding) can be a struggle if it is required, as highlighted by another participant:

> You know we can come up with a hundred different projects. But it's just getting the funding to … execute those projects and put them in place, that is a barrier sometimes, and with matches in particular, in one section of the sidewalk I was just talking about. That we have a grant … the funding is there through Department of Transportation. But the city's gonna have to come up with a $161,000 as a match. So that's problematic. (Participant 1.2)

When discussing fiscal resources as General PSE barriers, key informants mentioned similar concerns with the strain that economic issues and the transition from resource extraction had on local government operations. In addition, the costs associated with the opioid epidemic and substance use disorder have created additional strain on using local government resources for other priorities. Participant 1.6 described the simultaneous occurrence of the opioid epidemic, coal mine closures as a "perfect storm" resulting in the county losing half of its revenue, schools consolidating, and 150 jobs cut from the school system.

Of note, on the other side of that economic transition, there were different general PSE barriers mentioned. Participant 8.3, in a county that has seen a major boom in tourism in recent years, noted the downside for local residents: "A house will go on the market, and it'll be bought in 2 weeks, and usually by an out-of-state investor." This concern with short-term rentals – despite benefitting local tax revenue – was described as a barrier to affordable housing, limiting the capacity of locals to volunteer (human resources) to support PA organizations because they need to work multiple jobs.

Systems-Human Resources. Population loss through outmigration, substance use disorder, mortality, and aging were the most-frequently mentioned barriers to human resources capacity, though only mentioned generally, not specific to PA PSE change. The strain placed on local residents and organizations to be able to serve their community from these issues, was described in this way:

> People moved away to get jobs. And then with the opioid epidemic, I mean I don't know how to say this, but people died. People went to jail. Families and children lost their loved ones, I mean, family parents lost their sons and daughters, children lost their moms and dads I mean, for a great while. And even still today, I mean, we're still feeling the effects. But so I mean, you know, for a great while, the majority of our students, our school system either had a parent in the grave or in jail or on drugs. So you know, I would say, we're still 50% or more of our kids are raised by someone other than their biological parents because of the drug epidemic. (Participant 1.6)

The reductions in population have limited the overall capacity to such a great extent that every individual that is able to volunteer is vital; thus, when specific people are lost, the impact ripples through the community. For example, the impact of the unexpected death of one town's mayor was described as:

> …when you have a proponent that just fights all the time to try to make things better, and you lose

> that. It's kind of like, 'What are we going to do now?' You know, I know we have to keep going, but it's [difficult]… (Participant 4.2)

Multiple participants also mentioned the reduction in volunteerism resulting from COVID. For example:

> After I retired I've joined the United Methodist Church and the churches through the COVID era lost momentum. Most churches have an average of 10 to 20 members attending. And so we don't have the volunteers that we once had before. It's hard to get that momentum back right now. (Participant 5.1)

***Systems-Informational Resources*.** Informational resources were rarely mentioned as a barrier to PA or general PSE change. The two mentions of informational resource barriers to PA PSE included descriptions of the limited ability to communicate with people in need about PA locations and how the spread of disinformation about a trail's location created a barrier to working across jurisdictions. There was one mention of the general barrier of communicating with local residents due to the changing landscape of media and information dissemination, where local news and radio media outlets were losing out to national media, such as satellite radio and consolidated ownership of newspapers without local reporting.

***Systems-Organizational Resources*.** When describing organizational resources as barriers to PA or General PSE change, main ideas described by participants were the lack of existing organizations, such as parks and recreation groups, to offer programming and the loss of businesses, especially coal companies, that would provide fiscal resources to sponsor programming and sports leagues.

Environmental Factors. Environmental barriers to PA or General PSE change were rarely mentioned. A few participants described the topography as a barrier to PA environment change (e.g., "the slope is too steep to build a handicap [accessible kayak] launch" [Participant 2.3]). General infrastructure barriers limiting the capacity of residents to participate in PSE change are unique to the rural nature of these communities. Participant 1.3 mentioned limited internet access hindered capacity to share informational resources (e.g., health fair, PA facility information) and the natural layout of rural areas causing transportation barriers to participating in meetings or other collaborative opportunities.

***Interpersonal Factors*.** When mentioned as a barrier to PA PSE change, interpersonal factors were either describing a cultural issue (e.g., culture of inactivity and disinterest in PA spaces) or disagreement on the utilization of limited fiscal resources. To exemplify the latter point, a participant described:

> The issue with physical activity is that it is a little politically contested down here. Simply because it is so often affiliated with the high school sports, high school athletics. There's always a belief that high school athletics get too much in our area. That too much funds are spent without much regard when it comes to athletics be it you know your basketball or your football or baseball. We have even seen quite a bit with tennis. Where too much money is being spent here and not elsewhere … you know, we've seen a big push back for this rec center expansion. It's not a lot it's just a very vocal minority. But other health issues or other issues that the community faces that may take priority. (Participant 6.2)

Barriers to general PSE change were mentioned more frequently. These comments generally focused on political infighting over limited fiscal resources, disharmony between politicians and government entities (e.g., city council versus county commission), and a culture characterized as accepting of the status quo by an "old boys network" of leaders that was fearful of change. For example:

> I hate to say this way, but you've gotta play the politics. You know, you've got to convince the cities and the county commission that hardly ever get along to both be on board. There's a lot of, everybody wants their name on the top of the newspaper article. (Participant 6.2)

Noting interjurisdictional disharmony, one participant reported:

> …there's a lot of jealousy, and oh, [town 1 and town 2] will get everything. Yeah, there's 'they're the golden children,' and it's constantly from the [town 3 and town 4] people that [town 1 and town 2] was the golden children that they get everything. And it's not remotely true. (Participant 1.6)

Discussion

These rural key informants shared many examples of how interpersonal, policy, systems, and environment factors facilitated or prevented PSE changes. Our analytical approach allowed us to categorize whether factors were specific to PA or general capacity to engage in PSE change. Noteworthy findings are described below, indicating (1) that many of the PA PSE factors are intertwined and operate cyclically or interactively to facilitate change and (2) that non-PA factors may constrain or facilitate PA PSEs, similar to previous research in rural areas (Abildso et al., 2021; Casanave et al., 2021).

When considering systems factors, fiscal resources were most often described as facilitators of PA Environment change. More specifically, mini-grants were highlighted as beneficial for small-scale changes (e.g., materials for a short walking trail, splash pad, kayak launch). The benefit of mini-grants for PA PSE change have documented the benefit on PA of using funding for systems changes, such as forming walking groups for women (Caperchione et al., 2010), school-based PSE changes

(Moore et al., 2016), programming and physical resources to support programming at community-based organizations (Bobbitt-Cooke, 2005; Tamminen et al., 2014), and community environment change (Gabbert et al., 2023). When scaling up for larger-scale projects, such as those funded by transportation grants (e.g., Transportation Alternatives Program), the local funding match created a significant barrier because of limited fiscal resources, in concurrence with the literature (Stroope et al., 2024; Stroope et al., 2025). Creative organizational collaborations were highlighted as a way to overcome this, but state-level policies could have a positive impact as well. For example, creative state-level transportation department policy was used by Extension in Louisiana to overcome limited local match resources to facilitate substantial funding for built environment change in low-income, rural communities (Stroope et al., 2025).

The existence or absence of organizations was frequently mentioned by key informants. The absence of key governmental agencies that create or manage PA spaces, especially parks and recreation, resulting from limited fiscal resources was a key barrier to PA PSE change. Where organizations existed, the priorities of those agencies were critical determinants of PA PSEs, especially in many of the rural communities that have limited public space (Environmental capacity constraint) and people for PA PSE change. Specific strategies included the use of public works crews to improve sidewalks rather than forcing the property owner to do so in accordance with city ordinances; organizing a soccer league through the Local Health Department when the parks and recreation department couldn't; utilizing abandoned or unused spaces for PA programming; and engaging/training volunteers to lead PA programming. In addition, for multi-jurisdictional environment change (e.g. rail-trail and water trail spanning multiple counties), creative collaborations among political, philanthropic, business/economic development, and tourism/visitors' bureaus can overcome fiscal and other resource limitations.

With respect to general capacities to undertake PSE change, two key factors stood out. First, in concordance with rural PSE literature (Gabbert et al., 2023) general capacity of organizations in rural communities, such as Extension, to engage in PSE change was limited. Providing technical assistance for targeted activities, such as landscape design, reporting or evaluation, and grant writing could overcome capacity issues (Gabbert et al., 2023). Second, deep-seated interpersonal issues, such as partisan politics, competition between jurisdictions, and personal distrust among powerful stakeholders were described as barriers to organizational collaboration, such as is needed to undertake large-scale environment change. Thus, building trust among community members, potentially through a needs assessment and planning process, such as the approach of DNPAO, or through the creation of PA coalitions (Beck et al., 2019; Carter et al., 2019; Wallace et al., 2019) or partnerships (Barnidge et al., 2013) could be beneficial if conducted appropriately and inclusively.

Volunteerism (a human resource) is a strength of the communities represented in this study, though all counties were experiencing population losses and increases in older populations. Organizational support of those volunteers to engage in PA PSE activities (e.g., training volunteers as certified yoga instructors or bike-to-school leaders) is important but population losses are still a major concern because each volunteer is vital to community capacity. Within rural communities, the critical role of people as a valuable resource continues to emerge, both in a facilitative and debilitative way (Abildso et al., 2021; Casanave et al., 2021).

Policy and planning were rarely mentioned as a determinant of systems or environmental change. When mentioned, policies and plans were described as facilitators of large-scale, long-term environmental changes (e.g., a new park or multi-county trail system). In addition, the key informants described the results of policies (e.g., a school track was open to the public in one county but enclosed by a fence and locked gate in another county) or planning activities (e.g., sidewalk improvements being undertaken by a city) without mentioning a specific plan or policy. This finding may be an artifact of the wording of the interview questions and/or the descriptive analytical approach. Alternatively, some of the participants could have been unfamiliar with, or uncomfortable with, topics related to formal planning or policy processes compared to interpersonal or systems factors. Regardless, it is important to highlight the research that indicates that facilitating policy change may be considered an activity outside of the standard practice and organizational goals of Extension that the county agents work within (Washburn et al., 2022). Extension is an entity that historically has focused on direct education for knowledge acquisition and behavior change (Buys & Rennekamp, 2020). Augmenting their strength in direct education with training, funding, and technical assistance to increase capacity to implement PA PSE changes, as provided by the CDC-funded HOP, are critical to addressing the low rates of PA in rural populations in the US.

Limitations inherent in qualitative research apply to this research as well, including the potential biases of the analytical team, intercoder disagreement, and predetermined coding structure. Attempts to limit these included: (1) using an expansive analytical team with diversity of backgrounds and extensive community-based experience; (2) implementing multiple rounds of group- and individual coder training; (3) using descriptive methodology; and (4) conducting multiple rounds intercoder agreement when confirming the initial coding structure and when coding the transcripts after revising the a priori structure. The variation in the number of participants per county, despite attempting to reach equivalence in participation, is also worth noting. This could be a result of the amount of PSE changes or history of positive work on these efforts in the counties, which may have biased the responses toward more facilitators than barriers. Other strengths include focusing a set of the interview questions specifically on PA PSE, the inclusion of general factors affecting community capacity that may impact PA-specific PSE change, and reaching a broad geographic representation of the state by using Zoom

despite limitations of the platform (e.g., poor connectivity, choppy or no video; Oliffe et al., 2021).

In conclusion, this research suggests that PA environment change is both a *result* of policy and systems change and a *determinant* of subsequent PSE changes, systems changes are often the starting point, and that different PSE factors operate at different times based on the scope or maturity of a project. Implementation of rural PA environment change may be facilitated by focusing initially on providing mini-grants or small infusions of additional fiscal resources to facilitate quick, small-scale environment change, and then utilizing multiple systems changes (e.g., additional human resources, new informational resources [i.e., plans], interorganizational collaboration) and policy change (e.g., multijurisdictional MOUs) to facilitate long-term, large-scale environment changes.

Correspondence should be addressed to

Christiaan G. Abildso

West Virginia University Extension

PO Box 6031 | 355 Oakland St.

Morgantown, WV 26506-6031

cgabildso@mail.wvu.edu

304-293-5524

- Christiaan G. Abildso: 0000-0003-1972-2348
- Udday Datta: 0000-0001-6940-3420
- Samantha I. Moyers-Kinsella: 0000-0003-0810-0818
- Daniel Eades: 0009-0007-9680-6525
- Dana K. Voelker: 0000-0003-3973-0943
- Sam Zizzi: 0000-0003-0063-6992

Author Contributions

Conceptualization, C.G.A, S.I.M, U.D., D.K.V., D.E., E.M., S.Z.
Methodology, C.G.A, S.I.M, U.D., D.K.V., D.E., E.M., S.Z.
Investigation - Interviewing, C.G.A, U.D., D.K.V., D.E., E.M., S.Z.
Investigation – Analysis, C.G.A, S.I.M, U.D., D.K.V., D.E., E.M.
Writing – Original Draft, C.G.A.
Writing – Review & Editing, C.G.A, S.I.M, U.D., D.K.V., D.E., E.M., S.Z.
Funding Acquisition, E.M., C.G.A, D.K.V., S.Z.

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