



Supporting a rural wellness intervention through assessing and mapping rural physical activity environments

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ABSTRACT

Rural residents are more likely to be physically inactive than their urban counterparts and are therefore at higher risk for obesity and cardiovascular disease. Research has shown that these disparities are driven in part by the physical environment, policies, and programming in rural communities. The purpose of this study was to use the Rural Active Living Assessment (RALA) to assess the physical activity environment of four Midwestern towns and to develop physical activity maps to support Enhanced Win With Wellness, a community-based cardiovascular risk reduction program. The RALA Town Wide (TWA) and Program and Policy (PPA) assessments were conducted in all four towns and are scored from (0–100). The TWA scores ranged from 69 to 96 (mean = 82.25) and the PPA scores ranged from 47 to 70 (mean = 59.75), indicating the towns had more amenities that supported physical activity than policies and programming. Using data gathered from the RALA assessments, digital physical activity maps were created for each town using the Google Maps platform and accessible through QR codes. The maps were advertised through Facebook and flyers to program participants and were viewed 3,073 times during the study period. Our study illustrates how the results from the TWA and PPA can be transformed into an easily accessible map that can be used to reach populations residing in rural communities to increase awareness of physical activity amenities and improve engagement. It is also useful in helping identify gaps in recreational opportunities and to assist in developing policies or programs supporting physical activity.

1. Introduction

Physical activity (PA) promotes physical and mental health while reducing risk for diseases associated with sedentary lifestyles (Perry et al., 2015). Nationally, only 75.7% of adults met the combined aerobic and muscle-strengthening physical activity guidelines in 2017 (Whitfield et al., 2019). Residents of rural communities are more likely to be physically inactive, which in part contributes to higher rates of obesity, cardiovascular disease, and diabetes compared to urban counterparts (Whitfield et al., 2019; Hansen et al., 2015). A number of factors contribute to inactivity within rural communities, including poverty, time constraints, knowledge about how to exercise, limited social support, cultural beliefs, and lack of access to amenities (Chrisman et al., 2015). An increasing body of research has also highlighted the influence

of the rural physical environment on PA behaviors (Hege et al., 2017; Meyer et al., 2016).

Accessibility to safe and local amenities such as parks, playgrounds, and walking trails is central to promoting community health (Hansen et al., 2015; Frost et al., 2010). Rural residents often face unique challenges to accessing PA amenities as a result of the geographical dispersion of rural communities, limited public transportation, and lack of resources to advertise and maintain amenities (Chrisman et al., 2015; Yousefian et al., 2010). Furthermore, some rural residents do not have access to amenities such as sidewalks with adequate safety features, making it difficult for residents to walk outside and explore their communities (Chrisman et al., 2015; Thomson et al., 2019). Even in situations where amenities are present, conditions and perceptions about safety impact use (Kegler et al., 2015; Lo et al., 2017). Research in urban

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areas has shown that similar obstacles can be mitigated through community-level interventions such as developing walking maps to help residents identify safe walking routes or unfamiliar amenities, improve their perceptions of them, and encourage PA using available amenities (Nykiforuk et al., 2013; Kubota et al., 2020; McNeill and Emmons, 2012).

While many barriers in the PA environment are shared among rural communities, regional and town-specific variation necessitates the use of environmental assessment tools to inform community-based public health interventions and policies by identifying existing resources and gaps (Seguin et al., 2017). Moreover, given the current COVID-19 pandemic which has closed gyms and other facilities, identifying low to no cost outdoor PA opportunities that support social distancing are essential for maintaining healthy lifestyles. Several studies over the last decade have shown that the Rural Activity Living Assessment (RALA), is an effective tool to examine the unique PA environments of rural towns and to identify barriers to being active (Hafoka, 2017; Hege et al., 2017; Perry et al., 2015; Thomson et al., 2019).

To our knowledge, results of RALA assessments in the Midwest have not previously been published. Additionally, only two studies have used the RALA to support the development and implementation of community-based interventions (Perry et al., 2015; Thomson et al., 2019). Therefore, the purpose of this study was to use the RALA tools to assess the PA environments of four rural communities in the Midwest and develop PA maps to support the Enhanced Win With Wellness (E-WWW) program, a community-based cardiovascular risk reduction intervention (Khare, 2020).

2. Methods

2.1. Setting and background

The E-WWW program is a collaboration among health systems, academic institutions, and community organizations to reduce chronic disease risk by motivating individuals to improve PA and healthy eating behaviors in rural Stephenson and Carroll counties in northwest Illinois. To assess use and perceptions of PA resources, upon enrollment in the E-WWW intervention, participants (n = 186) completed the 11-item *Environmental Supports for Physical Activity – Long Form* questionnaire (Kirtland et al., 2003). The study was approved by the Institutional Review Board of the University of Illinois College of Medicine Rockford. Among participants, 86% (n = 160) described their neighborhoods as somewhat or very pleasant for walking, 19% (n = 36) indicated having good or very good streetlights for walking at night, and 45% (n = 83) indicated their neighborhoods did not have any sidewalks. In addition, 50% (n = 93) reported using community parks and walking trails for PA; 13% (n = 25) reported using shopping malls for PA or walking programs; and 6% (n = 11) reported using schools in their communities that were open for public recreation activities. Regarding use of recreational facilities for PA, 30% (n = 56) reported using public recreation centers and 50% (n = 92) reported using private recreational facilities. Based upon the limited self-reported use of PA amenities, our team decided to conduct environmental assessments in four towns in Stephenson and Carroll counties with the most E-WWW participants (Lena, Freeport, Mount Carroll, and Savanna) to identify PA facilitators and barriers which could be used to develop interventions to support PA. See Table 1 for town populations and demographics.

2.2. Data collection

Assessments were performed using the RALA, which consists of three tools. The town-wide assessment (TWA) has 33 town characteristic questions that assess topography, layout, and number/type of PA amenities. The program and policy assessment (PPA) includes 20 questions about town and school level policies and programs supporting PA. (Yousefian et al., 2010) The street-segment assessment (SSA) includes

Table 1

Results from the Rural Active Living Assessment and Use of Physical Activity Maps.

Domain (domain score) ^{1,2}	Lena	Freeport	Mount Carroll	Savanna	Mean (SD)
<i>Town-wide assessment</i>					
School location (15)	15	15	5	10	11.25 (4.79)
Trails (20)	20	20	20	20	20 (0)
Parks and play grounds (25)	25	25	22	25	24.25 (1.5)
Water activities (10)	10	6	6	6	7 (2)
Recreational facilities (30)	13	30	18	20	20.25 (7.14)
Total score (100)	83	96	69	81	82.25 (11.05)
<i>Program and policy assessment</i>					
Town policies (10)	0	10	10	3	5.75 (5.06)
Town programs (30)	22	30	12	12	19 (8.72)
School policies (30)	15	15	30	30	22.5 (8.66)
School programs (30)	10	15	10	15	12.5 (2.87)
Total score (100)	47	70	62	60	59.75 (9.53)
Number of physical activity amenities identified	31	60	19	25	
Use of physical activity maps	1, 295	585	424	239	
<i>Demographics³</i>					
Population estimate	2,879	24,119	1,571	2,977	
Median household income	56,367	39,975	56,413	31,710	
Below 100% Federal Poverty Line	8.9%	17.8%	9.6%	15.8%	
Bachelor's degree	14.4%	18.5%	23.8%	17.8%	

Note. 1. The overall score for the TWA and the PPA range from 0 to 100 with higher scores indicating better support for physical activity. 2. The highest score for each subdomain. Lower scores indicate that certain items are not present. 3. Demographic data retrieved from 2019 American Community Survey <http://www.census.gov/programs-surveys/acs>.

28 questions about safety, connectivity, aesthetics, and walkability in specified areas within the town (results not presented).

The RALA was completed over 18 months by one faculty member (PI) and two graduate students. The PI trained the students to use the RALA tools and collect and manage the RALA data. The research team assessed the first town together using all three instruments and met biweekly to discuss progress. Subsequently, at least two independent assessments were performed on each of the remaining three towns using the TWA and the SSA. The PPA was conducted by one student and reviewed by the PI.

Prior to each town assessment, the research team met to review online resources such as town and governmental websites, blogs, Facebook pages, and digital map platforms like Google and Apple Maps. Additional data were collected by talking to community members, local park district staff, and other key stakeholders. These data were used to create a list of amenities and a plan for assessing each town. RALA instruments were implemented according to the guidelines in the RALA codebook; however, photos and corresponding descriptions of each amenity were also collected. After each assessment, the research team met to review the results and discuss any differences. In cases where the amenities were scored differently, the research team reviewed the notes and pictures taken during the assessment and if necessary, repeated the assessment to achieve consensus. Progress was shared with the E-WWW organizational collaborators at monthly planning meetings and their feedback was used to guide further assessment activities.

2.3. Map development and dissemination

Using the data gathered from the RALA tools, online PA maps of the four towns were developed using Google Maps, a free web mapping and navigation application that allows individuals to create customized maps and share them with the public. The research team created maps that consisted of a list of PA amenities grouped by categories (parks, playgrounds, hiking trails, etc.) and geo-tagged using color coded icons. Additionally, brief descriptions, photos, and if available, links for more information were included for each amenity (Fig. 1). Since the maps were developed using Google Maps, they also provided directions. The maps are accessible through the E-WWW and local health department websites or through scanning a QR code with a smartphone (<https://sites.google.com/uic.edu/heart-to-heart-hip/local-resource-maps>). To increase awareness of the maps, they were advertised on the E-WWW Facebook page and flyers were mailed to E-WWW participants.

2.4. Data analysis

The TWA and PPA were scored according to the RALA codebook guidelines. (Hartley et al., 2009) The total score of the subdomains for both the TWA and the PPA range from 0 to 100, with higher scores indicating that towns supported more PA opportunities. Map usage was tracked using the “views” feature of Google Maps. (Table 1)

3. Results

3.1. Town-wide assessment

The TWA scores ranged from 69 to 96 ($M = 82.25$, $SD = 11.05$) (Table 1). Each town had river access, parks, playgrounds, playing

fields/courts, bike paths, and at least one hiking trail. During winter months, two towns had temporary ice-skating rinks and cross-country skiing was allowed on most hiking trails. All amenities in Savanna and Mount Carroll and 90% in Freeport and Lena were in good/excellent condition, indicating they were well maintained. All towns also lacked comprehensive lists of public (town, county, state) and private (fitness centers) PA opportunities. Additionally, some amenities located within one mile of the town center had no sidewalks leading to them and many lacked designated parking. Lastly, Lena and Savanna did not include the addresses of amenities on their town websites.

3.2. Program and policy assessment

The PPA scores ranged from 47 to 70 ($M = 59.75$, $SD = 9.53$). No towns reported having a walk-to-school program and only two had policies requiring new projects to support sidewalks and bike paths. Except in Freeport, there was very little PA programming and limited public transportation options. Only Lena and Freeport had school policies in place allowing for public use of their facilities, but programs were costly, required insurance, and needed to be scheduled to allow for janitorial and facilities staff to be around during and after the rental.

3.3. Evaluation of physical activity maps

A total of 135 amenities were identified in the four towns and were used to create the PA maps shared with E-WWW participants and community members. Despite a limited advertising campaign and the COVID-19 pandemic, which closed some amenities during the study period, maps were viewed 877 times between December 2019-May 2020. After the second advertising period, January-February 2021, maps of the four towns were viewed a total of 3,073 times.

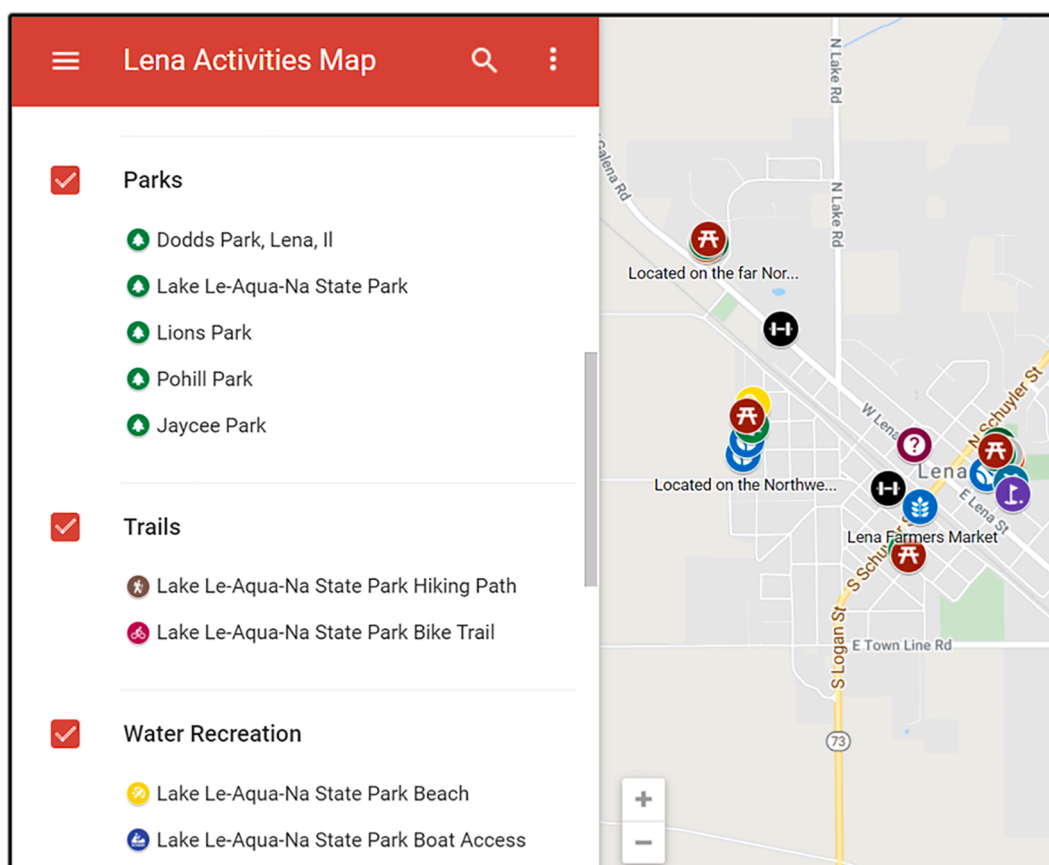


Fig. 1. Physical Activity Map for Lena, Illinois. *Note.* This is the computer version of the Google map and it will appear slightly different on the mobile version. Clicking on the amenity name or icon will open up a window with amenity description, pictures, links to additional resources, and directions.

4. Discussion

As part of a larger community-based intervention to address heart disease risk, this study assessed the PA environments of four rural towns in Illinois. All towns' outdoor amenities including playgrounds, hiking/walking trails, water activities, were frequently in good condition. With the exception of Freeport, which is larger and has more resources, the other towns lacked public recreation centers, which can limit accessible PA opportunities, especially during the winter. Nevertheless, the overall TWA scores for the four towns was higher than has been reported in rural areas of Washington state (Perry et al., 2015), North Carolina (Hege et al., 2017), or Mississippi. (Thomson et al., 2019) Findings suggest E-WWW participants' limited use of parks, trails, and other PA amenities is not primarily driven by lack of availability, but could be associated with the limited amount of PA programming and the social connections that go along with it, which adversely impacts PA (Meyer et al., 2016).

Similar to other studies, our findings illustrate the need for policies and infrastructure support to facilitate accessibility of PA amenities, increase awareness about amenities, and encourage their use (Hege et al., 2017; Meyer et al., 2016; Lo et al., 2017). Specifically, amenities frequently lacked sidewalks, designated parking, and little to no information about them was available. Because rural communities, including the towns served by E-WWW, often lack neighborhood sidewalks and PA programming that encourages the use of amenities, increasing awareness among residents of PA opportunities outside of one's neighborhood is particularly important.

While PA maps have been utilized in urban communities, such maps have often been limited to walking paths (Kubota et al., 2020; McNeill and Emmons, 2012). By mapping all PA resource types and providing detailed information, we anticipate the potential to reach the diverse populations residing in rural communities will increase both awareness of PA amenities and PA engagement. Moreover, these maps can be incorporated into other community-based interventions or could be used to enhance physical activity prescriptions, which have been shown to increase PA (Thornton et al., 2016). This study is limited in that we did not identify who accessed the maps or measured the impact of the maps on PA; however, they were viewed over 3,000 times suggesting that there was interest in learning more about the community resources. Moreover, in Lena the town with highest maps usage, key stakeholders proactively shared the maps, illustrating the importance of community engagement. Future research is needed to assess the impact of PA mapping on PA engagement and policy improvements. Also, the maps were created for E-WWW participants who might be more interested in PA than other community members, and therefore their use should be studied within the general population.

5. Conclusion

This study illustrated that the RALA is a feasible and effective tool for assessing the PA environment and to support the development of PA amenities maps for rural communities. It is also a low-cost strategy for towns or organizations to develop and maintain a comprehensive list of PA amenities for community members, which can be used to support PA interventions. The maps can also be used to visually illustrate where resources are located within the community, raise community awareness about PA, and guide programming and policy development.

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CRediT authorship contribution statement

Matthew Dalstrom: Conceptualization, Formal analysis, Investigation, Methodology, Software, Supervision, Writing – original draft, Writing - review & editing. **Benjamin Guth:** Formal analysis, Investigation, Software, Writing – original draft, Writing - review & editing. **Chelsey Lizer:** Formal analysis, Investigation, Software, Writing – original draft, Writing - review & editing. **Kristine Zimmermann:** Conceptualization, Funding acquisition, Writing – original draft, Writing - review & editing. **Manorama Khare:** Conceptualization, Funding acquisition, Writing - review & editing.

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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