

Physical Activity Levels and Well-Being in Older Adults

Wonyul Bae

Department of Sport Management and Media, Ithaca College, NY, USA

Young Ik Suh

Department of Leadership and Instruction, University of West Georgia, GA, USA

Jungsu Ryu and Jinmoo Heo

Department of Recreation, Park and Tourism Sciences, Texas A & M University, TX, USA

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Abstract

The objective of this study was to identify the interconnectedness of different intensity levels of physical activity and psychological (life satisfaction and positive affect) and physical (physical health) well-being. Participants were from the National Study of Midlife in the United States with assessments in 2004 and aged 25 to 74 living in the United States were included in the analyses. We conducted bivariate correlations to examine significant relationships among the study variables. In addition, after multicollinearity among the independent variable was checked, a series of hierarchical regression analyses with physical health, positive affect, and life satisfaction as criterion variables were conducted. The results showed that light physical activities were positively associated with physical health and life satisfaction in summer, whereas light physical activities and all dependent variables were positively correlated in winter. Furthermore, engaging in moderate physical activities was positively related only with physical health. Meanwhile, vigorous physical activities were not associated with life satisfaction, physical health, and positive affect in summer and winter.

Keywords

Physical activity, older adults, life satisfaction, health

Corresponding Author:

Jungsu Ryu, Department of Recreation, Park and Tourism Sciences, Texas A&M University, 600 John Kimbrough Blvd 2261 TAMU, College Station, TX 77843-2261, USA.

Email: jryu@tamu.edu

Introduction

According to the Administration on Aging (2016), the number of people aged over 60 years was about 57 million in 2010, and it will increase to 112 million by 2050. As the aging population increases in the United States, the issue of quality of life for these individuals has been of interest to researchers. The Physical Activity Council (2014) reported that the physical inactivity rate for people between the ages of 55 and 65 is 32.8%, and for the ages of 65 and older is 37.8% in 2013. Physical inactivity is likely to increase the risk of several chronic diseases including stroke, high blood pressure, anxiety, coronary heart disease, diabetes, obesity, and other stress-related disorders (World Health Organization, 2003). On the contrary, physical activity enhances and helps the quality of life and health of older people. Several studies found that the psychological and physical well-being of the older people can be improved by participating in physical activities at different intensity levels (Frye, Scheinthal, Kemarskaya, & Pruchno, 2007; Lindwall, Rennemark, & Berggrem, 2008; Windle, Hughes, Linck, Russell, & Woods, 2010). In addition, engaging in physical activity contributes to mental well-being among older adults such as positive mood, self-perceptions, and self-efficacy (Biddle, 2000; Fox, 2000; McAuley & Rudolph, 1995; Spirduso, 1995).

Regular physical activity among older people is highly recommended to promote an active lifestyle by the World Health Organization (WHO, 2015). According to WHO, older people should participate in at least two and half hours of moderate intensity (i.e., badminton, low-impact aerobics, golfing without a power cart, tennis-doubles) and one hour and fifteen minutes of vigorous intensity (i.e., hiking, basketball, high-intensity aerobics) level physical activity throughout the week. However, medical factors, such as orthopedic, arthritis, and heart disease, may limit the number of available physical activity participation opportunities.

In the past decades, there has been growing recognition that physical activity is linked with physical health and well-being. The relationship between each construct has been extensively claimed by previous literature, which has reported that physical activity has been considered as an important health promoting behavior (Lindwall et al., 2008; Shephard, 1991; Smith & Tommerup, 1995; Stathi, Fox, & McKenna, 2002). In a research conducted by Morgan and Bath (1998), for example, older adults with regular physical activity habits improve body strength and capacity as well as their sense of well-being. The findings of their study also suggested that there exists a significant relationship between exercise and health of older adults. Furthermore, various studies reported that the intensity (e.g., vigorous, moderate, light) of physical activity is positively associated with health benefits and well-being. For example, several empirical studies have been devoted to examine the importance of physical activity and to explain the relationship between exercise intensity and the

well-being of the elderly (Dionigi, 2007; Ruuskanen & Ruoppila, 1995; Tanaka et al., 2009; Wilmore & Costill, 1994). According to Brown et al. (2000), high-intensity physical activity is linked to an improved sense of well-being and satisfaction. On the other hand, Wilmore and Costill (1994) proved that low- and moderate-intensity physical activity had more positive effects for the physical health and well-being of older people than high-intensity physical activity. Such discrepancies in previous studies have provoked important questions about the influence of physical activity intensity (e.g., vigorous, moderate, light) on physical health and well-being of the older adults.

Well-being is a critical indicator of psychological functioning and positive human health (Mihalko & McAuley, 1996). One feature of well-being is subjective well-being, which includes three relatively independent components: positive affect, negative affect, and life satisfaction (Andrews & Withey, 1976; Emmons & Diener, 1985). Positive affect can be regarded as the degree to which a person experiences joy and happiness in life (Emmons & Diener, 1985). Negative affect refers to unpleasant emotions, which are independent from positive affect. Life satisfaction is defined as “a global assessment of a person’s quality of life according to his chosen criteria” (Shin & Johnson, 1978, p. 478). According to Kozma and Stone (1980), positive and negative affect are related to the affective and emotional aspects, whereas life satisfaction refers to a cognitive and judgmental process. The current study utilized the evaluation of positive affect and life satisfaction as a parameter of well-being.

To the best of our knowledge, few researches have studied the impact of physical activity intensity levels (i.e., vigorous, moderate, and light) on the psychological and physical well-being of older people. It might be crucial to differentiate among intensity levels of physical activities which lead to improved life satisfaction, positive affect, and physical health. Therefore, the primary purpose of this study was to explore the interconnectedness of different intensity levels of physical activity and psychological (life satisfaction and positive affect) and physical (physical health) well-being. The results of this study support different approaches for different intensity levels of physical activity on psychological and physical well-being.

Method

We used data collected in 2004 from the study of Midlife in the United States (MIDUS). The MIDUS is a survey of a nationally representative sample of non-institutionalized adults who are aged 25–74 living in the United States. The analytic sample for this study consisted of 1176 MIDUS participants who were retirees aged 60 years and older. The respondents’ age ranged from 60 to 84 years old ($M = 70.81$ years, $SD = 6.23$). Of the respondents, 47.8% were men and 52.2% were women. The majority were Caucasians (91.9%). Of the respondents, 45.3% were between the ages 60 and 69, 43.1% were between 70

and 79, and 11.6% were 80 years or older. A total of 30.1% were high school graduates, 22.0% had one to three years of college education (no degree), 13.8% had a four-year college degree, and 12.2% had a master or professional degree. With regard to marital status, 66.9% were married, 9.5% were divorced, 18.3% were widowed, and 5.3% were either separated or never married (see Table 1).

Instrumentation

Dependent variables. Physical health was measured by a single item: “In general, would you say your physical health is excellent, very good, good, fair, or poor?” Response options ranged from 1 = poor to 5 = excellent. Literature has demonstrated the validity and reliability of a single-item approach to assess physical health (e.g., Mroczek & Kloarz, 1998). To assess life satisfaction, respondents

Table 1. Frequencies of participant characteristics.

Characteristics	<i>n</i>	%
Age		
60–69	533	45.3
70–79	507	43.1
>80	136	11.6
Gender		
Male	562	47.8
Female	614	52.2
Race		
Caucasian	1081	91.9
African American	48	4.1
Native American	13	1.1
Other	26	2.2
Education completed		
High school	354	30.1
1–3 years of college, no degree	258	22.0
College degree	162	13.8
Graduate school	143	12.2
Marital status		
Married/partnered	787	66.9
Divorced	112	9.5
Widowed	215	18.3
Other (separated/never married)	62	5.3

were asked “using a scale from 0 to 10 where 0 means the worst possible life overall and 10 means the best possible life overall, how would you rate your life overall these days?” Responses were circled on a 10-point rating scale (0 = worst, 10 = best). Literature has indicated that single-item ratings appear to be valid and reliable to measure life satisfaction (e.g., Diener, Inglehart, & Tay, 2013). Measures of positive affect were based on ratings of how much of the time during the past 30 days respondents felt each of the following emotions: “cheerful,” “in good spirits,” “extremely happy,” “calm and peaceful,” “satisfied,” “full of life,” “close to others,” “like you belong,” “enthusiastic,” “attentive,” “proud,” “active,” and “confident.” Responses were coded as 1 = none of the time, and 5 = all of the time. A high score was indicative of higher positive affect.

Predictor variables. Three types of activities were assessed using the following questions. To account for seasonal variations of physical activities, same sets of questions were asked for summer and winter.

- Vigorous physical activity: How often do you engage in vigorous physical activities that causes your heart to beat so rapidly that you can feel it in your chest, and you perform the activity long enough to work up a good sweat and are breathing heavily? (e.g., competitive sports like running, vigorous swimming, high-intensity aerobics).
- Moderate physical activity: How often do you engage in moderate physical activity, that is not physically exhausting, but it causes your heart rate to increase slightly and you typically work up a sweat? (e.g., light tennis, slow or light swimming, low-impact aerobics, golfing without a power cart).
- Light physical activity: How often do you engage in light physical activity that requires little physical effort? (e.g., bowling, archery, golfing with a power cart, fishing).

These items were rated on a 6-point Likert-type scale, and the items ranged from never (1) to several times a week (6).

Data analysis

Bivariate correlations were conducted to identify significant relationships among the study variables. After multicollinearity among the independent variable was checked, a series of hierarchical regression analyses with physical health, positive affect, and life satisfaction as criterion variables were conducted. Age and gender were controlled for in all analyses in light of literature demonstrating association with subjective well-being. Age and gender of the participants were entered in Step 1. In the second step, types of activities were entered in to the models to assess their contributions to the models' variance.

Results

Frequencies of activities in summer and winter are reported in Tables 2 and 3, respectively. Pearson correlation coefficients showed that there were a number of small but statistically significant relationships among the variables (see Table 4). Age had a negative relationship with physical health ($r = -.07, p < .05$), vigorous activity ($r = -.22, p < .01$), moderate activity ($r = -.18, p < .01$), and light activity ($r = -.13, p < .01$). Physical health was positively associated with positive affect ($r = .33, p < .01$), life satisfaction ($r = .34, p < .01$), vigorous activity ($r = .10, p < .01$), moderate activity ($r = .18, p < .01$), and light activity ($r = .17, p < .01$). Positive affect positively correlated with life satisfaction ($r = .52, p < .01$) and light activity ($r = .07, p < .05$). Life satisfaction was significantly associated with moderate activity ($r = .07, p < .05$) and light activity ($r = .10, p < .01$).

Table 2. Frequencies of activities in summer.

	Light activity		Moderate activity		Vigorous activity	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Several times a week	98	9.8	263	26.5	477	47.1
Once a week	43	4.3	120	12.1	149	14.7
Several times a month	27	2.7	58	5.8	64	6.3
Once a month	138	13.9	162	16.3	117	11.6
Less than once a month	136	13.7	92	9.3	64	6.3
Never	553	55.6	299	30.1	141	13.9

Table 3. Frequencies of activities in winter.

	Light activity		Moderate activity		Vigorous activity	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Several times a week	108	10.9	295	29.9	489	48.6
Once a week	48	4.8	144	14.6	175	17.4
Several times a month	42	4.2	79	8.0	73	7.2
Once a month	142	14.3	146	14.8	104	10.3
Less than once a month	143	14.4	84	8.5	57	5.7
Never	507	51.2	238	24.1	109	10.8

Table 4. Pearson correlation coefficients.

	1	2	3	4	5	6	7
1. Age	1.00						
2. Physical health	-.07*	1.00					
3. Positive affect	-.02	.33**	1.00				
4. Life satisfaction	-.03	.34**	.52**	1.00			
5. Vigorous activity	-.22**	.10**	.01	.02	1.00		
6. Moderate activity	-.18**	.18**	.06	.07*	.53**	1.00	
7. Light activity	-.13**	.17**	.07*	.10**	.25**	.49**	1.00

Note. * $p < .05$, ** $p < .01$.

Activities in summer

Results of the hierarchical regression analyses with physical health, positive health, and life satisfaction in summer are displayed in Table 5. For all analyses, the control variables were entered in Step 1. Results showed that moderate activity ($\beta = .137, p < .01$) and light activity ($\beta = .090, p < .05$) were significantly related to physical health. The total variance explained by the model was 4.5%. Results further revealed that light activity ($\beta = .085, p < .05$) was a significant predictor of life satisfaction. Light activity accounted for about 1.2% of the variability in life satisfaction.

Activities in winter

Table 6 shows the findings of the hierarchical regression analyses with respect to physical health, positive affect, and life satisfaction in winter. Two variables predicted physical health—moderate activity ($\beta = .143, p < .001$) and light activity ($\beta = .093, p < .01$) contributed significantly to the variance in physical health. Light activity was the only variable to make a significant contribution to positive affect ($\beta = .079, p < .05$). Light activity accounted for about 1.3% of the variance in positive affect. In the model predicting life satisfaction, only the coefficient for light activity was significantly positively associated with life satisfaction ($\beta = .097, p < .01$), explaining 1.7% of the variance.

Discussion

The results illustrated that light physical activities were positively associated with well-being among the retirees over 60 years of age. Some seasonal variability was observed. In summer, participating in light physical activity was associated with physical health and life satisfaction, whereas in winter, engaging

Table 5. Hierarchical regression analysis of activities in summer.

Dependent variables	Physical health		Positive affect		Life satisfaction	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Age	-.080* (.006)	-.043 (.006)	-.051 (.004)	-.039 (.004)	-.021 (.007)	-.007 (.008)
Gender	.021 (.069)	.032 (.069)	-.017 (.043)	-.017 (.043)	.028 (.091)	.023 (.093)
Vigorous activity		.002 (.022)		-.038 (.014)		-.021 (.030)
Moderate activity		.137** (.023)		.073 (.014)		.040 (.030)
Light activity		.090* (.024)		.050 (.015)		.085* (.032)
F	3.346	9.093***	1.297	2.106	.582	2.258*
R ²	.007	.045	.003	.011	.001	.012

Note. Standardized regression coefficients reported, standard errors in parentheses.

* $p < .05$, ** $p < .01$, *** $p < .001$.

Table 6. Hierarchical regression analysis of activities in winter.

Dependent variables	Physical health		Positive affect		Life satisfaction	
	Model 1	Model 2	Model 1	Model 2	Model 1	Model 2
Age	-.090 ^{***} (.006)	-.054 (.006)	-.055 (.004)	-.040 (.004)	-.035 (.007)	-.021 (.008)
Gender	.026 (.069)	.032 (.069)	-.019 (.043)	-.024 (.044)	.026 (.091)	.017 (.093)
Vigorous activity		-.014 (.024)		-.057 (.015)		-.046 (.032)
Moderate activity		.143 ^{***} (.023)		.084 (.015)		.058 (.031)
Light activity		.093 [*] (.023)		.079 [*] (.015)		.097 ^{**} (.031)
F	4.274 [*]	9.447 ^{***}	1.495	3.326 ^{**}	.915	3.153 ^{**}
R ²	.009	.047	.001	.013	.002	.017

Note. Standardized regression coefficients reported, standard errors in parentheses.

* $p < .05$, ** $p < .01$, *** $p < .001$.

in light physical activity was positively related with all dependent variables. This finding suggests that light physical activities such as bowling, archery, fishing, and golfing with a power cart contributes to positive emotions (i.e., feeling cheerful, satisfied, active, happy) of older adults in the winter. Interestingly, this result may be practically applied to promoting older adults' mental health. Seasonal affective disorder has been related to the winter season (Spoont, Depue, & Krauss, 1991), and research has revealed that older adults are prone to feel more depressed in winter than other seasons (O'Hare, O'Sullivan, Flood, & Kenny, 2016). It can be implied that encouraging older adults to participate in light physical activity in winter can be one of the alternative treatments to make them less depressive and experience positive effects. Overall, the results were consistent with the study of Buman et al. (2010) which suggested that light-intensity physical activity contributes to better physical health and well-being of older adults. Older adults tend to spend their daily time engaging in light-intensity activities than their younger counterparts (Westerterp, 2008). Our study adds to the literature demonstrating the importance and impact of light physical activity on older adults' well-being.

Meanwhile, engaging in vigorous physical activity did not contribute to older adults' psychological and physical well-being regardless of the season. The results show that vigorous activity was not associated with life satisfaction, physical health, and positive affect in summer and winter. On the other hand, moderate physical activity was positively related only with physical health. These findings coincide with Wilmore and Costill's (1994) suggestion that participating in moderate physical activity is more likely to contribute to physical health for old people than vigorous physical activity. Regular participation in moderate physical activity is an instrumental element in maintaining health and well-being (Seefeldt, Malina, & Clark, 2002), and we confirmed the positive relationship between moderate physical activity and physical health of older adults without a seasonal variation.

In general, research has shown that moderate and vigorous activities are more likely to contribute to lower mortality rates, a greater longevity (Lee & Paffenbarger, 2000; Lee & Skerrett, 2001), and prevent diseases such as hypertension, heart disease, and diabetes (Bauman, 2004). On the other hand, light physical activity is more likely to be associated with psychological benefits. Buman et al. (2010) demonstrated that light physical activity is related to better quality of life and a lower level of stress. While some literatures provided the effects of light physical activity on physical health, its impacts on mental health have been found to be more significant. Consistent with previous literatures, this study showed that only light physical activity has significant relationships with psychological variables, and vigorous physical activity is not related to well-being variables. It suggests that understanding each level of physical activity separately is necessary and crucial to offer practical implications for older adults.

This study provides some important suggestions to health professionals who may employ physical activity programs to older adults. According to Chen and Fu (2008), older adults over 70 years of age participated in physical activities more often than those who were in their 60s. Segmenting the older adult market based on age stratification and seasonal variability will enable professionals to provide appropriate physical activity programs which will enhance older adults' well-being. Furthermore, by understanding older adults' physical activity patterns, professionals can make better decisions regarding when and what levels of physical activity are necessary for their physical and mental well-being.

There are some limitations we need to address in this study. Although the MIDUS offers various constructs on well-being, a selection of instruments were beyond the investigators' control. Physical health and life satisfaction were assessed using single item. While literature has demonstrated acceptable validity and reliability of these items, well-being could be better assessed using multi-trait and multi-method scales. The instrument that was used to measure physical activity participation does not capture a full spectrum of daily activities of older adults. Those items were rather simple measures, and more sophisticated assessments might explain specifically the impact of physical activity participation on the well-being of older adults. For example, further study should include the frequency and the time of the day of participating in each level of physical activity. It will provide more detailed data regarding how older adults engage in different levels of activity with or without seasonal variation. While the MIDUS describes the years when the data were collected, specific information regarding the time of year was not provided. Clarifying what time of year data were collected will help interpreting the results because it is possible that there is technical dependence between the data. In addition, the variance for the regression models were relatively low, therefore results should be interpreted with caution. The low R^2 value suggests that other variables may be involved in predicting well-being of older adults. Further research should consider using additional indicators and theories from positive psychology domains such as social support, depressive symptoms, eating patterns, and loneliness.

With regard to demographic characteristics more than half of the participants were married in this study. Literature has shown that spouse support may facilitate physical activity participation, and future studies should examine such effect and how it relates to the well-being of older adults. Despite some limitations, this study adds to the literature by demonstrating the impacts of different levels of physical activity and seasonality on well-being of older adults. This study sheds light on the impact of light physical activity on well-being. Although ample research has demonstrated the importance of moderate and vigorous physical activity on well-being of older adults, the effect of light physical activity has been understudied (Loprinzi, 2013). Considering the positive impact of light physical activity on outcome variables in this study regardless of the seasonality, future

studies identifying types of health-promoting light physical activities of older adults are warranted.

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Author Biographies

Wonyul Bae is an assistant professor of sport management in the School of Business at Ithaca College.

Young Ik Suh is an assistant professor of sport management in the Department of Sport Management, Wellness & Physical Education at University of West Georgia.

Jungsu Ryu is a PhD candidate in the Department of Recreation, Park and Tourism Sciences at Texas A&M University.

Jinmoo Heo is an associate professor in the Department of Sport and Leisure Studies at Yonsei University.