



The Role of Physical Activity and Community Engagement in Understanding Mental Health Among Community-Dwelling Seniors

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Caregivers and health practitioners are often looking for good intervention techniques to help community-living older adults to improve their mental health. This study examined the relationship between physical activity and community engagement and their effect on mental well-being among older men and women. Data from National Health and Aging Trends Study from the years 2018 to 2020 were used to explore and test the posited relationships. Partial least-squares structural equation modeling was used to test the developed model that focused on the relationships among physical activity and mental well-being when controlling for demographics in older adults. Social interactions added importance to well-being among older men and women. Physical activity factors and community engagement all together have a positive impact on an older adults' mental well-being. This study provides statistically significant empirical evidence that older adults who are physically active and involved in the community exhibit greater mental well-being than those who isolate themselves.

KEY WORDS: Community, Elderly, Healthy aging, Mental wellness, Physical fitness, Socialization

Mental health is considered a stigma in many societies. Health practitioners believe that mental illness is just like any physical illness where risk can be reduced by preventive medication. For older adults, the risk is higher for several reasons. It could be an effect of chronic medical conditions, such as cancer, diabetes, hypertension, or alcohol/drug abuse, or even a stressful lifestyle. Mental illness is a health condition where an individual is showing signs of emotional distress or has problems with normal functioning or even socializing.¹

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Some noticeable symptoms in older adults with mental illness are deteriorating physical functionality and mild to severe cognitive impairment, which could lead to dementia or depression.² A decline in physical health could be due to lack of mobility, and not being mobile can affect mental well-being.

The phrase *physical activity* is often highlighted when we talk about maintaining health. Most institutions such as schools, colleges, and multinational corporations have activity centers or gyms for their students or employees. Light or extreme physical activity leads to a good blood flow within the body and affects body functioning. Not only does it make the muscles active/flexible, but also the blood flow to the brain keeps us energized and optimistic. Researchers have found that leisure activities also contribute to an individual's health. Involvement in the community, active learning, and visiting a recreational place have many physical and mental health benefits.³ Some examples of leisure activities include yoga, tai chi, and qigong, which foster mental peace, and recreational activity/physical activity. Wang et al⁴ observed that people with acute pain and depression gained more interest in yoga, tai chi, and qigong, and the number of people who were adapting to yoga, tai chi, and qigong went from 5.8% to 14.5% in 15 years.

Physical inactivity, unhealthy eating habits, and not engaging in a healthy lifestyle can lead to cardiovascular diseases, including heart diseases and stroke, even in young age groups. Being overweight or obese does not make it easier to fight cardiovascular disease and reduce the risk of death. They only contribute to but do not mitigate the risk of cardiovascular disease. People's environment and their socioeconomic status have a significant impact on their eating habits and on their motivation to change unhealthy habits.^{5,6}

From an economic standpoint, insurance companies reduce the healthcare cost for adults 65 years and older based on their level of physical activity.⁷ By participating in wellness programs, older adults can reduce their healthcare costs. Heart disease is the leading cause of death in America, and people who are obese or who have other heart diseases are more at risk. A wellness program focuses on preventive medication and measures enabling people to take care of themselves. Although these programs do not have quick results, they offer significant help to mitigate the risk of chronic conditions and benefit in the long run. They often have incentives that make people care for their health and motivate them to live healthy lifestyles and save

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money on healthcare.^{8,9} As we get older, our motivation to participate in outdoor activity might decrease, which could be for a variety of reasons. But it is possible to break the habit and to develop a routine of physical activity, thus taking charge of personal health.

Although there have been studies to prove that a good physical regimen can help with a few mental illnesses, some had an absence of sufficient evidence, and some studies had a generalized application to all age groups.¹⁰ Lindau et al¹¹ conducted a 3-month experiment to demonstrate the improvement in perceived quality of life with good mental health. They found that it is possible to increase confidence in self-care through intervention, and individuals can become proactive in searching for resources for self-care. Although intervention helped engage the small study group in understanding the health benefits of a healthy mind, this happened over time and not immediately. Chi-Fung et al¹² conducted a study to test preventive care intervention at the workplace. They sent educational emails about blood pressure management and cholesterol control that provoked people to check their respective levels and get the care necessary to bring their levels back to normal. The researchers noticed a change in their eating habits and lifestyles. The data were collected in 2004 and 2006 in the HRA (Health Risk Appraisal), a survey of national health promotion activities started in 1989.

Community-based physical activity engagement programs have a positive impact on society. The programs were funded by the National Diabetes Prevention Program and the Centers for Disease Control and Prevention to help the community care for themselves and avoid the risk of cardiovascular disease and other chronic diseases. The more people participated in the community activities, the greater the reduction in Medicare expenditure (ages 60–64 years). They saw an increase in participation when a monetary wellness benefit for qualified health behavior changes is offered.^{13,14}

Vladeck et al¹⁵ conducted a study that supports the need for community-engaged care and support for healthy aging. Their participants included chronic conditions such as diabetes and stroke, but their study identified the difficulty of handling environmental barriers and stress. Community-based engagement services must be specific to aging needs. Periodically measuring participants' health and identifying health risks can help mitigate the susceptibility to chronic conditions. Isolation, without any social interaction, can provoke mental illnesses. Mental well-being can also affect a person's confidence and independence.

This study examines the influence of physical well-being and social behavior on mental well-being among community-dwelling older adults.

METHODS

Data Collection

The data for this study were collected from the National Health and Aging Trends Study (NHATS), an organization

invested in the study of health and well-being of the US aging population since 2011. The participants in this study are Medicare beneficiaries who are 65 years and older. The interviews and data collection techniques are supported by the National Institute of Aging and led by Johns Hopkins University Bloomberg School of Public Health and the University of Michigan. The NHATS data are collected annually, and in-person interviews are conducted to collect detailed information that encompasses physical abilities, daily activities, social behavior, and use of technology or assistive devices and assess cognitive capacity and well-being.

For this study, the data were taken from NHATS round 8 (2018; n = 3910), round 9 (2019; n = 3579), and round 10 (2020; n = 3222). We explored the data to understand the relationship between physical activity, mobility among older adults, community engagement, and mental health. We handpicked the questions from the complete survey. The subtopics include health conditions, community, physical capacity, participation, sensory and physical impairments, and symptoms.

Regression models were built on understanding the relationship between nonsedentary behaviors, physical capacity, physical pain, personal health perception, and mental status. The results of this study identify that physical fitness factors such as physical capacity, lower physical pain, and physical independence are positively related to a person's mental health. The examination of this large data set (total n = 10 711) of adults 65 years and older shows that the motivation to engage in physical activity has a more significant overall benefit and is predictive of the way a person perceives his/her health.

This study is institutional review board approved (IRB-19-191), and the data are publicly available at nhats.org.

Conceptual Model

Physical Capacity

Body strength declines as we grow older. Hence, it is essential to consider the physical characteristics of participants before we can recommend the required exercise. The implications of weakness can be many, starting with food intake, health conditions, and others. Physical capacity measures include the following self-reported items.¹⁶

This construct examines the participant's body strength. The questions that form this construct are as follows:

1. Were they able to walk six blocks?
2. Were they able to climb up to 20 stairs?
3. Were they able to lift or carry 20 pounds?

Walking and Balance Score

Based on the distance and time that the participant walked, NHATS researchers have reported a score between 0 and 4 for the participants who took the walking course.

Balance score (between 0 and 4) was calculated based on activities such as standing on one leg with eyes closed, semitandem (placing 1 ft in front of the other), and holding two leg stands for 10 seconds.

H1. Older adults' ability to walk and lift slightly heavy objects positively impacts their mental health.

Physical Independence

This construct measures a person's participation in activities.¹⁷ The responses to the following questions were yes or no, and they assess if the activity was interrupted by ill health or mobility.¹⁸

1. In the last month, did your health or functioning ever keep you from visiting with friends and family not living with you?
2. In the last month, did your health or functioning ever keep you from volunteer work? Was your health or functioning a reason that you did not participate in volunteer work?
3. In the last month, did your health or functioning ever keep you from attending religious services?

H2. In older adults, experiencing limited physical pain is related to a healthy mind.

Lower Physical Pain

This construct measures the strength of the body and the reported physical difficulties that the participants have that limit their ability to be mobile or outdoors. The questions were taken from the Sensory and Physical Impairments and Symptoms section of the NHATS data. The activities and questions were taken from Freedman et al.¹⁹

1. Do you have lower body strength? Especially in the legs, hips, knees, or feet?
2. Do you feel easily exhausted?
3. Do you have problems with balance or coordination?

H3. Older adults' community participation is positively related to their mental health.

Community Engagement

This measure is a combination of questions that test the participant's trust in the community and social behavior. Primarily, it assesses social behavior among community dwellers.^{20,21} The responses for the following questions were taken on a 3-point Likert scale of the degree of agreement, with 3 being *agree a lot*, 2 as *agree a little*, and 1 as *do not agree* with the statement:

1. Do people in your community know each other very well?
2. Are people in your community willing to help each other?
3. Can people in your community be trusted?

H4. Older adults who engage in the community and build and develop trust in their community have positive mental health.

Mental Health

This construct measures the participant's perceptions of self-health, anxiety, and depression (Figure 1). Two questions, one about anxiety (taken from the two-item Generalized Anxiety Disorder scale)²² and the other about depression (taken from the two-item Patient Health Questionnaire),²³ are given as follows:

1. Over the last month, how often have you felt down, depressed, or hopeless?
2. Over the last month, how often have you felt nervous, anxious, or on edge?

The responses for the above questions were a 4-point Likert scale, with 4 being not at all, 3 as several days, 2 as more than half the days, and 1 as nearly every day (see Supplemental Digital Content 1, <http://links.lww.com/CIN/A210>).

We also included a question about perception of their health:

1. Would you say that in general your health is excellent, very good, good, fair, or poor?

Data Analysis

We used the partial least-squares structural equation modeling (PLS-SEM) to create a model representing each criterion's dependencies and significant attributes. We also used multiple regression to confirm and support the results from PLS-SEM.²⁴

We used SmartPLS 3.0 to test the performance of the data model. The regression analysis was done using SPSS Statistics 27 (IBM Inc., Armonk, NY, USA). We used exploratory factor analysis to check for common method bias, which means that the total variance was less than 50% when the items were loaded into a single factor.²⁵

The average variance extracted (AVE) was used to verify the reliability of the measurement model. Tables 1–3 are summaries of the measurement model for the data run for 3 years, 2018 to 2020. The AVE exceeded 0.5 in every construct in all 3 years.^{26,27} The variance inflation factors for the independent variables are less than 10, with an exception in round 10 data for the construct physical capacity. In multiple regression, multicollinearity is observed when independent variables are competing with each other to influence the dependent variable, and variance inflation factor identifies the degree of multicollinearity. In round 10 data, we observed high multicollinearity, which makes us believe that physical capacity was not a good fit for prediction. We closely observed the responses, and more than 95% of participants perceived themselves to be physically able.

Table 1 summarizes the model's R^2 , path coefficient, and t statistics from the PLS results. In round 8, the R^2 was 35.3%, which shows that 35% of the variation in mental health

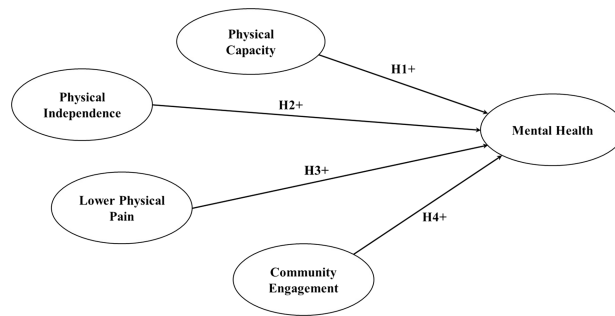


FIGURE 1. Conceptual model.

among older adults can be explained from the independent variables. We see this consistently in three rounds. Rounds 9 and 10 had an R^2 of 36% and 33.5%, respectively. The corresponding t statistics were significant in the independent variables. The variable lower physical pain had the highest significance (round 8; $\beta = .344, t = 23.87, P < .05$) (see Supplemental Digital Content 2, <http://links.lww.com/CIN/A211>, for results of rounds 9 and 10). It has a positive impact on mental health. Similarly, physical capacity (round 8; $\beta = .22, t = 13.57, P < .05$) and physical independence (round 8; $\beta = .14, t = 8.04, P < .05$) had a positive effect on mental health. Community engagement also was positively correlated to mental health but had the least significance (round 8; $\beta = .10, t = 7.51, P < .05$).

We ran the model for multiple regression to test the results obtained from the PLS model. They seem consistent except for the variable “physical capacity” in round 10 (see Tables 3,4 for estimates in rounds 8 to 10). Because of high multicollinearity, this variable was not included in the round 10 model. This can be interpreted that 99% of the participants had the same answer to the logical questions. When we observed their responses closely, they answered “yes” to at least two of three questions.

DISCUSSION

Many factors lead to deteriorating mental health in aging populations. However, it is vital to identify the characteristics

and extend awareness of the preventive measures that help older adults to remain healthy. This study identified some of the factors that can maintain mental health in older adults. It contributes to the aging literature and provides clarity on the relationship between physical activities and mental health. This study tested for the factors that influence mental well-being among older adults during 3 years, 2018–2020. The results reveal that an individual's physical health and perception of community engagement positively impact mental health. Social isolation or community disengagement causes premature mortality and mental deterioration or declining cognitive abilities.

Just as the literature supported, physical ability and mobility have a positive impact on mental health. Being part of a community and trusting neighbors are also positive influences on an aging population. We found these results to be consistent for 3 consecutive years.

In this study, various aspects of physical health such as an adult's ability to be physically strong and care for themselves (H1), their ability to be mobile and socialize (H2), not experiencing pain when being mobile (H3), and having a positive attitude toward community engagement and being social (H4) were examined for their effect on mental health. Among older adults, physical independence plays a significant role in their mental health. This finding is consistent with prior research.

Table 1. Partial Least-Squares Structural Equation Path Results in the Model

Path	Round 8 (2018)		Round 9 (2019)		Round 10 (2020)	
	$R^2 = 35.3\%$		$R^2 = 36\%$		$R^2 = 33.5\%$	
	Path Coefficient	t Statistic	Path Coefficient	t Statistic	Path Coefficient	t Statistic
Physical capacity → mental health	0.22	13.57	0.19	11.02	0.15	8.26
Physical independence → mental health	0.14	8.04	0.17	8.46	0.15	7.21
Lower physical pain → mental health	0.34	23.87	0.35	21.72	0.38	24.69
Community engagement → mental health	0.10	7.51	0.11	7.16	0.12	7.66

Table 2. Correlations, Square Root of AVE, Means, SD Composite Reliability, and AVE of Latent Variables in the Model for Round 8 Data

Round 8 (n = 3910)	1	2	3	4	5	Mean	SD	Composite Reliability	AVE
1. Physical capacity	0.82 ^a					1.69	1.69	0.93	0.67
2. Physical independence	0.44	0.74 ^a				0.90	0.22	0.78	0.54
3. Lower physical pain	0.50	0.38	0.75 ^a			0.60	0.37	0.80	0.57
4. Community engagement	0.14	0.05	0.09	0.79 ^a		2.46	0.53	0.83	0.63
5. Mental health	0.47	0.38	0.52	0.17	0.76 ^a	3.51	0.60	0.80	0.57

^aSquare root of AVE.

We identified that including community engagement and exploring social behavior increased the impact on mental health. Perceptions of being a member in a trusted community impact the dweller's mental health. The more people were open to engagement and trusted in their neighbors, the less they were depressed and perceived themselves to be satisfied with their physical health.

We started the study with round 8 data and were satisfied with the results. When we ran the same model for round 9 data, we noticed a slight decrease in the physical capacity's coefficient. The population is a year older now and does not perceive itself to be as strong as the year before. We also observed that limited physical pain and physical independence have slightly increased.

This study observed that older adults maintained community engagement and positive mental well-being throughout the study. Collecting 3 years of continuous data helped us to observe the participants' change in perceptions of physical health and their interaction within the community. We observed that all the participants who can perform their daily activities and do not experience much pain are less likely to feel anxious or depressed. We also observed that 90% of the participants actively engaged in maintaining physical activity. In their response to their favorite activity within the community, the top 5 were walking, running, volunteering, volleyball, and socializing. These results supported our hypothesis that physically active people who trust their neighbors are more likely to be mentally healthy. Although these will not be the

only factors contributing to an older adult's mental health, they are key factors in preventing mental disorders. The implications of the study will be useful to caregivers, health practitioners, and to older adults seeking to improve their health status.

LIMITATIONS

In this study, the preexisting health conditions of the participants were not considered under moderators that influence mobility. We did not test an adult's motivation to exercise or be mobile but considered their activity in the community and their perception of health. The responses on the NHATS survey could be prone to errors because of the participants' social desirability and reporting biases. Hence, the relationships among the constructs may be conservative.

CONCLUSION

The findings of this study resonate with the current research that physical fitness plays a positive role in the mental health of older adults. It also reveals that community engagement makes an equal contribution to mental well-being. Social behavior in older adults is indicative of their mental state and can impact their everyday activities. We observe that trust also plays an essential role in community engagement. Public health interventions can focus on such behaviors and act to promote the best care for older adults. Social isolation saw a new trend in 2020 because of COVID-19. The biggest hurdle for older adults in this scenario was technology

Table 3. Structural Estimates for Rounds 8 and 9

Path	Round 8 (2018)				Round 9 (2019)			
	PLS-SEM Result		Regression Result		PLS-SEM Result		Regression Result	
	Coefficient	t Score	Coefficient	t Score	Coefficient	t Score	Coefficient	t Score
Physical capacity → Mental health	0.22	13.28	0.20	13.02	0.19	11.02	0.18	11.36
Physical independence → mental health	0.14	8.13	0.15	10.36	0.17	8.46	0.18	11.67
Lower physical pain → mental health	0.34	24.16	0.35	23.16	0.35	21.72	0.36	22.64
Community engagement → mental health	0.10	7.78	0.10	7.29	0.11	7.16	0.10	7.35

Table 4. Structural Estimates for Round 10

Path (Round 10)	PLS-SEM Result		Regression Result	
	Coefficient	t Score	Coefficient	t Score
Physical capacity → mental health ^a	0.15	8.26	—	—
Physical independence → mental health	0.15	7.21	0.13	8.19
Lower physical pain → mental health	0.38	24.69	0.38	23.46
Community involvement → mental health	0.12	7.66	0.12	7.38

^aIn regression, physical capacity was excluded because of 0 tolerance; 90% of responses in this category were the same. It has a high multicollinearity and was not a good fit in the model.

adoption. A productive intervention is to build technological skills that help older adults to maintain contact with their friends and family virtually. The model results remained consistent when tested for 3 consecutive years and can be used in further study to predict older adults' cognitive abilities.

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