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Original Research Article

Subjectively Measured Occupational Physical Activity and Barriers/Attitudes toward Physical Activity among Rural Communities

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Abstract

Introduction: There is a distinct disparity as it relates to physical activity levels and leisure time physical activity in rural populations. There are many barriers to physical activity accessibility that have been identified, as well as many potential interventions that could be used to reduce this disparity. It has been determined that there is a significant disparity in health outcomes in rural communities, however, due to the heterogeneity of the population, the cause of these disparities is still yet to be identified. The purpose of this study was to better elucidate the reasons for these distinct disparities and to use the information gathered to produce better targeted messaging for those individuals who do not have occupational physical activity as a part of their daily life. **Methods:** A cohort of 102 participants (15 male, 86 female; age range 18-76 years) completed an online survey tool comprising previously validated survey tools such as the International Physical Activity Questionnaire (IPAQ) in addition to a validated general health history and lifestyle questionnaire (HHQ). When considering trends observed in previous research regarding where certain resources are lacking in rural communities, questions were added from the Saint Louis Environment and Physical Activity Instrument. **Results:** Overall survey response rate was 59%, with individuals from 26 different counties across 6 different states throughout the Midwest. T-test analysis showed a significant ($p < .05$) difference between those with heavily active occupations and those reporting sedentary occupations in vigorous-intensity work time, moderate-intensity work time, and walking time throughout the week. Those with heavily active occupations, on average, achieved 261.9 min/wk vigorous activity, 395 min/wk of moderate activity, and 17.3 min/wk of walking. This was significantly greater than those with sedentary occupations who, in comparison, reported only 31.9 min/wk of vigorous activity, 74.8 min/wk of moderate activity, and 5.1 min/wk of walking. Chi-squared analysis assessing the relationship between occupation type and depression prevalence showed no significant difference in depression rates between occupational groups. **Conclusion:** These data suggest that individuals who have a physically demanding occupation fulfill American College of Sports Medicine (ACSM) national activity guidelines, whereas those with sedentary occupations do not engage in adequate physical activity levels throughout the week.

Key Words: Rural Health, Job, Physical Activity Fulfillment, Lifestyle Behaviors, Targeted messaging.

Introduction

The prevalence of obesity remains on the rise throughout the United States. Research by Finkelstein et al. estimated a 33% increase in the prevalence of obesity in the next 20 years¹. Increased body fat content associated with obesity can cause increased risk of developing conditions such as cardiovascular disease, type 2 diabetes, and metabolic syndrome, which could decrease an individual's lifespan and quality of life². Though the risk of obesity appears to be increasing nationwide, certain areas appear to be more affected than others. A study published by Trivedi et al. reported a 5% difference in obesity rates between urban and rural environments with a 30.4% prevalence of obesity in an urban setting and 35.6% in a rural setting³. The authors sought to explain these findings via self-reported questionnaire, and found lower overall physical activity (PA) rates in the rural setting. Only 41.3% of individuals in a rural setting fulfilled federal physical PA guidelines for Americans, while 47.2% achieved fulfillment in an urban setting³. This data is supported by a study published by Whitfield et al. that showed a similar difference between rural and urban PA fulfillment, according to the same guidelines. The study identified that in an urban setting, 25.3% of individuals fulfill PA guidelines while in a rural setting, 19.4% of individuals fulfill guidelines⁴.

The physical setting or environment is one of the differences that may explain the PA contrasts between rural and urban

communities. Increased distance from recreational facilities, poor development of land, and not feeling safe due to traffic or crime are all factors that lead to an increased likelihood of being obese and/or physically inactive⁵. Neighborhood built environment has been shown to be a major reason for the difference between rural and urban health disparities⁶. While the rural environment hinders PA fulfillment, there are aspects to rural living that may be conducive to meeting PA guidelines. Rural occupations such as those in agriculture may provide the PA necessary for fulfilling the American College of Sports Medicine (ACSM) PA guidelines⁷. In a study by Racine et al. it was determined that 1 hr of heavy carrying and lifting completed through occupational PA by farmers fulfilled federal PA guidelines⁸.

There is a limited quantity and quality of research involving PA in rural community-dwelling adults. The reason for health disparities present in rural populations have been difficult to study as a result of the population's heterogeneity compared to their urban counterparts. There is also limited research available involving how one's workplace/occupation plays a role in PA fulfillment, especially in rural settings.

The authors of this study seek to quantify the work done in agricultural and other labor intensive jobs available in rural settings. It is hypothesized that the work done at these jobs is enough to fulfill the federal PA guidelines set forth by ACSM⁷.

Additionally, this study aims to identify individuals in rural communities who do not have a labor intensive job and struggle with accessible resources for PA. The purpose of this study is to discover trends and relationships among occupational PA, exercise habits, and behavioral characteristics in regards to leisure time PA in rural individuals. This information is needed to assess the access to PA in rural communities and what these individuals do with those resources. The information gathered can be used to produce better targeted messaging suggestions for those individuals who do not have occupational physical activity as a part of their daily life.

Methods

Participants

Adults, aged 18 and older, residing in rural communities in the Midwest were eligible to participate in this study. A 'rural community' was defined as any community with a population of ≤ 9999 people. The sample size in this study was 102 participants, 86 female, 15 male, and one who did not report biological sex. These participants ranged in age from 18-76 years old ($M=44.42$, $SD=15.38$). The total sample included participants from 26 counties across six different states.

Experimental Design

Using a convenience sampling method, a cross-sectional survey was utilized through the Qualtrics survey tool (Qualtrics, Provo, UT). For survey distribution and participant recruitment, the Wisconsin Farm Bureau,

Wisconsin Office of Rural Health, and the Wisconsin County Extension Offices were all contacted as resources to contact eligible participants. Additionally, the study was advertised in local newsletters and on social media platforms such as Facebook. Survey responses were collected over the course of 30 days.

After providing informed consent, participants were asked to complete a 68 question survey. This survey tool consisted of questions from three different questionnaires: A general health history and lifestyle questionnaire (HHQ), the International Physical Activity Questionnaire (IPAQ), which was previously validated by Craig et al. and the Saint Louis Environment and Physical Activity Instrument^{9,10}. The Saint Louis Environment and Physical Activity Instrument has not been validated and tested for reliability, however, an earlier version of the instrument was tested for reliability in U.S. women of varying ethnicities aged 40 years and older¹¹.

The survey tool used in this study primarily assessed variables related to general health status and subjective PA data. A question was added to the IPAQ asking participants to state their job title/occupation. Questions taken from the Saint Louis Environment and Physical Activity Instrument were those which aimed to assess attitudes towards PA behaviors, barriers to PA participation, and the social aspect of PA behaviors. The questions

selected from the Saint Louis Environment and Physical Activity Instrument were included to take into account trends established in previous research identifying resources that rural communities lack. Participants were informed they could stop completing the survey at any time. All study procedures were approved by the Institutional Review Board at the University of Wisconsin-Eau Claire.

Procedures

Reported occupations were divided into two groups; 'physically active' and 'sedentary.' The operational definitions for variables assessing PA levels utilized in this study were those established by the ACSM. Physical inactivity is defined as < 150 min/wk of exercise. Participant PA levels were stratified into four categories according to ACSM guidelines as follows: (1) No leisure time activity, (2) less than the minimum goal (<450 MET min/wk), (3) meeting the minimum goal (450-750 MET min/wk), and (4) exceeds PA guidelines (>750 MET minutes/wk). Weight was assessed through Body Mass Index (BMI), which was reported in kg/m². Participant BMI measurements were categorized as either underweight (BMI < 18.5), normal (BMI 18.5-24.9), overweight (BMI 25-29.9), or obese (BMI >30).

Statistical analyses

All statistical analyses were performed using Microsoft Excel and reported as means \pm standard deviation. Data were screened for accuracy, completeness, and

normality. Descriptive data gathered from the survey included demographic information, health characteristics and behaviors, barriers and facilitators to PA within the rural environment, occupation and exercise habits. These data were compiled into frequency tables and displayed as percentages of overall responses. Differences between PA habits of those with physically active occupations and sedentary occupations were compared using independent t-tests with unequal variance. To assess the relationship between occupation type and reported depression, both a two-tailed t-test with two samples assuming unequal variance and a chi-squared analysis were run. Alpha level was set at $p < .05$ to determine significant differences between mean values.

Results

The first set of data presented in Table 1 pertains to participant demographic information for the 102 participants in this study. The second data set presented in Table 2 details the exercise habits of the surveyed participants. Data presented in Figure 1 indicates preferred mode of exercise among participants. It was found that non-walking/running modes of aerobic training (AT) were preferred among participants, with 38.9% of respondents indicating AT (other mode) as their primary mode of exercise. Data representing the distance participants needed to travel in order to get to the nearest exercise facility in their community is presented in Figure 2.

It was found that 95.1% of participants resided >2 miles from the nearest exercise facility, with 59.2% of respondents residing 2-10 miles from the nearest facility, and 32% of respondents residing >11 miles from the nearest facility. Individual responses indicating level of physical activity throughout the week are reported in Table 3. Significant differences were found between physically active and sedentary occupations on vigorous-intensity work time, moderate-intensity work time, and total amount of walking time throughout the week. Those with heavily active occupations, on average, achieved 261.9

min/wk vigorous activity, 395 min/wk of moderate activity, and 17.3 min/wk of walking. This was significantly greater than those with sedentary occupations who, in comparison, reported only 31.9 min/wk of vigorous activity, 74.8 min/wk of moderate activity, and 5.1 min/wk of walking. Data indicating the relationship between depression and occupation type are reported in Figure 3. A p-value between 0.9 and 0.1 was found using a standard Chi squared distribution table. It was found that there was no significant difference in depression prevalence between occupational groups.

Table 1. Demographic information.

<i>Individual-level variables</i>	<i>N</i>	<i>Percent</i>	<i>Mean</i>	<i>SD</i>
Age (yrs)			44.4	15.4
Weight (kg)			78.6	17.4
Sex			1.7	0.1
F	86			
M	17			
Race				
White	101			
Other	1			
Not Reported	1			
BMI (kg/m ²)			27.9	6.2
<18		0		
18-25		35		
25.1-30		42		
>30		25		
Self-Reported Health Status				
Excellent		19.4		
Good		50.3		
Average		20.4		
Poor		0.97		
Terrible		0.97		

BMI= Body Mass Index (kg/m²)

Table 2. Participant exercise habits (% of participants).

	Yes	No	<i>I don't know/ No answer</i>
Do you exercise?	57.8	42.1	
Do you use resources in your community?	30.7	46.8	22.6
Do you feel you can adequately exercise in your community?	84.2	15.8	
If resources were increased would you exercise more?	39.6	26	33.7

Table 3. Activity levels throughout the week by occupation.

	<i>PA Heavy Work</i>	<i>Sedentary Work</i>
Vigorous activity (min/wk)	261.9 ± 146.7	31.9 ± 146.7
Moderate activity (min/wk)	395 ± 186.3	74.8 ± 130
Walking time (min/wk)	17.3 ± 10.2	5.1 ± 7.4

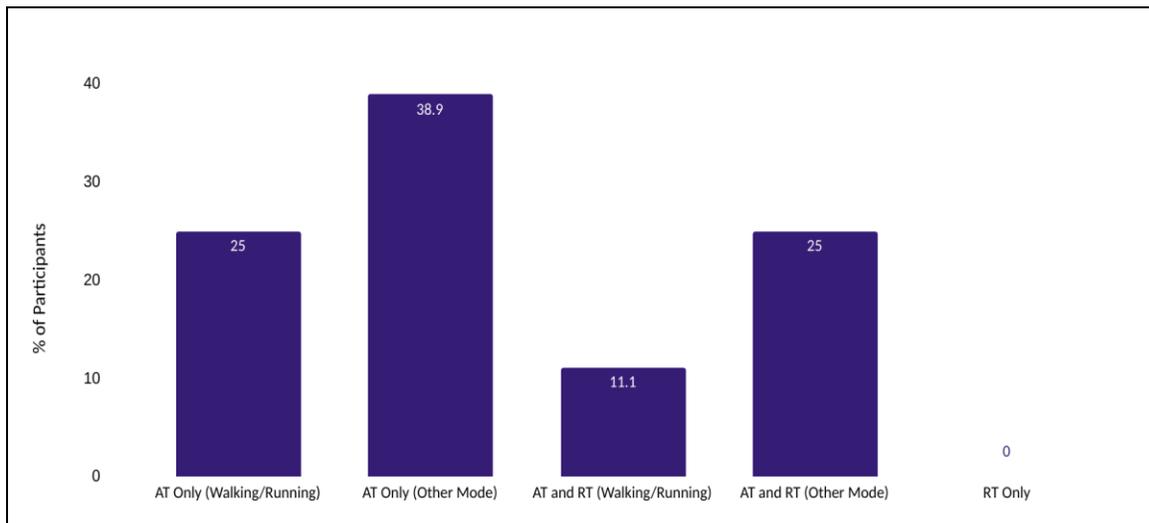


Figure 1. Modes of exercise used among participants.

AT = Aerobic Training and RT = Resistance Training

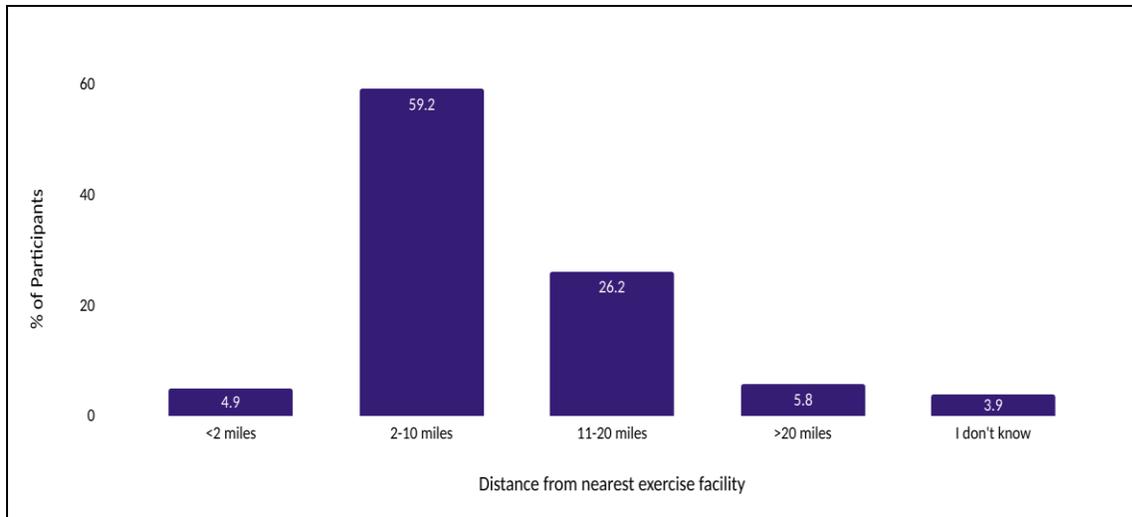


Figure 2. Distance from nearest exercise facility.

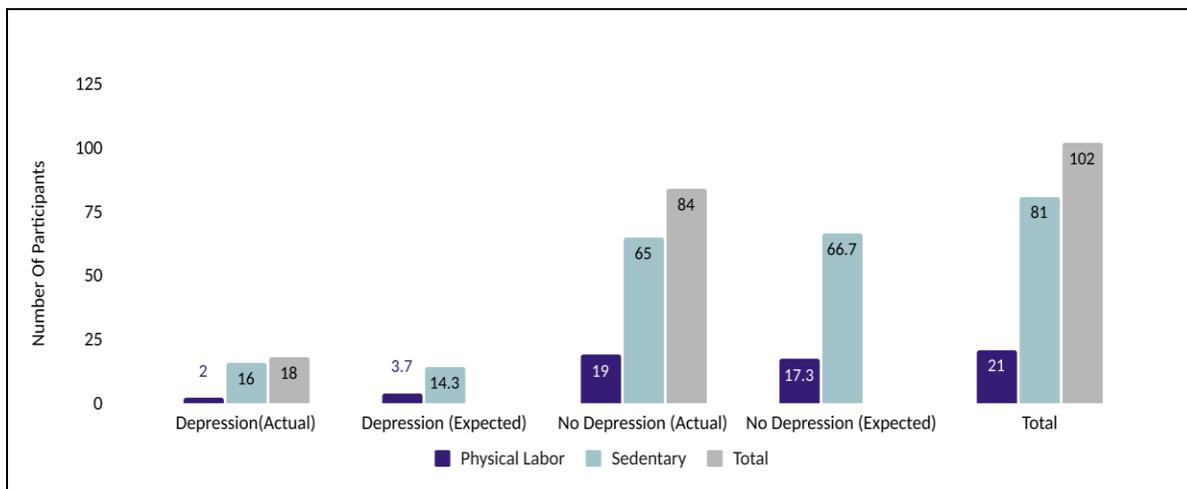


Figure 3. Relationship between occupation and reported depression.

Discussion

The purpose of this study was to discover relationships between occupational PA, exercise habits, and behavioral characteristics in regards to leisure time PA in rural individuals. This study also aimed to identify the rural living individuals who do not have a labor intensive job and struggle with accessible resources for PA. It was hypothesized that the work done in agricultural and other labor

intensive jobs available in rural settings is enough to fulfill the PA guidelines set forth by ACSM.

Occupational PA

Individuals living in rural communities see less fulfillment of the ACSM PA Guidelines compared to individuals living in urban communities⁷. This lack of PA could potentially have lasting health impacts on those in rural

communities as moderate amounts of PA can help to reduce cardiovascular disease risk⁷. Within rural communities, however, our results support the hypothesis that individuals with physically intensive occupations perform sufficient enough activity to fulfill PA Guidelines. Through self reporting, our subjects report an average 395 minutes of moderate PA a week in their physically intensive occupations, fulfilling the PA guidelines in question. These findings are in agreement with Racine and others that found that 60% of farmers reported heavy carrying and lifting for 1 hr a day, similar to the overall time reported in this study⁸. Taking into consideration occupational PA, overall PA fulfillment in rural communities may be higher and more representative of the truth.

While the results show some individuals in rural communities are fulfilling their PA through their occupation, those with more sedentary positions significantly underachieve in terms of PA in all categories and do not fulfill PA guidelines. Steps to increase activity levels should be taken for these specific individuals as sedentary occupation workers are still capable of meeting PA guidelines and therefore reducing their risk of metabolic syndrome¹².

In the occupational setting, employers should be encouraged to provide or incentivize on-the-job exercise opportunities, perhaps targeting those individuals who lack resources in the communities in which they live. There are many advantages of an active and healthy

workforce to companies. Lower insurance rates, fewer sick days, and increased productivity are examples of benefits that can come from this^{13,14}. Increasing the resource availability in rural communities could also help increase PA.

PA and Mental Health

Healthy amounts of PA and movement behaviors are often linked to better mental health^{15,16}. A question in the assessment tool asked participants to indicate if they dealt with depression. Eighteen individuals reported being depressed and, of those, 16 had sedentary jobs. Although the current researchers saw more reported depression in individuals with sedentary jobs, the data did not indicate a significant relationship between depression and sedentary occupations, which was likely due to uneven sample size in the groups. More research is therefore needed to confirm whether increased depression in sedentary workers is related to the significant difference between reported PA in sedentary workers and those with active jobs.

Access to Resources in Rural Communities

A lack of availability of resources for leisure time participation in rural communities may work to reduce the amount of leisure time activity and non-exercise activity thermogenesis (NEAT). A study published by Chrisman et al. stated that, if resources are available within a community, individuals are twice as likely to meet their PA guidelines¹⁷. While resource availability was a focus of the study, the results are inconclusive. The data from this study reports only 15% of the

participants do not feel that they can adequately exercise in their community and only 3% reported not having a safe place to exercise or that they believed resources were too far from their homes. While past studies have shown the largest barriers for PA to involve the built environment involving safety and community access^{5,18,19}. Other studies, including the results from this study, differ. The findings of this study were aligned with other recent findings that reported having no available time to exercise was the largest reported barrier to PA, in addition to the hypothesis that PA is not a priority in rural communities^{17,20}. These inconsistencies in findings between literature are speculated to be multifactorial. One factor could include population size differences among the rural communities involved in the studies as well as other specific demographics of the participants. A study by Brumby et al. found success in a program that allowed farmers to adhere to wellness programs and activities when presented in engaging and relevant forms. Other affirmative research is needed on this topic to determine what resources are best for individuals in rural communities in order to improve adherence to meeting PA guidelines²⁰.

LIMITATIONS

The cohort in this study was mostly white and overly represented by women. Therefore, generalizations should be mindful of this sample. Further studies should be conducted in a more diverse sample, while expanding in additional regions outside of the Midwest. Limitations of this study include the use of a

self-reported survey which could create biased and over-inflated responses of the participants' health or exercise habits. This survey was distributed during the COVID-19 pandemic which limited the ability for in-person data collection measures and the overall scope of the data able to be collected.

Future research directions should seek to consider the use of accelerometers to track activity differences for physical labor jobs and sedentary jobs to more objectively compare differences between the two. There is also a need to look deeper into the metabolic and psychosocial differences between job types. Future action is needed in identifying activity interventions based on the answers from this survey and implementing it into rural communities in order to actively see if physical activity and exercise levels increase

Conclusion

Individuals in rural environments with physically intensive occupations perform sufficient enough activity to fulfill the ACSM Physical Activity Guidelines. However, those with more sedentary occupations may lack the availability and resources to complete the recommended amount of PA. The information gained from this research may better guide messaging and outreach programs that specifically target rural individuals with no occupational PA.

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