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SHORT COMMUNICATION

Continued development of the Rural Active Living Perceived Environmental Support Scale (RALPESS): preliminary evidence for validity among American Indians

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ABSTRACT:

Introduction: Much of the US adult population does not engage in regular physical activity or meet the recommended guidelines for exercise. Moreover, many rural Americans disproportionately experience lower health status and life expectancy attributed to obesity, poor diet, and lack of physical activity. Evidence supports the role of perceived physical and social-environmental factors as potential influencers of exercise. However, measurement of these influencers, particularly within diverse, rural populations, has been sparse. A substantial number of American Indians live in federally defined rural areas, and many rural American Indians are at elevated risk for being overweight and obese due to physical inactivity. Therefore, this study established the validity and reliability of the Rural Active Living Perceived Environmental Support Scale (RALPESS) within a predominantly rural American Indian sample.

Methods: In this cross-sectional pilot study, the 33-item RALPESS was administered to 130 adults, across 19 rural localities within Oklahoma, who were recruited from community events hosted by local partners of the tribal Head Start program. Confirmatory factor analysis was used to examine the hypothesized factor structure of the RALPESS.

Results: Confirmatory factor analysis showed an adequate fit between the hypothesized model and the data. Analyses produced an acceptable χ^2 goodness of fit index with two degrees of freedom. The comparative fit index and parsimony goodness of fit index were acceptable. The root mean square error of approximation and its 90% confidence interval were also acceptable. Overall, the RALPESS showed suitable internal consistency for the full measure and its subscales, resulting in Cronbach's alpha between 0.82 and 0.96.

Conclusions: This pilot study produced confirmatory evidence that the RALPESS is likely a valid and reliable tool for use with rural American Indian populations. Continued validation of this scale, particularly in international rural communities, will support further investigation into this important public health issue, and may further efforts towards the development and promotion of effective programming to increase exercise engagement.

Keywords:

American Indians, confirmatory factor analysis, exercise, inactivity, perceived environment, physical activity, public health, USA.

FULL ARTICLE:

Introduction

Despite well-known health benefits of physical activity (PA), ongoing concern exists in the USA that the adult population does not engage in regular PA or meet the recommended guidelines for aerobic and muscle-strengthening exercise[1-3]. A recent national call to action to improve PA cited environmental factors as a key strategic focus[4], and researchers have observed significant associations between PA and community environments (eg access to facilities) for decades[5]. As this area of inquiry has matured, scholars from diverse fields have produced an amalgam of intersecting PA research on objective and subjective measures of the built environment[6-8], linking PA to perceived environmental supports[9-12]. However, these objective (eg distance to a facility) and subjective (eg quality of sidewalk maintenance) measures do not always correlate, nor are they necessarily associated with the same PA outcomes[13,14]. Moreover, the locality (eg urban versus rural) of PA appears to attenuate the strength of such associations[15]. This latter discovery is particularly meaningful because people living in rural areas tend to be less physically active than those living in urban areas[16,17]. As part of ongoing research in this area, Umstattd et al developed the Rural Active Living Perceived Environmental Support Scale (RALPESS), for which continued investigation, particularly among diverse populations, is warranted[18].

Because a substantial portion (20.5%) of a diverse group of people known as the American Indians live in federally defined rural areas[19], authors of the present study identified American Indians as an important population with which to continue work using the RALPESS. Rural American Indians (RAIs) are shown to be disproportionately affected by cardiovascular disease, diabetes, and stroke and are at elevated risk for being overweight and obese due to physical inactivity[20,21]. Despite the significant health disparities faced by this population, studies have identified a paucity of research on PA in RAI populations[22]. To address this gap, the present study measures the construct validity of the RALPESS in a predominant RAI sample, while simultaneously addressing three important aims: (1) heeds the call for continued work with the RALPESS in diverse populations, (2) generates additional research on PA among RAI, and (3) adds to the body of literature on environmental supports for rural PA.

Methods

The RALPESS instrument

The RALPESS instrument was originally created by Umstattd et al to measure perceived environmental supports for PA using four-point Likert-type scales ('strongly disagree' to 'strongly agree')[18]. In their development study, following expert panel review and field testing, the RALPESS was subjected to a principal component analysis (PCA) with varimax rotation to identify latent factors[18]. The PCA supported a seven-factor solution consisting of indoor areas (IAs; items 1–6), outdoor areas (OAs; items 7–9), town center connectivity (TCC; items 10–15), town center resources (TCRs; items 16–18), school grounds (SCHs; items 19–21), church facilities (CHUs; items 22–28), and areas around the home or neighborhood (AAHs; items 29–33). Each factor was explained by at least three items, and together the seven factors accounted for 71.62% of the variance, with good subscale consistency[18]. The final 33-item

instrument developed by that research team, along with factor definitions and item descriptions, is presented in Table 1.

Table 1: Confirmatory Structure of the seven-factor (33-item) Rural Active Living Perceived Environmental Support Scale with definitions, item-loadings and internal consistency

Factor (*n*=130)	Item†	Cronbach α
Factor 1 (IA) – Indoor Areas (6 items): perceived indoor areas that could be used for physical activity such as indoor pools, recreation centers, YMCAs, gyms, fitness centers, exercise rooms, sports courts, skate areas, or areas with exercise or sports gear (balls, treadmills, etc.).		
1. My town has private indoor exercise areas (pay to use).	0.70	0.93
2. The indoor exercise areas are nice to use and well kept (there is little or no trash, no broken glass, and equipment works).	0.81	
3. The indoor exercise areas in my town are generally safe.	0.79	
4. My town offers indoor exercise activities (programs, sports teams, classes, lessons, etc.)	0.84	
5. There is equipment for physical activity or exercise at the indoor exercise areas in my town.	0.84	
6. There are choices of activities for physical activity or exercise at the indoor exercise areas in my town.	0.78	
Factor 2 (OA) – Outdoor Areas (3 items): perceived outdoor areas designed for physical activity such as pools, sports fields, sports courts, skate areas, tracks, trails, parks, lakes, rivers, or playgrounds.		
1. Outdoor exercise areas in my town have available restrooms.	0.81	0.80
2. Outdoor exercise areas in my town have water fountains.	0.81	
3. There are sufficient police officers or sheriffs patrolling the outdoor areas in my town where people could be physically active or exercise.	0.62	
Factor 3 (TCC) – Town Center Connectivity (6 items): perceived areas of connectivity in the town center (i.e. the main part of town where the library, town hall, town green, post office, library, or courthouse are located) that are supportive of physical activity.		
1. There are shopping areas and places to eat in the town center.	0.56	0.82
2. There are sidewalks in the town center.	0.50	
3. The sidewalks are nice to use in the town center (they are shaded, there are pleasant things to look at, no trash).	0.86	
4. The sidewalks are nice to use in the town center (they are well kept and not uneven).	0.85	
5. The streets are marked where I should cross in the town center or there are crosswalks.	0.65	
6. The area around the town center has working streetlights.	0.59	
Factor 4 (TCR) – Town Center Resources (3 items): perceived resources in the town center that people can use to be physically active.		
1. There is equipment for physical activity or exercise in the town center at indoor places.	0.75	0.83
2. There is equipment for physical activity or exercise in the town center at outdoor places.	0.80	
3. There are several choices or activities for physical activity or exercise in the town center.	0.76	
Factor 5 (SCH) – Schools (3 items): perceived areas at schools that could be used for physical activity.		
1. The school(s) in my town has playground(s) with equipment.	0.84	0.87
2. There is equipment for physical activity or exercise at the school(s).	0.90	
3. There are choices of activities for physical activity or exercise at the school(s).	0.88	
Factor 6 (CHU) – Churches (7 items): perceived areas at churches that could be used for physical activity.		
1. My town has churches with indoor recreational areas for exercise open to the public.	0.83	0.94
2. My town has churches with outdoor recreational areas for exercise open to the public.	0.87	
3. I can use the indoor church areas for physical activity or exercise.	0.83	
4. I can use the outdoor church areas for physical activity or exercise.	0.81	
5. Churches in my town offer exercise or physical activity programming or activities.	0.82	
6. Churches in my town have public playgrounds with equipment.	0.78	
7. Churches in my town encourage exercise or being physically active.	0.85	
Factor 7 (AAH) – Areas Around Home (5 items): perceived areas around the home or neighborhood (ie yard, streets, parks, fields) that promote physical activity.		
1. There are crosswalks in the area around my home.	0.75	0.86
2. The roads around my home have a place to walk or ride a bike next to the road (shoulder, bike lane, built path, etc.)	0.82	
3. The roads around my home have good lighting.	0.77	
4. There are sidewalks on most of the roads in the area around my home.	0.84	
5. There are sidewalks in the area I live that connect places so that you can walk from place to place (like connecting a store to the post office).	0.85	

Sampling and recruitment

For the present study, participants were conveniently recruited from local events hosted by partners of a tribal Head Start program in rural Oklahoma during the months of March to May of 2013. The final sample consisted of adults (*n*=130) aged 18 years or more who consented to take part in the study and who completed the RALPESS instrument in paper and pencil format. The self-reported biometrics of weight and height were used to calculate participants' body mass index (BMI) during the single administration period. No incentives were provided for study participation.

Data analysis

To test for construct validity, unidimensionality, and reliability of the 33-item hypothesized factor structure[23], data collected were entered in the Statistical Package for the Social Sciences v22 (IBM; http://www.spss.com) for confirmatory factor analysis using the AMOS module. Descriptive statistics were assessed for problematic patterns by checking for out-of-range values, univariate outliers, and reviewing likelihood of means and standard deviations. No participant had greater than 5% missing data.

Ethics approval

The University of Mississippi Institutional Review Board (protocol no. 07-101) approved all recruitment and data collection prior to the study.

Results

Sample

The sample, described in greater detail in Table 2, predominantly

was American Indian (89.1%) and consisted of more females (82.4%) than males (17.6%); most (86.4%) males were American Indian. The average number of total days of regular exercise, a measure of PA engagement for at least 30 minutes per day over 1 week, was 3.22 (standard deviation (SD)=2.78). The average weight for females was 80.90 kg (SD=21.25) with a BMI of 29.86 (SD=7.25), which bordered criteria set for overweight (BMI=25.0–29.9) and obese (BMI≥30.0) based on national guidelines[24]. Using the same criteria[24], the average weight for males was 102.79 kg (SD=31.82) with a BMI of 31.21 (SD=8.38), which meant most men in the sample were obese.

Table 2: Sample characteristics[†]

Characteristic	*n*	%	Mean	Standard deviation
Total days of reported physical activity	130		3.22	2.78
Educational level				
Grades 1–8 (elementary)	1	0.1		
Grades 9–11 (some high school)	7	5.4		
Grades 12 or General Education Diploma (high school graduate)	34	26.2		
College 1–3 years (some college)	59	45.4		
College 4 years or more (college graduate)	27	20.8		
Marital status				
Married	72	56.3		
Partnered/significant other	8	6.3		
Single	31	24.2		
Divorced/separated	16	12.5		
Widowed	1	0.8		
Age (years)				
Male	22		33.52	9.70
Female	103		36.14	12.83
Race/ethnicity				
White	11	8.6		
American Indian	114	89.1		
Other	3	2.4		
Sex				
Male	22	17.6		
Female	103	82.4		
Weight (kg)				
Male	21		102.79	31.82
Female	102		80.90	21.25
Body mass index (kg/m^2)				
Male	21		31.21	8.38
Female	102		29.86	7.25

[†] Total days of reported physical activity minimum and maximum scores were 0 and 7 days, respectively. To be counted as a day, participants reported at least 30 minutes of physical activity for a day.

Statistical analysis

Analytic criteria: Using the established seven-factor solution[18], the RALPESS was subjected to confirmatory factor analysis, where latent variables were allowed to correlate, and all items were modeled to load on their corresponding factors (Fig1). Regression weights, expected parameters of change, and modification indices received examination for areas of model misfit. Model appropriateness was tested against standards established by Stevens[25] and Byrne[26]. Item-to-factor loadings were examined at ≥0.40 specified at the $p<0.01$ level that resulted in a reasonable, non-significant χ^2 goodness of fit index (CMIN=2.00–5.00; $p<0.05$). To assess the differences between corresponding elements of the data to the hypothesized model, a root mean square error of approximation was evaluated between 0.00 and 0.10, along with its 90% confidence interval. The comparative fit index received examination at greater than or equal to 0.95. To assess the least number of variables accounting for the most amount of variance between the data and the hypothesized model, the parsimony goodness of fit index was assessed at greater than or equal to 0.10. Cronbach's alpha was checked against a minimum of $\alpha>0.70$ to indicate a reliable measure[27]. Along with this established criteria, model complexity and theoretical considerations were accounted for based on the suggestion of Marsh et al[28], who cautioned against strict cut-offs for fit indices.

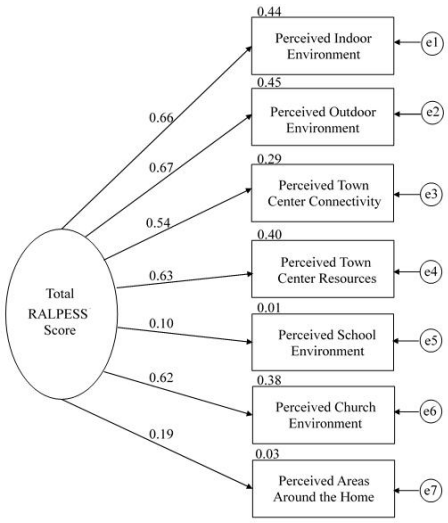

Figure 1: Final model of the Rural Active Living Perceived Environmental Support Scale.

Final model and fit: Results from the confirmatory factor analysis showed an adequate fit between the hypothesized model and the data. Items in the final model were kept if the item-to-factor loadings were ≥0.40 (Table 1). Analyses produced a non-significant ($p<0.05$), acceptable χ^2 goodness of fit index (3.56) with two degrees of freedom (CMIN/df=1.78). The comparative fit index (0.96) and parsimony goodness of fit index (0.46) were acceptable. The root mean square error of approximation (0.08) and its 90% confidence interval (0.02–0.13) were also acceptable. These overall findings, combined with a logical interpretation of the item content as compared to the underlying factors, led to the final determination that the hypothesized model fit the data well and no alternative model was tested. Internal consistencies for the RALPESS are presented in Table 1. Cronbach's alpha for the full measure (α=0.96) and the seven subscales of IA (α=0.93), OA (α=0.80), TCC (α=0.82), TCR (α=0.83), SCH (α=0.87), CHU (α=0.94), and AAH (α=0.86) were acceptable and exceeded the 0.70 criterion.

Discussion

This pilot study produced confirmatory evidence that the RALPESS can be used to measure perceived environmental supports of PA within RAI populations located in the USA. Analyses supported the construct validity of the measure as presented by a 33-item, seven-factor solution. These findings are significant because of not only the relative lack of research on PA in RAI populations, but also a difference in perceived environmental supports for PA in rural areas when compared to urban areas. Continued validation of this scale, particularly in diverse international communities, will support further investigation into this important public health issue of rural physical inactivity. It is also suggested that future researchers assess the predictive and nomological validity, as well as concurrent use of the RALPESS with the Rural Active Living Assessment tools[29], to inform geographically appropriate interventions towards the promotion of PA worldwide. Finally, the authors recommend consideration of the degree to which financial barriers may affect access to some resources, which may be 'identified' as being within the environment, but that are – in reality – difficult to utilize.

Limitations

Despite the valuable contributions of this research, the generalizability of findings should be considered given some limitations. Convenience sampling methods were used to recruit participants specific to the research aims, for which physical limitations are noted to be disproportionally high among RAI populations[30], and likely impacted PA engagement. Most participants in the sample were overweight/obese adult females who had at least a high school/General Education Diploma education and were employed. Although adequate for this study[31], some researchers prefer larger samples for confirmatory factor analysis and note that arranging like items together on instrumentation could lead to the assertion that the construct validity of the measure is part and parcel of the assessment structure. Lastly, self-report data and BMI increasingly have been shown to be less effective[32] and accurate metrics of health.

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