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Rural community systems: Youth physical activity promotion through community collaboration☆

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ABSTRACT

A common way to address rural population health issues is through community stakeholders working together. Youth physical activity (PA) happens in adult-led in-school and out-of-school group opportunities that vary across communities and generally occur in isolated settings. This study explores similarities and differences in rural community system structure and collaborative process variables that help to conceptualize the collaborative impact influencing population youth PA outcomes. Stakeholders (Community 1, $n = 23$; Community 2, $n = 26$) and youth (Community 1, $n = 205$; Community 2, $n = 213$) were recruited in 2018–2019 as part of Wellscapes, a hybrid implementation-effectiveness community randomized trial. A stakeholder survey ($n = 49$) measured community system structures and collaboration processes. Youth completed the Youth Activity Profile to measure PA levels. More Community 1 respondents than Community 2 resided within city limits (73.9% vs. 34.6%). Collective efficacy was significantly greater in Community 1 ($M = 4.0$, $SD = 0.5$) than in 2 ($M = 3.2$, $SD = 0.4$), $p < 0.05$. Perceptions of trust scored significantly greater in Community 1 ($M = 4.1$, $SD = 0.3$) than in 2 ($M = 3.3$, $SD = 0.5$), $p < 0.05$. Though both communities met rural definitions and had stakeholder investment, Community 1 had a greater proportion of PA-implementing stakeholders and more residing within city limits which may have influenced that community's higher scores in collective efficacy and trust. Community 2 had more stakeholders in administrator roles and yielded greater youth PA levels. Unique and common variables of rural communities should be considered in understanding system factors that impact youth PA.

1. Introduction

The promotion of physical activity (PA) among youth is an important community health priority (Kuh and Cooper, 1992; McCormack and Meendering, 2016). PA is critical for preventing many adult chronic diseases like cancer, diabetes, and heart disease, but it also plays a crucial role in mental health and overall quality of life (Physical Activity Guidelines Advisory Committee, 2018; Bianchini et al., 2002). Youth PA has declined over time, and opportunities for activity vary by where youth live, learn, and play (McCormack and Meendering, 2016; Dollman et al., 2005; Bassett et al., 2015 Aug 1). A past with youth roaming independently throughout their neighborhoods choosing where and how to be physically active has been replaced, even in rural communities, by adult-led in-school physical education and out-of-school group opportunities like clubs and youth sport programs (Dollman et al., 2005; Bassett et al., 2015 Aug 1; Umstattd Meyer et al., 2016). The group

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opportunities for PA provided by adults during in-school and out-of-school time vary across communities and generally occur in isolated, un-connected settings (Tassitano et al., 2020 Dec).

Rural communities, some with limited resources and infrastructure, face unique health challenges such as higher rates of obesity and related chronic conditions (Umstattd Meyer et al., 2016). A common way to address population health issues among rural residents is through community stakeholders working together, and this process of combining resources through community collaborations has been shown to be an effective way to promote collective action (Fawcett et al., 2000; Butterfoss and Kegler, 2012). Adults in the community who influence and deliver group opportunities to youth could, collectively, have a greater impact on settings for youth PA if they acted through a community system of collaboration like a local coalition (Butterfoss and Kegler, 2012; Kok et al., 2015; Carson et al., 2014).

Examining system structural and collaborative process variables can help us conceptualize this collaborative impact. Bates and Bacon define a community system as boundary-maintained whole made up of interrelated geographic and social elements, and the structure of a community system is the pattern of arrangement of these elements at a given time (Bates and Bacon, 1972). The National Academies of Sciences, Engineering, and Medicine expanded on this definition in 2017, describing a community system as an arrangement of individuals, families, and groups who share some relationships, values, characteristics, interests, or geography (National Academies of Sciences, Engineering, and Medicine, 2017). Both the structure supporting a community system and the collaboration processes within a community system likely affect the impact of that system on youth group opportunities (Korn et al., 2018).

Based on rural definitions and factors like population and geography, communities on the surface may appear quite similar. Recent research, though, highlights that there may be differences in rural communities worth illuminating (Chinni and Pinkus, 2019). Although researchers have investigated community social systems and collaboration processes that build capacity and promote change (Yang et al., 2012; Nowell and Foster-Fishman, 2011), little work has included exploration of how the geographic structure specific to rural communities relates to the community system social structure and collaborative processes, especially as they relate to youth PA outcomes. The purpose of this study was to explore similarities and differences in the variables of rural community system structures and collaborative processes that help us to conceptualize the collaborative impact influencing population youth PA outcomes.

1.1. Background

Table 1 summarizes selected structural and collaborative process variables within a community system approach for understanding a collaborative impact.

1.1.1. Community system structure

Community structural factors such as geographic, natural, human, cultural, social, political, financial, and built environment resources likely impact the effectiveness of collaboration systems (Korn et al., 2018; Emery and Flora, 2006; Flora et al., 2015). For instance, geographic structural factors such as a community's classification based on size and distance to an urban area and the residency of stakeholders may impact resources and collaboration (Ghelfi and Parker, 1997;

Table 1
Community System Variables.

Term	Definition	Operationalization	Example
Community			
Community Classification	A type of geographic area determined by physical boundaries and size (Geverdt, 2015; Bennett et al., 2019)	A U.S. Census measure of the population and square miles of a community	CitySuburbanTownRural
Community Distance to Urban Center	The distance from a community to resources of an urban area (Geverdt, 2015; Bennett et al., 2019)	A Geographic Information System measure of the proximity in miles of a rural community to an urbanized area with a population of 50,000 or more people	FringeDistantRemote
Community Group Structure			
Community Stakeholder Administrator Role	Stakeholder in a coordinating system representing a role of an adopter of evidence-based practices, programs, or policies who makes decisions about whether to invest resources (Dzewaltowski et al., 2009; Dearing, 2009)	A measure of the type of stakeholder administrator roles and the number of roles each stakeholder reports	% of stakeholders in community group system that are principals, parks and recreation administrators, youth club administrators, health department administrators
Community Stakeholder Implementer Role	Stakeholders in the system representing a role of a group leader who interact with youth in the delivery of practices, programs, or policies in day-to-day interaction with the target audience (Dzewaltowski et al., 2009; Dearing, 2009)	A measure of the type of stakeholder implementer roles and the number of roles each stakeholder reports	% of stakeholders in community group system that are teachers, coaches, youth club group leaders, parent volunteers, health department employees
Stakeholder Residency	The interaction of individuals within their social and physical environments (Barker, 0000)	A measure of whether the stakeholder lives inside or outside the city limits of community of interest	% of stakeholders in community group system that are city residents
Community Group Collaboration Processes			
Trust	A prediction about the likely behavior of others to be trustworthy reciprocators (Ostrom and Walker, 2003; Rousseau et al., 1998)	A measure of the level of confidence of a stakeholder that community group members trust each other to work towards community wellness objectives	Average score of confidence of community group members of beliefs that members trust each other
Collective Efficacy	A shared expectation in the capability of a group to achieve a joint outcome (Carroll et al., 2005; Bandura, 2006 Feb 1)	A measure of the level of confidence of a stakeholder that community group members share a belief that they can organize and execute community wellness objectives effectively	Average score of confidence of community group members that the Community Group can collaborate effectively

Geverdt, 2015). Determining a community's geographic boundary can be challenging though because of the various and conflicting definitions, especially when defining rural areas (Bennett et al., 2019). Policy makers in the U.S. use various definitions of rural communities depending on the agency and program. Population size and distance to a larger population area are general factors considered when establishing rural definitions (Geverdt, 2015; USDA ERS, 2020). How far a rural community is from an urban center influences where the stakeholders reside and work and also impacts the community's access to resources. A gap exists as to whether stakeholder knowledge of, connections to, and investment in the community may vary based on whether or not they live in that community. As shown in Table 1 we conceptualize the physical boundaries of a community and the distance to the resources of an urban area as geographic structure constructs of a community (Ghelfi and Parker, 1997; Geverdt, 2015).

Structural factors, the patterns of inter-relationships of units in a system, that define a collaborative system include bringing together diverse organizations represented by stakeholders with varying roles, and these units (i.e., organizations, stakeholders) may reside both inside and outside of the community of interest (Rogers, 1983). We redefine a coalition as described in our previous work, as a "Community Hub," which is a group facilitating a collaborative decentralized multi-level system of community organizations and stakeholders in bi-directional knowledge sharing and problem-solving to co-create local solutions (Dzewaltowski et al., 2009). A Community Hub involves a facilitating group collectively working towards a common goal with independent and autonomous tasks reaching out to stakeholders who are the lead implementers of practice, program, and policy changes for populational health improvement.

Understanding the social structure of the community system is critical to creating or fostering change. Stakeholders coming to a collaboration typically represent their specific community leadership role (e.g., teacher, health department director, parent, etc.), and they are positioned to personify that role within the collaboration system (Kok et al., 2015). As shown in Table 1, community stakeholders are conceptualized in this study as either organization or program **administrators**, stakeholders in the system representing a role of an adopter of evidence-based practices, programs, or policies who make decisions about whether to invest resources (e.g., principals, parks and recreation administrators, etc.) or lead **implementers**, stakeholders in the system representing a role of a group leader who interact with youth in the delivery of practices, programs, or policies in day-to-day interaction with the target audience (e.g., teachers, youth sport coaches, etc.) (Dzewaltowski et al., 2009; Dearing, 2009). Stakeholders in some circumstances could hold multiple roles. Group leaders are more likely to be the stakeholders leading group opportunities for youth, whereas the administrators may be the policy and program decision-makers. We conceptualize roles of the stakeholders, both types and number, as a social structure construct (Dzewaltowski et al., 2009; Dearing, 2009). We conceptualize stakeholder residency within the community, the interaction of individuals with their social and physical environment, as a geographic and social structure construct (Barker).

1.1.2. Community system collaboration processes

Collaboration processes are both an outcome and producer of community structures. Research on community collaborations has found that benefits of coalitions include increased trust and communication among the community groups that comprise a coalition (Butterfoss and Kegler, 2012). We conceptualize collaboration processes as successful when a Community Group collaboration fosters collective work among independent actors as collective efficacy and trust constructs (Table 1) (Dearing, 2009). Carroll et al., defined collective efficacy as a person's beliefs about a group or organization's capacity (Carroll et al., 2005), and Bandura defined collective efficacy as a shared expectation in the capability of a group to achieve a joint outcome (Bandura, 2006 Feb 1). In their interdisciplinary work to explain how trust develops, Ostrom and Walker defined trustworthiness as a prediction about the likely behavior of others to be trustworthy reciprocators (Ostrom and Walker, 2003). Their work draws from Rosseau and colleagues' definition of trust as a person's vulnerability based upon the positive beliefs about how others will behave (Rousseau et al., 1998).

2. Methods

2.1. Community setting and participants

The Wellscapes Project includes a Type 3 – Hybrid Implementation-Effectiveness community randomized trial (ClinicalTrials.gov Identifier: NCT03380143) where two rural Great Plains communities representative of communities with a concentration of primarily white children (Wave 1) and two communities representative of communities with a concentration of primarily Hispanic/Latino children (Wave 2) in 3rd through 6th grade were chosen for planned recruitment ($n = 4$ communities) (Bandura, 2006). The present study reports on baseline collaboration year data from Wave 1 communities ($n = 2$). Communities were included in the sample if they met the following inclusion criteria: concentration of white, non-Hispanic residents; completed a community health needs assessment and had a community health improvement plan that identified obesity prevention as a priority; were located in a rural area that was distant from an urbanized area (>10 miles); had one public high school; and the health department and school district had agreed to participate in the study. The advantage of selecting communities with these characteristics to meet research goals was that youth out-of-school organizations and settings (e.g., afterschool programs, youth sports, etc.) were well-defined. The focus was to define a rural community based on a social system of in-school and out-of-school places where children live, learn, and play; therefore, our concern was that the community was far enough from a major population center that children did not typically travel out of town for group activities. We required a population large enough to house a public-school district catchment area with one public high school and a distance greater than 10 miles from an urbanized area. Our population and distance classifications were drawn from rurality criterion from the Department of Education Rural and Low-Income School Program (RLIS) based on the National Center for Education Statistics (Eligibility – Rural and Low-Income School Program, 2020). Distance was classified as Town, Distant; Town, Remote; Rural, Distant, and Rural Remote (Flora et al., 2015). Eligible participants were all 3rd through 6th grade children participating in sampled community organized youth group opportunities at school, afterschool programs, youth clubs, and youth sport programs.

Prior to a baseline collaboration year, communities and community groups nested within were randomized to receive one of two different community improvement processes (Wellscapes, Standard Practice) over a two-year period (Baseline year, Intervention year). As one element of the interventions, the research team collaborated with the local health department to facilitate the formation of a Community Group of stakeholders (e.g., administrators, teachers, coaches, club leaders, and afterschool program leaders) in each community as part of the baseline year of the community randomized trial. A health department local coordinator recruited administrators and group leaders by inviting them to Community Group workshops. Original group members identified additional community members affiliated with opportunities for PA in the community and invited those individuals to participate in the Community Group. Throughout the baseline year, the health department coordinator and existing group members continued to reach out to organizations with aims related to those of the community youth PA intervention to invite them to participate. Briefly, during the baseline year stakeholders from each Community Group participated in one of two different four-time yearly workshops with protocols targeting different capacity improvement processes. The objective of both communities' baseline year was developing capacity to increase PA in youth,

leading to scaled intervention in year 2. The first Community Group (Standard Practice) protocol followed five key conditions of the Collective Impact approach: a common agenda, shared measurement, mutually reinforcing activities, continual communication, and support from a backbone institution (Kania and Kramer, 2011; Wolff et al., 2017). The second Community Group (Wellscapes) protocol followed an iterative improvement cycle of Investigate (What is our community wellness landscape?), Design (What community opportunities do we want to design for children and families?), Practice (How do we try to practice implementing our design?), and Reflect (Did we develop our community's wellness landscape?) (IDPR cycle) (Bandura, 2006). While complete description of the interventions is beyond the scope of this paper, the aim here is to report investigation information based on the assumption that the first step in whole-of-community work is to investigate the existing local social system.

2.1.1. Procedures

This cross-sectional study was conducted using responses from a stakeholder survey collected and managed using REDCap (Research Electronic Data Capture), a secure, web-based application designed to support data capture for research studies (Harris et al., 2009). Korn and colleagues demonstrated that surveying community stakeholders is an effective method for measuring the networks, knowledge, and engagement of the community health intervention leaders (Korn et al., 2018). In order to develop a community stakeholder survey, we reviewed the literature and existing stakeholder survey instruments (Korn et al., 2018). We defined a content domain and generated items that addressed key constructs to develop a measure of community system structures and collaboration processes. A team of subject matter experts evaluated whether the items we adapted for our survey accurately assessed the identified constructs. The survey was delivered in two distinct rural communities (Community 1 and Community 2) in May 2019 and evaluated community stakeholder (i.e., group opportunity leaders and Community Group members) experiences with youth PA opportunities. A subset of items was specific to Community Group members.

The study also used youth PA responses from the Youth Activity Profile (YAP) hosted by Iowa State University. The YAP is a validated online assessment tool that is used to assess self-reported physical activity among youth (Saint-Maurice et al., 2015). The YAP is made up of 15 items that assess in-school (n = 5 items) and out-of-school (n = 5) time segments of PA. Sedentary behaviors (n = 5) are also assessed. Community-level weekly average minutes of moderate-to-vigorous physical activity (MVPA) in 3rd – 6th graders was determined using the Spring 2019 YAP.

2.2. Measures

2.2.1. Community system structure

Social Structure. Respondents were asked to check all the community roles that applied to them from the following list of administrators and group leaders: school administrator, schoolteacher, parks and recreation or youth sport organization administrator, youth sport coach, faith-based group leader, youth organization (e.g., after-school program, 4-H, scouting, etc.) administrator, youth organization group leader, health department employee, parent, and other. The number of roles was calculated by summing the responses by participant.

Geographic Structure. The community distance from an urban area was measured in miles. Additional geographic structure features included community population and total area. Distances in street miles from rural to urban areas were calculated using Google Maps (maps.google.com). Populations and total area of each community were obtained from the U.S. Census Bureau 2010 data (Census.gov [Internet]).

Geographic and Social System Structure. All survey participants were asked "Is your home within the [community] city limits" and responded with "Yes," "No," or "Prefer not to answer." This provided a measure of stakeholder residency.

2.2.2. Community system collaboration processes

Collective Efficacy. Data with respect to collective efficacy were collected from the stakeholder survey and were directed to those who identified as part of the Community Group. Following Social Cognitive Theory measurement guidelines, the item asked for participants to respond to the following statement along a 5-point Likert scale from not sure (1) to extremely sure (5): "Community hub members share a belief that they can organize and execute community wellness objectives effectively" (Bandura, 2006).

Trust. Data with respect to trust were collected from the stakeholder survey and was directed to those who identified as part of the Community Group. The item asked for respondents to reply to the following statement along a 5-point Likert scale from not sure (1) to extremely sure (5): "Community hub members trust each other and the Wellscapes Team (Wellscapes coordinator and the health department) to work toward community wellness objectives."

2.2.3. Community system youth physical activity

Under teacher supervision, students reported their PA and sedentary behaviors that occurred in the last week using the on-line YAP. Using calibration equations developed specifically for the online version, the YAP individual-level data were aggregated to provide community-level estimates of daily MVPA. This community population health outcome does not take into consideration demographic differences such as age, gender, race/ethnicity, or socioeconomic status in the samples or in the selected community populations.

2.3. Analysis

Key characteristics of community system structures, community system collaboration processes, and youth MVPA in the two rural communities were analyzed by calculating frequencies and means. Bivariate analyses were conducted by using two-sample t-tests to examine mean differences in Community 1 and Community 2 community system collaborative processes (collective efficacy and trust) and community system youth PA. All analyses were conducted using STATA/SE 15.1 (StataCorp, College Station, TX).

3. Results

The community stakeholder survey was distributed to 74 stakeholders across both communities (Community 1, n = 28; Community 2, n = 46. Sixty-six percent (n = 49) completed the survey (Community 1, n = 23; Community 2, n = 26) with a response rate of 82% from Community 1 and 57% from Community 2. The greater number surveys distributed in Community 2 was due to more clubs associated with the school and more volunteer coaches identified by a recreation coordinator. Community stakeholder survey respondents had a similar average age (Community 1: M = 41.2, SD = 12.7; Community 2: M = 39.5, SD = 9.0). In both communities, most respondents were non-Hispanic white (Community 1: n = 22 (95.7%); Community 2: n = 24 (92.3%). Community system structural variables (social, geographic, and geographic and social) and community youth MVPA, can be found in Table 2.

3.1. Community system social structure

As shown in Table 2, respondents from Community 1 and 2 identified most frequently in group leader roles as teachers (47.8% and 30.8%, respectively), youth sport coaches (56.5% and 34.6%, respectively), and parents (60.9% and 38.5%, respectively). Fig. 1 highlights the stakeholders with multiple roles in each community. Community 1 had more respondents with multiple roles than Community 2 (5 roles = 8.7% vs. 0.0%; 4 roles = 13.0% vs 3.8%; 3 roles = 17.4% vs. 15.4%; 2 roles 34.8% vs. 26.9%).

Table 2
Community System Structure and Community Youth MVPA.

	Community 1 (n = 23)	Community 2 (n = 26)
Social Structure		
Stakeholder roles, No (%)		
In-school		
Administrator	2 (8.7)	4 (15.4)
Group leader (e.g., teacher)	11 (47.8)	8 (30.8)
Out-of-school program administrator		
Parks and Recreation or Youth sport	4 (17.4)	2 (7.7)
Faith-based	0	1 (3.9)
Youth organization (e.g., 4-H)	2 (8.7)	1 (3.9)
Out-of-school program group leader		
Youth sport coach	13 (56.5)	9 (34.6)
Faith-based group leader	2 (8.7)	2 (7.7)
Youth organization group leader	4 (17.4)	4 (15.4)
Health department employee	2 (8.7)	3 (11.5)
Parent	14 (60.9)	10 (38.5)
Stakeholder in Community Group, No. (%)	9 (39.1)	9 (34.6)
In-school administrator	1 (11.1)	3 (33.3)
In-school teacher (e.g., teacher)	2 (22.2)	0
Out-of-school program administrator		
Parks and Recreation or Youth sport	2 (22.2)	2 (22.2)
Faith-based	0	0
Youth organization (e.g., 4-H)	1 (11.1)	1 (11.1)
Out-of-school program group leader		
Youth sport coach	4 (44.4)	2 (22.2)
Faith-based group leader	0	0
Youth organization group leader	2 (22.2)	0
Health department employee	2 (22.2)	3 (33.3)
Parent	6 (66.7)	2 (22.2)
Geographic Structure		
Distance to urban area, miles (GoogleMaps)	63.5 miles	21.2 miles
Population, No.	3,460	2,090
Total area, square miles	2.2	0.8
Geographic and Social Structure		
Live inside city limits, No. (%)	17 (73.9)	9 (34.6)
Community Youth PA	**(n = 205)**	**(n = 213)**
Daily minutes of MVPA, mean (SD)	78.1 (18.8)	86.6 (18.7)

3.2. Community system geographic structure

Based on 2010 Census data, distance to an urban area was greater for Community 1 than 2 (63.5 versus 21.2 miles), and Community 1′s population (3,460) was higher than Community 2′s (2,090). Community 1 had over twice the total area as Community 2 (2.18 versus 0.78 square miles). Community 1 was classified as Town, Remote which means it is territory inside an urban cluster greater than 35 miles from an urban area. Community 2 was classified as Rural, Distant, which means it is more than 5 miles but <25 miles from an urban area and rural because it is territory greater than 2½ miles but less than or equal to 10 miles from an urban cluster.

3.3. Community system geographic and social structure

More Community 1 respondents (73.9%) resided within city limits than in Community 2 (34.6%).

3.4. Community system collaboration processes

As shown in Fig. 2, Community Groups varied by community. Among survey respondents who were Community Group members (n = 18), collective efficacy scored higher in Community 1 (M = 4.0, SD = 0.5) than Community 2 (M = 3.2, SD = 0.4); $t(16) = -3.5$, $p < 0.05$., and perceptions of trust in each other scored significantly higher in Community 1 ($M = 4.1$, $SD = 0.3$) than in Community 2 ($M = 3.3$, $SD = 0.5$); $t(16) = -3.9$, $p < 0.05$.

3.5. Community system youth Moderate-to-vigorous physical activity

In 2018–2019, 465 3rd-6th graders were enrolled in two elementary schools across both communities (Community 1, $n = 238$; Community 2, $n = 227$, and 90% ($n = 418$) completed the YAP (Community 1, $n = 205$; Community 2, $n = 213$). Mean daily minutes per day of 3rd through 6th grade youth (Community 1, n = 205; Community 2, n = 213; 90% of students enrolled in school district target grade) MVPA was significantly lower in Community 1 ($M = 78.1$, $SD = 18.8$) than in Community 2 (M = 86.6, SD = 18.7); $t(416) = 4.6$, $p < 0.05$.

4. Discussion

The purpose of this study was to explore the similarities and differences in the variables of rural community system structures and

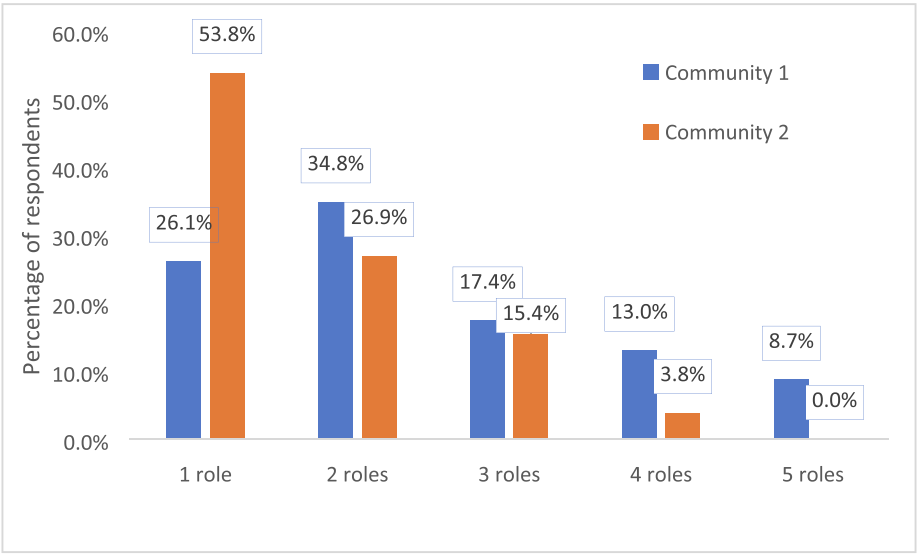

Fig. 1. Respondents and Multiple Roles by Community.

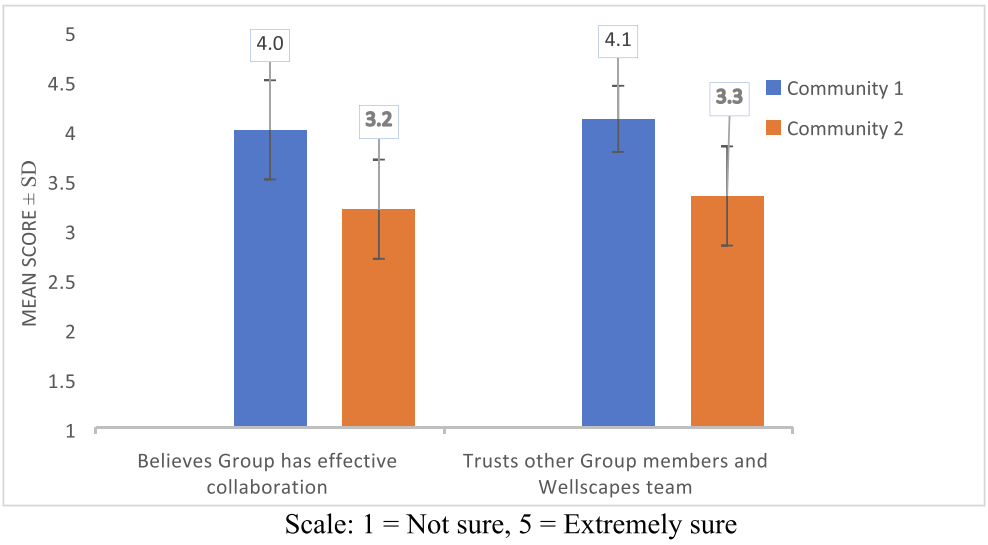

Fig. 2. Community System Collaboration Processes. Scale: 1 = Not sure, 5 = Extremely sure.

collaborative processes that help us to conceptualize the collaborative impact influencing population youth PA outcomes. Results of the study showed that, irrespective of demographic differences, the community population health outcome of youth MVPA was less in Community 1 than in Community 2, by an average of eight and a half minutes per day. Results also highlighted the unique attributes of each community system's social, geographic, and geographic and social structure and differences in each community system's collaborative processes. Although current research suggests childhood obesity is more prevalent in rural settings than urban, PA outcomes by setting have varied (McCormack and Meendering, 2016). A 2018 review found mixed associations between obesity-related outcomes and coalition engagement in obesity prevention interventions (Korn et al., 2018). Understanding the systemic factors surrounding community leadership and collaboration that may be driving these different youth PA outcomes is important.

4.1. Community system social structure

In our study, while there was evidence of stakeholder investment in promoting youth PA in both communities, more Community 1 stakeholder survey respondents identified in the implementer role as group leaders of youth PA. For example, more teachers, youth sport coaches, and parents were the stakeholders in Community 1 than in Community 2. Typically, adults in these types of roles are the individuals directly leading the opportunities for PA (Vandell et al., 2015; Dzewaltowski et al., 2002; Dzewaltowski et al., 2008). Community 2 stakeholder survey respondents were more likely to be administrators of schools and youth programs or health department leaders. The administrators may be the adults making the decisions about PA policies and programs, but they may not directly interact with the youth and impact their PA behaviors (Vandell et al., 2015; Dzewaltowski et al., 2002; Dzewaltowski et al., 2008). This pattern carried through into Community Group membership. Wolff and colleagues argue that a just and equitable collaboration will include community residents as equal partners in a coalition (Wolff et al., 2017). Community 1, with the greater number of group leaders may have experienced a more equitable collaboration but may have had less decision-making power than a coalition made up of administrators. Stakeholder theory suggests that the more power and legitimacy a stakeholder has, the more influence they may have (Kok et al., 2015). Residents of communities that are more geographically isolated may find themselves playing multiple roles within the community. Community 1 had more respondents with more than one community role than Community 2—several were holding four to five stakeholder roles within the community. Worth exploring is whether holding multiple roles in a community system increases stakeholder power and/or creates stronger and more equitable connections within the system.

4.2. Community system geographic structure

Though both Community 1 and 2 were classified as rural and either distant or remote from an urbanized area, there were differences between communities. Community 1 had a greater population and covered more than twice the area as Community 2. Community 2 had a shorter distance to an urban area than Community 1, just over 21 miles versus over 63 miles. Simple urban versus rural classifications may not provide enough detail to account for such geographic boundary variability as seen in Communities 1 and 2 in our study. A 2014 study of disparities in mortality between urban and rural areas found the degree of disparity varied along the rural–urban continuum, indicating that rural places have ample heterogeneity (James, 2014). Also consistent with our findings, the American Communities Project in a recent report highlights the diversity of the geographic landscape of rural America (Chinni and Pinkus, 2019).

4.3. Community system geographic and social structure

While rural residents often must travel distances for resources, the distance to the nearest urban area was greater in Community 1 than Community 2. More adult stakeholders resided within the city limits in Community 1 than in Community 2 (73.9% versus 34.6%). It is possible that because Community 2 was only 21 miles away from an urban area, adult stakeholders from that community chose to live in the urban area setting. This geo-social dynamic of residency may impact the number of roles that stakeholders assume and their relationships within the community system with non-residents less likely to take on additional roles. In addition, stakeholders in Community 2 attended Community Group quarterly workshops less consistently. Grounded in the work of Barker, a place-based social ecological model suggests that individuals interact with their social and physical environments in behavior settings and that healthy behaviors will result from the development of healthy places (Dzewaltowski et al., 2002; Dzewaltowski et al., 2008). Coalition research indicates that bringing multiple and diverse organizations and stakeholders together can drive systems change (Dzewaltowski et al., 2002; Dzewaltowski et al., 2008), and, as seen in the variety and number of roles reported, the Community Groups in both communities reflect

that diversity. It is unclear though whether representatives of settings within a community who are not residents will be able to successfully drive systems change. Stakeholders may be more invested in creating healthy places in settings where they themselves live, work, and play in multiple roles.

4.4. Community system collaborative processes

Our study found that the Community Group that had more members that had more who were community residents reported higher scores for collective efficacy and perceptions of trust. In more isolated rural community systems, community members may frequently "rub elbows" by working and living near each other. Collective efficacy may indeed be driven by stakeholders' community investment due to community system structural factors such as residency and distance to an urban center. The stronger feelings of trust and beliefs in collective efficacy in Community 1 may have been strengthened by the fact that members lived closer to each other and interacted in multiple ways over time within the community. In their work on trust and reciprocity, Ostrom and Walker posit that trust is an essential component of effective collaboration, and (Ostrom and Walker, 2003) trust is a learned interaction that can be developed over time and when there is an expectation due to prior experience. Community 1 respondents, because they lived in closer proximity to each other, may have had more familiarity with other Community Group members which impacted their collective efficacy. A *Coalition Model for Community Action* describes how community members are more likely to support community programs when they themselves have had input into their development and implementation (Butterfoss and Kegler, 2009).

Results of the study raise important questions about the link between the community system structures, positive collaborative processes, and the impact of a coalition on youth PA. Perhaps adults in administrator roles, as seen in Community 2, have the decision-making power and salience to impact a Community Group more quickly and effectively through program or policy changes than a Community Group made up primarily of group leaders—no matter the trust and collective efficacy in the group. Adopted grasstops changes in the system may not effectively flow to the grassroot implementers who lead management of dynamic day-to-day context changes in behavior settings that youth interact with. Collaborations should likely include both community administrators and implementers to best facilitate implementation of evidence-based programs, policies, and practices. The Comprehensive School Physical Activity Program (CSPAP) conceptual framework recognizes the importance of a coordinated team housed in the school system made up of administration, group leaders, and community members in promoting youth physical activity in schools (Carson et al., 2014). A recent scoping review highlighted how school administrators promote health in their schools through collaboration, advocacy, and support (Webster et al., 2020). Collaborations to impact youth health outcomes can also be housed outside of the school system and bring together organizations and stakeholders from multiple sectors (Butterfoss and Kegler, 2012; Butterfoss and Kegler, 2002). The Wellscapes project is a multi-sectoral coalition—bringing together administrators and implementers from both in-school and out-of-school programs (Intervention, 2020). Further research should explore collaboration and the role of administrators and implementers in out-of-school settings in promoting PA. Finally, results also indicate that stakeholder residency may influence group trust and confidence in their abilities to work together. Community collaborations should include stakeholders that have an investment in the community.

4.5. Limitations

One limitation of this study is that data were collected at one time point after the random assignment to two different interventions at the completion of the baseline year, and therefore provide a static picture of the community systems. Both collective efficacy and trust may have scored differently prior to the implementation of the intervention. Further, the collective efficacy item may not have sufficiently measured efficacy in that it did not inquire about the multitude of specific behaviors required from different roles in the system. The sub-sample of nine community group stakeholders from each community is a relatively small sample; a larger sample may have yielded more robust results. This community population PA outcome does not take into consideration demographic differences such as age, gender, race/ethnicity, or socioeconomic status in the samples or in the selected community populations. A limitation of the significance test is that the p value may be biased due to a lack of homogeneity of variance, but our purpose here was descriptive rather than inferential. We also may see different youth PA outcomes if we were to study the communities over time. In addition, even though youth PA was self-reported using a validated tool, outcomes may not as accurately reflect objective measures of PA. A more in-depth qualitative case study investigating administrator, group leader, and Community Group member perspectives may help us better describe and explain the community system and collaborative processes at play in building community capacity to increase PA in youth. Finally, given that the study explores the social system in only two rural Great Plains communities, results may not be generalizable.

5. Conclusions

This study demonstrates how to approach and study important population health questions about community system social and geographic structures and the interaction between them—especially pertaining to system collaboration processes and collaboration effectiveness outcomes. Though both communities met rural definitions and had community stakeholder investment, Community 1 had a greater proportion of PA-implementing stakeholders and more stakeholders residing within city limits which may have influenced that community's higher scores in collective efficacy and trust. Community 2 had more stakeholders in administrator roles, perhaps with more decision-making power and influence on local PA policies and practices, that ultimately yielded greater youth PA levels. The unique and common variables of rural communities and their interactions need to be considered in understanding system factors that increase youth PA.

6. Ethics approval

The Institutional Review Board at University of Nebraska Medical Center approved data collection procedures in 2018 (IRB #446-18-EP).

7. Consent to participate

The IRB approved the Wellscapes Community Initiative as Exempt, and a waiver for informed consent was approved due to normal educational practice and collection of de-identified data. The randomized controlled trial was approved by the IRB as minimal risk with a waiver of child assent requested. Parents provided informed consent to collect his or her child's name and link the name with their school ID number to link data. Consents forms are available upon request.

8. Availability of data and material

Following NIH and IRB data sharing policies, data will be made available after publication of the main findings of R01CA215420 from the PI David A. Dzewaltowski, Ph.D.

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Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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