



Active Living In Rural Appalachia: Using The Rural Active Living Assessment (RALA) Tools To Explore Environmental Barriers

By: **Adam Hege**, Richard W. Christiana, Rebecca Battista, and Hannah Parkhurst

Abstract

People residing in rural communities are more likely to be physically inactive and subsequently have elevated risks for chronic disease. Recent evidence has shown this could stem from environmental barriers, inadequate programming and policies directed at the promotion of physical activity (PA) in rural settings. The objective of this research was to assess active living features in rural towns and townships ($n = 16$) across seven counties in northwestern North Carolina (NC). The study utilized the Town-Wide and Street Segment components of the Rural Active Living Assessment (RALA) as well as the 2014 American Community Survey results. The assessments were conducted in the summer of 2016 in the rural Appalachia region of NC. Using the RALA town-wide assessment scoring system (0 –100), the range of scores was 18–84, with the mean being 50.06. Three towns had no sidewalks, nine towns had sidewalks on only one side of the main streets, and four had sidewalks on both sides of the main streets. One town was rated as highly walkable, seven towns as moderately walkable, five towns as moderately unwalkable, and three towns as highly unwalkable. The rural Appalachia region of NC offers unique topographic, geographic and environmental barriers to PA. However, our findings indicate many rural towns offer common PA amenities. Future research should utilize qualitative methods and a community-based participatory research approach to more fully understand the challenges with increasing PA in the rural and often isolated Appalachia communities.

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Active living in rural Appalachia: Using the rural active living assessment (RALA) tools to explore environmental barriers[☆]

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ABSTRACT

People residing in rural communities are more likely to be physically inactive and subsequently have elevated risks for chronic disease. Recent evidence has shown this could stem from environmental barriers, inadequate programming and policies directed at the promotion of physical activity (PA) in rural settings. The objective of this research was to assess active living features in rural towns and townships ($n = 16$) across seven counties in northwestern North Carolina (NC). The study utilized the Town-Wide and Street Segment components of the Rural Active Living Assessment (RALA) as well as the 2014 American Community Survey results. The assessments were conducted in the summer of 2016 in the rural Appalachia region of NC. Using the RALA town-wide assessment scoring system (0 – 100), the range of scores was 18–84, with the mean being 50.06. Three towns had no sidewalks, nine towns had sidewalks on only one side of the main streets, and four had sidewalks on both sides of the main streets. One town was rated as highly walkable, seven towns as moderately walkable, five towns as moderately unwalkable, and three towns as highly unwalkable. The rural Appalachia region of NC offers unique topographic, geographic and environmental barriers to PA. However, our findings indicate many rural towns offer common PA amenities. Future research should utilize qualitative methods and a community-based participatory research approach to more fully understand the challenges with increasing PA in the rural and often isolated Appalachia communities.

1. Introduction

Physical inactivity is a global pandemic and public health crisis responsible for over 5 million deaths annually (Kohl et al., 2012; Lee et al., 2012). From an ecological perspective, researchers have suggested four key domains may help to explain physical activity behaviors: recreational opportunities, occupation, household factors, and transportation options (Meyer et al., 2016a; Sallis et al., 2012). While there are vast disparities regarding physical activity, often rooted in the aforementioned domains as well as other social and individual factors, geographic location (rural vs. urban) and the associated living conditions has emerged as a significant characteristic (Hansen et al., 2015; Meyer et al., 2016a).

Evidence has indicated that rural communities have higher rates of inactivity (Martin et al., 2005; Meyer et al., 2016a; Meyer et al., 2016b; Parks et al., 2003; Reis et al., 2004) and obesity (Befort et al., 2012; Bennett et al., 2011; Eberhardt and Pamuk, 2004) when compared to urban settings. Numerous plausible factors contribute to this disparity including increased rates of poverty, limited resources related to health

and health care, transportation challenges, lower population densities, limitations regarding health information and communication, and a lack of recreational and other physical activity promoting amenities, including a further distance to schools and workplaces (Meyer et al., 2016a; Meyer et al., 2016b). However, the majority of the research directed at the built environment and recreational opportunities for physical activity has focused in urban areas with little attention to rural settings (Frost et al., 2010; Meyer et al., 2016a).

In recent years, several assessment tools have been developed and validated for evaluating the aspects of communities related to physical activity; however, most of these tools are designed for urban or suburban areas and not for rural communities (Meyer et al., 2016a). Evidence from urban areas has suggested that connectivity of streets and social amenities, diverse use of land and green space, increased access to public transportation, the presence and condition of sidewalks, and the distance to recreational amenities and parks is associated with increased physical activity (Cain et al., 2014; Perry et al., 2015; Rothman et al., 2014; Saelens et al., 2012; Sugiyama et al., 2013). To address physical activity disparities in rural areas, it is vital to identify and

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understand the aspects of the physical environment that hinder physical activity behaviors. As such, it is critical to develop and make use of tools and measures for comprehending the unique context found within rural counties and towns.

With the goal of evaluating physical activity environments of rural communities, the Rural Active Living Assessment (RALA) tools were developed (Yousefian et al., 2010). The RALA can be utilized to examine the connectivity, built environment features, recreational amenities, and policies within rural settings. However, to our knowledge, only two published studies (Perry et al., 2015; Robinson et al., 2014) have made use of the RALA tools and there is a need to make use of it to further understand the uniqueness of rural communities when it comes to physical activity. One study (Robinson et al., 2014) took place in Alabama and Mississippi, whereas, the other study (Perry et al., 2015) was in Washington state, which are located in different geographic regions of the United States (U.S.) and offer contrasting topographic features. Mountainous locations combined with rurality, such as found in the Appalachia region of the U.S., could present topographic features that add to the challenges of promoting physical activity (Appalachian Regional Commission, 2017). Therefore, the purpose of this study was to use the RALA tools to examine the physical activity environments of rural, geographically dispersed, and mountainous communities within the southern Appalachian Mountains of North Carolina (NC).

2. Methods

2.1. Setting and demographics

Fifty-two possible towns, with populations < 10,000 (Hartley, 2010) in a 10 county region of northwestern NC were initially identified for assessment. These towns were identified through a search using Google Maps. When the study began, researchers quickly established that many of the towns in this region were too closely connected to assess independently. Using the RALA standards as our guide, we limited our town assessments to towns with at least one town center. When towns were within 15 miles of each other, the larger of the two towns was assessed. Therefore, the research team reached a consensus as a group, and in the end, assessed 16 towns in the Appalachia region of NC, which spanned seven counties. To make comparisons regarding demographic makeup across counties and towns and the associated characteristics, investigators made use of the most recently available (2014) American Community Survey (Bureau, 2016) results. Table 1 provides the population of each county and town in relation to the population of NC. In addition, Table 1 displays the educational attainment of the adult (18 years and over) population, the percentage of people below the poverty level, the percentage unemployed, racial make-ups (white vs. non-white), and the percentage of people reporting commuting to work by public transportation, walking, and other means including bicycle. Table 2 provides population density and descriptive characteristics.

2.2. Data collection

The RALA features three components (Hartley, 2010; Yousefian et al., 2010; Perry et al., 2015), and for this study the Town-wide and Street-segment components of the RALA were utilized. We did not make use of the Program and Policy Assessment Tool because we were only concerned with the accessibility and availability of built environment characteristics and walkability/active living components in this study. The Town-wide assessment tool focuses on topography and geographic qualities, schools, town recreational amenities including trails, bike paths, public parks, swimming opportunities, skating, recreation centers and fitness facilities, and playing fields and courts. The Street-segment assessment tool examines multiple walkability and land use measures as well as subjective measures of the walkability and the aesthetics of the town. Specific features in the tool include presence and

condition of sidewalks, street shoulders, safety (traffic lights, stop signs, school flashing lights, speed bumps, and public lighting), subjective traffic volume (high, medium, or low), barriers (highway, train tracks, private property/no trespassing, industrial zone, or natural features), subjective connectivity (yes/no), public and civic buildings (library, museum, police station, church, etc.), commercial buildings (restaurant/bar, gas station, retail, theater, etc.), and subjective walkability and aesthetic (Likert: strongly agree – strongly disagree).

Four members of the research team conducted all of the town assessments (two faculty researchers, one graduate student, and one undergraduate student). Prior to beginning the study, the PI reviewed the literature depicting the use of the RALA and the codebook instrument; the PI then met with the team members on multiple occasions to review and the team also piloted the use of the instruments in one of the nearby rural communities. The study's PI was present for all of the town assessments. In addition, a minimum of two team members (in some instances the PI and one other team member) were present for all assessments. The RALA tool codebook provides specific instructions on how to assess for each of the features involved (Hartley, 2010).

The travel distance to the respective towns for data collection ranged from 20 min to up to nearly two hours. Due to the large land area of the towns that were assessed, most assessments were conducted by automobile rather than on foot. Initially, the towns were assessed individually by team members. The team of two or three then came together to compare results and to make final comprehensive assessments of each town. The assessments were conducted from June to August 2016. The study involved no contact or interaction with human subjects, thus no institutional review was needed.

2.3. Data analysis

For analyses purposes, the scoring guidelines suggested by the developers of the RALA were utilized (Hartley, 2010). The total score for each town could be up to 100, when adding all of the sub-domains (school location, trails, parks and playgrounds, water activities, and recreational facilities). With the Town-wide assessment, a score closer to 100 indicates that the town is more conducive for and supportive of physical activity. Due to the large spatial areas of the towns and the large number of towns being assessed, the Street-wide assessment was conducted from a whole-town perspective rather than by individual streets. The RALA guidelines (Hartley, 2010) call for analyses of each street segment independent of each other. This study, instead, examined multiple street segments, and then compiled one comprehensive street-segment assessment for each independent town. For our study purposes, we were only concerned with town-level data. In doing so, the number of public/civic features (up to 11) and commercial features (up to 11) found in each town were calculated. The following point values were utilized to characterize the dimensions of each town's street segments: sidewalks (3 = both sides of street; 2 = one side of street; 1 = intermittent; 0 = footpath/none); sidewalk condition (1 = poor/fair; 2 = good/excellent); shoulders (2 = sidewalk buffer; 1 = defined shoulder; 0 = none); shoulder condition (1 = poor/fair; 2 = good/excellent); safety features (range: 0–5); traffic volume (3 = low; 2 = medium; 1 = high); barriers present (range: 0–5); connectivity (0 = no; 1 = yes); walkability (1 = strongly agree; 2 = agree; 3 = disagree; 4 = strongly disagree); and aesthetics (1 = strongly agree; 2 = agree; 3 = disagree; 4 = strongly disagree). Lastly, bivariate correlations were used to measure associations between specific features and the subjective assessment of walkability for towns. All statistical analyses were performed using SPSS Version 23.0 (Corp., I., 2014).

Table 1
Demographics.

	County 1	County 2	County 3	County 4	County 5	County 6	County 7	North Carolina
Population, N (±)	17,739 (44)	27,173 (82)	51,903 (90)	82,140 (253)	69,093 (144)	10,974 (119)	15,380 (72)	9,750,405 (1352)
Town 1	647 (n/a)							
Town 2	1078 (207)							
Town 3		1493 (328)						
Town 4		1508 (323)						
Town 5			1153 (258)					
Town 6			360 (113)					
Town 7			1175 (211)					
Town 8				988 (274)				
Town 9				4694 (28)				
Town 10					3559 (22)			
Town 11						2089 (323)		
Town 12	725 (183)							
Town 13							2257 (367)	
Town 14					4198 (297)			
Town 15				3774 (23)				
Town 16				5164 (37)				
Educational Attainment, % (±)								
High school graduate or higher	78.2 (6.3)	80.7 (2.0)	88.3 (1.4)	75.9 (1.6)	74.3 (1.7)	79.6 (3.0)	81.2 (2.4)	85.4 (0.1)
Bachelor's degree or higher	10.8 (4.2)	18.6 (1.7)	38.0 (2.3)	13.4 (1.0)	12.9 (1.3)	17.4 (2.3)	16.4 (2.3)	27.8 (0.2)
Percentage of people below poverty level, % (±)	23.8 (9.4)	20.5 (2.3)	32.1 (1.8)	20.5 (2.1)	24.3 (2.2)	21.2 (3.3)	19.6 (3.2)	17.6 (0.2)
Percent unemployed, % (±)	4.4 (1.1)	5.3 (1.1)	6.5 (1.0)	7.8 (0.7)	7.9 (0.8)	6.9 (1.7)	5.5 (1.3)	6.6 (0.1)
Race, %								
White	92.1	95.5	96.3	91.3	92.5	92.8	97.2	71.5
Non-White	7.9	4.5	3.7	8.7	7.5	7.2	2.8	28.5
Commuting to work, % (±)								
Public transportation	0.0 (1.6)	0.2 (0.3)	1.6 (0.8)	0.1 (0.1)	0.1 (0.2)	0.1 (0.3)	0.0 (0.6)	1.1 (0.1)
Walked	0.0 (1.6)	0.9 (0.7)	6.5 (1.1)	0.9 (0.5)	1.1 (0.5)	1.6 (1.1)	1.3 (0.8)	1.8 (0.1)
Other means/bicycle	1.9 (2.2)	0.1 (0.1)	1.0 (0.6)	1.4 (0.6)	0.5 (0.3)	1.2 (1.0)	0.5 (0.7)	1.3 (0.1)

3. Results

3.1. Town-wide assessments

For town-wide assessment scores (0–100), the mean was just over 50 (50.06), with scores ranging from 18 to 84. Nine of the towns had no school that children could walk to, one town had an elementary school within walking distance, two towns had an elementary school and high school that children could walk to, three towns a middle and high school to walk to, and one town had all three types of schools that were walkable for children; the mean score for the category was 4.63 (0–15). The mean score among the towns for trails, including hiking/walking trails, biking trails, and other physical activity trails was 9.13 (0 – 20). The towns had relatively high numbers of accessible parks and playgrounds, with the mean score being 21.00 (0–25). In terms of access to water activities and recreational facilities, the mean scores were 2.19 (0 – 10) and 13.13 (0 – 30) respectively. [Table 3](#) provides a full

breakdown of the town-wide assessment scores.

3.2. Street segment assessments

Among the 16 towns, the mean number of commercial features was 6.56 (range: 3–10), while the mean number of public/civic features was 6.69 (range: 2–11). Five of the towns had sidewalks on both sides of the road, eight towns had sidewalks on one side of the road, five towns had intermittent sidewalks, and four towns had no sidewalks. Among those that had sidewalks on both sides of the road, the towns generally also had areas where there were sidewalks either on one side of the road or intermittently. Of the 12 towns with sidewalks, seven had sidewalks in excellent or good condition, while the other five were in fair to poor condition. Ten of the towns had defined shoulders on the side of the road. With a possible total of up to five safety features, the mean among the towns was 1.38, with no town having more than three. The traffic volume among the towns was considered medium and with a possibility

Table 2
Town and county characteristics.

Town	Town population density	County population density	General town topography	Presence of “town center?”	General town street pattern
1	N/A	186 sq./mi	Hilly	Yes – 1 distinct	Radial
2	545/sq. mi	186 sq./mi	Hilly	Yes – 1 distinct	Grid
3	780/sq. mi	64 sq./mi	Hilly	Yes – 1 distinct	Grid
4	624 sq./mi	64 sq./mi	Hilly	Yes – 1 distinct	Grid
5	N/A	163 sq./mi	Flat	No	Radial
6	N/A	163 sq./mi	Flat	Yes – 1 distinct	Radial
7	414/sq. mi	163 sq./mi	Hilly	Yes – 1 distinct	Grid
8	904 sq./mi	163 sq./mi	Hilly	No	None
9	909 sq./mi	176 sq./mi	Hilly	Yes – multiple	Grid
10	620.5 sq./mi	176 sq./mi	Hilly	Yes – 1 distinct	Grid
11	738 sq./mi	92 sq./mi	Hilly	Yes – 1 distinct	Radial
12	997.1 sq./mi	47 sq./mi	Hilly	Yes – 1 distinct	Radial
13	557 sq./mi	186 sq./mi	Hilly	Yes – 1 distinct	Radial
14	640 sq./mi	70 sq./mi	Hilly	Yes – 1 distinct	Grid
15	1013 sq./mi	92 sq./mi	Flat	Yes – 1 distinct	Radial
16	792 sq./mi	176 sq./mi	Flat	No	Radial

Table 3
Town-wide assessment scores.

Town	School location (15)	Trails (20)	Parks and playgrounds (25)	Water activities (10)	Recreational facilities (30)	Total score (100)
1	0	9	15	1	11	36
2	0	9	18	0	11	38
3	0	9	20	5	6	40
4	0	9	24	0	15	48
5	0	4	14	0	0	18
6	11	12	23	4	9	59
7	11	17	25	5	26	84
8	0	5	14	1	7	27
9	11	8	23	5	19	66
10	0	9	23	1	9	42
11	10	5	23	4	19	61
12	6	9	23	0	16	54
13	0	16	23	0	9	48
14	15	12	25	5	21	78
15	0	8	23	4	25	60
16	10	5	20	0	7	42
Mean score	4.63	9.13	21.00	2.19	13.13	50.06

of up to five potential barriers, the mean was 0.94, with two being the highest number.

Seven towns were considered to have good connectivity in which segments of the town were connected by sidewalks, bike paths, or trails. The mean rating of the towns' walkability (1–4, with 1 being best) was 2.50 and the subjective rating of the aesthetics was 2.19 (1–4, with 1 being the best). When exploring relationships between specific features and subjective walkability, statistically significant relationships were found with the number of public/civic buildings, sidewalks (particularly on both sides of the street), street shoulders, the number of safety features present, and the subjective connectivity of the towns. The relationships are negative, due to the rating system for walkability (1 = strongly agree, 2 = agree, 3 = disagree, 4 = strongly disagree). Tables 4 and 5 provide the full breakdown of segment characteristics by town and the correlations with the global segment walkability.

4. Discussion

This study of northwestern NC, specifically the Appalachia region, found that among 16 rural towns, there were wide discrepancies in the built environment's support for active living. In terms of the town-wide recreational opportunities, scores ranged from 18 to 84, with only six of the towns scoring over the mean of 50.06. With the recreation amenities, many towns were doing well as it pertains to parks and playgrounds, but the biggest differences occurred with the proximity to school locations, the availability and access of walking and hiking trails, and other recreational facilities.

Table 4
Segment characteristics by town.

Feature	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	T11	T12	T13	T14	T15	T16	Mean
Commercial features	8	9	6	10	7	3	5	3	9	7	7	6	6	8	8	3	6.56
Public/civic features	5	7	8	7	2	3	10	6	3	9	11	10	5	9	7	5	6.69
Sidewalks	0	1	1	1	0	0	3	0	1	2	1	1	2	3	1	1	1.13
Both sides of street	0	1	0	0	0	0	1	0	0	1	0	1	0	1	0	0	0.31
One side of street	0	0	1	1	0	0	1	0	0	1	0	0	1	1	1	1	0.50
Intermittent	0	0	0	0	0	0	1	0	1	0	1	0	1	1	0	0	0.31
Footpath/none	1	0	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0.25
Sidewalk: condition	N/A	2	1	1	N/A	N/A	2	N/A	1	2	2	2	1	2	1	2	1.58
Shoulder	0	0	0	1	0	0	2	1	2	2	1	1	2	1	0	1	0.88
Shoulder: condition	N/A	N/A	N/A	1	N/A	N/A	2	1	1	2	2	2	2	2	N/A	2	1.70
Safety features	2	2	0	0	0	0	3	1	3	2	1	2	3	0	1	2	1.38
Traffic volume	2	1	2	2	1	3	2	3	1	2	2	1	3	2	3	3	2.06
Barriers present	1	0	1	1	1	0	1	1	2	1	0	1	1	2	1	1	0.94
Connectivity	0	0	1	1	0	0	1	0	0	0	0	0	1	1	1	1	0.44
Walkable	3	2	2	2	4	3	1	3	2	3	3	2	2	2	3	3	2.50
Aesthetics	2	1	2	2	2	2	1	3	3	2	3	2	2	2	3	3	2.19

Table 5
Bivariate correlations with global segment walkability.

Feature	r	p value
Number of commercial features	− 0.16	0.54
Number of public/civic features	− 0.64	0.00**
Sidewalks	− 0.74	0.00**
Both sides of street	− 0.71	0.00**
One side of street	− 0.54	0.02*
Intermittent	− 0.37	0.13
Shoulders	− 0.74	0.00**
Number of safety features	− 0.60	0.01*
Traffic volume	0.04	0.87
Number of barriers present	− 0.17	0.51
Connectivity	− 0.54	0.02*

Note. Global segment walkability = perceived walkability by trained raters.

* p < 0.05.
** p < 0.01.

As mentioned previously, while much of the research in relation to the built environment and physical activity has focused on urban areas, the findings have consistently shown a direct association with school walkability and increased physical activity among youth (Davison et al., 2008; Ding et al., 2011; Kerr et al., 2006). Many of the towns in the present study, surprisingly, had numerous offerings for social gatherings and connections in the form of public/civic and commercial buildings (i.e., restaurants) that could lead to expanded social networks. A built environment which promotes social capital has been

established as an important feature of promoting physical activity across all age groups (Gao et al., 2015; Greiner et al., 2004; Legh-Jones and Moore, 2012; Leyden, 2003). As expected, sidewalks were limited and in modest to poor condition and many of the roads had no distinguishable shoulders. However, previous research is conflicted on whether sidewalks may or may not be a significant predictor of increased physical activity in rural areas; there is also the recognition that increased sidewalks in rural settings may not be feasible (Kegler et al., 2015; Kegler et al., 2014; Meyer et al., 2016a; Meyer et al., 2016b).

Interestingly, many of the towns, as perceived by the raters, had a relatively high traffic volume for typical rural settings (Stewart et al., 2016). This most likely was the case due to the assessments being performed in the summer months, when many of these towns, in this particular geographic location, serve as tourist locations (i.e., climate, mountains). However, what was concerning, was that there were very few safety features (i.e., sidewalks, crosswalks, shoulders, etc.) to protect pedestrians and cyclists. Recent research has depicted the importance of building for safety when seeking to promote active living among citizens (Paul et al., 2016; Pollack et al., 2014). In the end, the towns that were assessed in this study were considered to have limited connectivity and were not easily walkable. When assessing for possible associations between the subjective walkability ratings, we found that the presence of public and civic features, sidewalks on at least one side of the road and an increased number of safety features were most strongly correlated with a higher rating of walkability.

To our knowledge, there are only two other published studies making use of the RALA tools. One study (Robinson et al., 2014) took place across 22 towns in Alabama and Mississippi, whereas, the other study (Perry et al., 2015) took place within four towns in Washington state. These two studies examined multiple street segments in each town and compiled the total, unlike our approach in which we took the average across the segments for each town, making it difficult for comparisons. The study in Alabama and Mississippi also sought to make comparisons across the counties (four in each state) and the states rather than at strictly at the town level as we did. In Mississippi, the four towns studied all scored as high as possible for school location (15), while in our study only one town had a perfect score and five other towns had at least two schools in close proximity. The present study compares closely with the study from Washington in relation to access to trails, with our findings only presenting slightly lower scores, but the rural NC towns appear to offer much more in the form of parks, playgrounds and recreational facilities. Likewise, our study corroborates with the Washington study in that there was a significant association between the presence of sidewalks on at least one side of the street, the presence of shoulders, town connectivity and raters' subjective walkability of the towns. What is really unique to our study is the mountainous environment found in the majority of the rural towns that we assessed, which can add to the barriers to in accessing active living opportunities.

Across the seven counties that we assessed, the percentage of adults reporting no leisure-time physical activity ranged from 22 to 33; overall the average in NC for 2016 was 25% (Institute, U.o.W.P.H., 2016). Not surprisingly, the counties also generally had a lower percentage of the population walking or riding their bicycle to work when compared to the state average. Two direct reasons for this would be the lack of available and closely accessible forms of employment and citizens primarily living outside of town limits. The notion that the built environment does not promote active living was the premise of this study, but we found that many of these towns actually had features known to improve activity levels. To this end, population density, as depicted in Table 2 presents a major hurdle as people are so dispersed, it is difficult to provide opportunities that everyone will find accessible. As such, there may be transportation barriers. Also, while there is the recognition that many of the towns have environmental and systems change needs, it appears that some of the towns with recreational features and amenities could be experiencing disconnect in terms of citizens actually

making use of what is available. This could signal a call to improved communication and marketing between public officials and community leaders with their constituents. Building off of this and our other findings, there are several plausible reasons that obviously could go beyond the scope of this study for why there are higher rates of physical inactivity in this Appalachia region of NC and in other rural settings. It could include such factors as educational attainment and health literacy levels (Berkman et al., 2010; Osborn et al., 2011; Paasche-Orlow and Wolf, 2007; Wolf et al., 2007) as well as poverty, economic and social inequalities (Gurley, 2016; Burton et al., 2013; Thiede and Monnat, 2016).

The present study provides useful insight into the challenges with assessing for and promoting active living in rural communities. However, this study has several limitations worth noting. We assessed the town limits of each of the 16 towns, and in reality, a low proportion of citizens actually live within the town limits of rural areas as found in Appalachia. In this study, we did not assess the physical activity of rural residents but rather simply made use of public data already available. In addition, we did not gather perspectives from community members regarding their perceptions of the built environment's role in their ability to participate in physical activity. A major strength of this study is that we made use of a tool specifically designed to assess rural settings such as found in Appalachia and the literature remains limited in published research using the tool. There is a fervent need for more analyses of rural communities in relation to environmental determinants of active living.

This study helped to meet the call to action for more examination of rural active living (Meyer et al., 2016a), but also highlights the need for further research and intervention development in rural communities such as found in Appalachia. Future research should make use of qualitative data, preferably a mixed-method approach with assessment tools such as RALA, to capture a more comprehensive and ecological representation of the factors associated with active living in rural areas. The literature has useful examples of qualitative approaches that could be tailored and combined with environmental assessment data (Chrisman et al., 2015; Edwards et al., 2014; Kegler et al., 2014). One particular and innovative approach which could be utilized and that we seek to use in our next steps is PhotoVOICE (Hennessy et al., 2010; Walia and Liepert, 2012). PhotoVOICE is a qualitative method of research that involves study participants taking photos of their physical environments and expressing thoughts in written form as it pertains to why the photo is related to the topic area (i.e., physical activity). In terms of interventions targeting rural settings, this study also signifies the importance of a systems approach incorporating multiple levels of the social ecology. Building from this, partnerships involving multiple professional disciplines (John et al., 2012) in collaboration with community members such as found in a community-based participatory research (CBPR) would serve as a viable starting point (Barnridge, 2015). Two essential targets for these types of interventions in the rural context found in Appalachia include churches and schools (Greder et al., 2014; Saunders et al., 2014; Year, 2014).

With rural locations facing health disparities at such an alarming rate, it is evident that context specific interventions are needed. This research centered on active living environments could ignite large scale alterations to rural communities with the result of improved health outcomes and quality of life across the U.S. With a growing attention to rural America by our political leaders and policymakers, now may be the time to capitalize on these needed changes.

Transparency document

The Transparency document associated with this article can be found, in online version.

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