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Identifying Chronic Conditions and Other Selected Factors That Motivate Physical Activity in World Senior Games Participants and the General Population

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Abstract

This study assesses chronic disease or disease-related conditions as motivators of physical activity. It also compares these and other motivators of physical activity between Senior Games participants (SGPs) and the general population. Analyses are based on an anonymous cross-sectional survey conducted among 666 SGPs and 177 individuals from the general population. SGPs experienced better general health and less obesity, diabetes, and depression, as well as an average of 14.7 more years of regular physical activity ($p < .0001$), 130.8 more minutes per week of aerobic activity ($p < .0001$), and 42.7 more minutes of anaerobic activity per week ($p < .0001$). Among those previously told they had diabetes, high blood pressure, high cholesterol, or depression, 74.2%, 72.2%, 70.4%, and 60.6%, respectively, said that it motivated them to increase their physical activity. Percentages were similar between SGPs and the general population. SGPs were more likely motivated to be physically active to improve physical and mental health in the present, to prevent physical and cognitive decline in the future, and to increase social opportunities. The Senior Games reinforces extrinsic motivators to positively influence intrinsic promoters such as skill development, satisfaction of learning, enjoyment, and fun.

Keywords

aerobic exercise, anaerobic exercise, physical activity, intrinsic motivators, extrinsic motivators, health

Introduction

Regular physical activity is one of the most important things a person can do for his or her health (Centers for Disease Control and Prevention [CDC], 2011). Physical Activity Guidelines for Americans were released on October 7, 2008, and they reflect a comprehensive review of research on physical activity and health (Office of Disease Prevention and Health Promotion [ODPHP], 2014). The guidelines for adults involve 150 minutes of moderate-intensity aerobic activity per week and 2 or more days a week of anaerobic muscle-strengthening activities of moderate or high intensity involving all major muscle groups (ODPHP, 2014). Older adults should replace vigorous physical activity with activity at low or moderate intensity for longer duration (Pate et al., 1995). Meeting these guidelines is a way to control weight, reduce the risk of cardiovascular disease, reduce the risk for type 2 diabetes and metabolic syndrome, reduce the risk of some cancers, strengthen bones and muscles, improve mental health and mood, increase the ability to perform daily activities and prevent injuries (especially in older adults), and increase longevity (CDC, 2011; Healy et al., 2008; Johns, Hartmann-Boyce, Jebb, Aveyard, & Behavioral Weight Management Review Group, 2014; Katzmarzyk, Church, Craig, & Bouchard, 2009; Mayo Clinic, 2012; Vazquez, Duval, Jacobs, & Silventoinen, 2007).

Although participation in both aerobic and anaerobic activities that meet the 2008 Physical Activity Guidelines among adults aged 18 and older in the United States has improved in recent years (i.e., 14.3% in 1998 to 20.8% in 2012), a large percentage of individuals fail to meet the national guidelines (National Center for Health Statistics [NCHS], 2014). For example, in 2012, 42.2% of males and 50.7% of females failed to meet either the aerobic

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activity or muscle-strengthening guidelines. For males and females combined, failing to meet either the aerobic activity or muscle-strengthening guidelines increased with age: 41.0% for ages 18 to 44 years, 49.6% for ages 45 to 64 years, and 58.4% for ages 65 years and above (NCHS, 2014).

Although we have a good idea of how selected demographic factors are associated with physical activity, our understanding of why people choose to be physically active is incomplete. Social cognitive theory has been used as a theoretical model for explaining initiation and maintenance of physical activity (Bandura, 2001; Petosa, Suminski, & Hortz, 2003; Wallace, Buckworth, Kirby, & Sherman, 2000). This theory assumes that physical activity involves a rational decision-making process wherein the activity is inherently interesting and enjoyable or is believed to produce a separate desired outcome. Intrinsic motivation refers to doing something because it is inherently interesting or enjoyable (emanating from one's sense of self), whereas extrinsic motivation refers to doing something because it results in a separate outcome (Deci & Ryan, 1985), such as physical and mental health benefits or increased social opportunities.

Research has shown that intrinsic motivators of physical activity that satisfy an innate psychological need (e.g., skill development, satisfaction, self-worth, enjoyment) better reflect increased and maintained physical activity than extrinsic factors that are executed to achieve a separate consequence (e.g., praise, money, increased energy, improved quality of life; Buckworth, Lee, Regan, Schneider, & DiClemente, 2007; Frederick-Recascino & Schuster-Smith, 2009). Intrinsic and extrinsic motivational factors are not entirely separate in the sense that as extrinsic motivational factors produce positive outcomes, intrinsic motivational factors can be accentuated (Ryan & Deci, 2000). For example, as physical and mental health benefits improve because of physical activity, the physical activity itself may become more satisfying, enjoyable, and fun.

World Senior Games participants are a group of older adults who have largely embraced a physically active lifestyle. In 1987, the World Senior Games began with the aim to encourage greater physical activity among older adults by providing a place where they could compete in a number of athletic events and socialize with fellow participants. Since that time, the Games have been held each year over a 2-week period in early October in St. George, Utah. The Games offer 26 events and have grown to include more than 10,000 participants each year from the United States, Canada, and other countries.

In a previous study, more than 94% of Senior Games participants were identified as having been physically active the majority of their life (Merrill, Shield, Wood, & Beck, 2004). It has also been shown that these individuals enjoy better general health than their age-equivalent counterpart (Merrill, Roy, & Lowe, 2013; Merrill, et al., 2004). To better understand the reasons for the comparatively high level of physical activity among Senior Games participants, they were asked to rank 14 intrinsic and extrinsic motivational factors of physical activity. The top reason given for being physically active was recreational enjoyment and fun (Merrill, et al., 2004), which is supported as a top reason for being physical activity in other research (Salmon, Owen, Crawford, Bauman, & Sallis 2003). The next four reasons given in the study were to improve quality of life, increase energy, control weight, and increase social opportunities (Merrill, et al., 2004), which have also been identified as important motivators of physical activity in other studies (CDC, 2011; Guedes, Hatmann, Martini, Borges, & Bernardelli, 2012; Miller & Iris, 2002).

Previous research of motivators of physical activity among Senior Games participants did not consider whether diagnosed chronic disease or disease-related conditions motivated physical activity. In addition, it did not compare motivators of physical activity between Senior Games participants and the general population. Differences may provide insight into how to motivate greater physical activity in general. The current study will assess the influence the diagnosis of chronic disease (i.e., diabetes, depression) or disease-related conditions (i.e., obesity, high blood pressure, high cholesterol) has on motivating physical activity. Other potential motivators of physical activity (e.g., better health, social opportunities, stress relief, family history) will also be assessed according to Senior Games or general population status.

Method

Each year at the Senior Games, free health screenings are available to the participants and their spouses. A popular screening procedure is the carotid artery intima-media thickness (IMT) ultrasound test (Linhart, Gariepy, Massonneau, & Dauzat, 2000), which is used to detect the presence and progression of atherosclerosis. Consecutive participants of the IMT screening were invited to complete an anonymous survey. The response rate for our convenience sample was 98.0% of all Senior Games IMT screening participants, yielding 666 completed questionnaires, with ages ranging from 45 to 91 years. Although participants in the Games were required to be 50 years or older, four spouses were included who were in the age range 45 to 49. Approximately 84.1% of participants resided in the United States (28.2% from Utah and 55.9% from other states), 13.2% were from Canada, and 2.7% were from elsewhere.

A pilot study of six adults aged 45 years or older completed the questionnaire. They were told the purpose of the study and asked to consider the face and content validity of the instrument. This resulted in a few minor

wording changes, but it was unanimously agreed that the instrument was clear and contained appropriate content.

Data from the completed questionnaires were entered by two different individuals and then compared for accuracy. A small number of discrepancies were corrected by referring to the original questionnaire. The institutional review board at Brigham Young University approved the study in September 2013.

To compare the sample of participants from the Senior Games with a group more representative of the general population of older adults, we took a sample of individuals attending the Good Life Expo. This was a community activity held at the Spanish Fork Fairgrounds in central Utah. The event included displays on home improvements, family lifestyle, health care, food storage, emergency preparedness, gardening, home-based business, financial improvement, nutrition, and education. Adults aged 45 years and older receiving free IMT screening were invited to complete the questionnaire. The response rate was 76.5%, yielding 177 completed questionnaires. Ages ranged from 45 to 88, with 14 in the age range 45 to 49. All individuals who completed the survey at the Good Life Expo were from the United States, with 92.5% from Utah. In the Results section, we show that this sample is comparable to the United States population with respect to general health, obesity, diabetes, depression, selected health-related conditions, and aerobic and anaerobic physical activity. The United States general population estimates were based on sampled data from the Behavioral Risk Factor Surveillance System (BRFSS) and the NCHS (2014).

Instrument

The survey included 20 questions about demographics, health (i.e., current health assessment and health history), smoking status, and physical activity/exercise. These questions were taken directly from the BRFSS, a validated survey administered each year by the CDC (2013). Demographic variables consisted of age, sex, marital status, education, race/ethnicity, and place of residence. Participants were asked their height and weight, upon which body mass index (BMI) was calculated, and smoking status (never, former, current). BMI was calculated as $\text{weight}(\text{lb}) \times 703 / \text{height}^2(\text{in}^2)$ (CDC, 2015). The health assessment questions were "How would you describe your personal health?"—to which they responded excellent, very good, good, fair, or poor—and "During the past 30 days, for about how many days have you felt very healthy and full of energy?"

The physical activity questions began with, "During the past month, other than your regular job, did you participate in any physical activities or exercises such as running, calisthenics, golf, gardening, or walking for exercise?" We then asked, "On average, on how many days per week do you engage in aerobic exercise? (e.g., biking, jogging, swimming, walking)," and then, "On those days you engaged in aerobic exercise, how many minutes do you spend on average?" Two similar questions were also asked that involved anaerobic exercise. Finally, we asked, "How many years have you regularly engaged in physical activities or exercise such as running, calisthenics, golf, gardening, or walking for exercise?"

Following the physical activity/exercise questions, four questions were asked as to whether they had ever been told by a doctor or other health professional that they had diabetes, hypertension/high blood pressure, high cholesterol, or depression. To each of these questions, if they responded "yes," they were asked, "Did this motivate you to increase your physical activity or exercise?"

At the end of the questionnaire we asked, "What motivates you to be physically active or exercise?" Seven items followed: "family history of disease," "to help manage stress," "to provide social opportunities," "to prevent or slow down physical health problems," "to prevent or slow down cognitive decline in the future," "to feel physically better now," and "to feel mentally better now."

Statistical Techniques

Means and proportions were used to summarize and describe the data. Independent Senior Games and Good Life Expo group means were compared for equality using the F statistic based on Type III sums of squares. Regression analyses were performed to compare years of regular involvement in physical activity, current levels of aerobic and anaerobic activity, and days felt healthy and full of energy in the past 30 days according to Senior Games versus Good Life Expo participation, adjusting for selected variables. Prevalence ratios were adjusted for selected variables. Interaction (or effect modification) was assessed using the Breslow–Day test for homogeneity. Two-sided tests of hypotheses were evaluated using the 0.05 level of significance. Analyses were performed using the Statistical Analysis System (SAS; 2010) software.

Results

Senior Games participants were older (66.8 [SE = 0.3] vs. 65.3 [SE = 0.8] years of age) and more likely to be male than Good Life Expo participants (Table 1). There was no significant difference between groups (i.e., Senior Games participants vs. Good Life Expo participants) with respect to marital status, education, or race/ethnicity. Hence, only age and sex are potential demographic confounders of the association between group and other selected outcomes. Overall, greater than 75% were married, 50% had a college degree, and 90% were White. A small number of participants currently smoked cigarettes (n = 32, 3.8%), which percentage did not

Table 1. Senior Games and Good Life Expo Participants According to Selected Variables.

	Senior Games		Good Life Expo		χ^2
Variable	*n*	%	*n*	%	*p* value
Age					
45-54	56	8.4	34	19.2	.0002
55-64	200	30.0	48	27.1	
65-91	410	61.6	95	53.7	
Sex					
Male	359	53.9	67	37.8	.0001
Female	307	46.1	110	62.2	
Marital status					
Married	530	79.6	133	75.1	.3367
Divorced	67	10.0	16	9.0	
Widowed	45	6.8	20	11.3	
Separated	3	0.4	1	0.6	
Never married	21	3.2	7	4.0	
Education					
<HS	6	0.9	4	2.3	.1895
HS or GED	91	13.7	26	14.7	
Some college	193	29.0	60	33.9	
College degree	376	56.4	87	49.2	
Race/ethnicity					
White	602	90.4	168	94.9	.0918
Black	21	3.2	0	0.0	
Hispanic	20	3.0	3	1.7	
Asian	10	1.5	1	0.6	
Multiracial	6	0.9	1	0.6	
Other	7	1.0	4	2.2	

Note. HS = high school; GED = General Educational Development.

significantly differ between the Senior Games and Good Life Expo participants ($p = .2245$).

Senior Games participants experienced better general health, with lower prevalence of obesity, diabetes (in ages 65+ only), and depression, than participants from the Good Life Expo (Table 2). The association between group and obesity was significantly modified by age (i.e., lower obesity among Senior Games participants was more pronounced in the age group 55-65), based on the Breslow–Day test. The associations between group and each of the variables listed in the table were not significantly modified by sex, so stratification by this variable was not included in the table. IMT was not significantly different between Senior Games participants ($M = 0.761$ [$SE = 0.005$]) and Good Life Expo participants ($M = 0.756$ [$SE = 0.009$], $p = .5647$), after adjusting for age and sex. History of a diagnosis of high blood pressure and high cholesterol was similar between Senior Games and Good Life Expo participants. General health, obesity, and history of diabetes, depression, and selected health-related conditions tended to be similar between Good Life Expo participants and the U.S. population.

Average years of regular involvement in physical activities like running, calisthenics, golfing, gardening, or walking was 37.1 ($SE = 0.9$) for Senior Games participants and 22.7 ($SE = 1.9$) for Good Life Expo participants. During the past month, Senior Games participants were more likely to participate in any physical activity and to satisfy the 2008 Physical Activity Guidelines involving aerobic and anaerobic physical activity than Good Life Expo participants (Table 3). The higher percent of any physical activity in the past month among Senior Games participants was significantly more pronounced in males than females, based on the Breslow–Day test. In addition, the higher percent of Senior Games participants who completed 150+ minutes of aerobic activity significantly decreased with older age, based on the Breslow–Day test. Senior Games participants also had higher levels of physical activity than the general population.

Survey participants were asked, "During the past 30 days, for about how many days have you felt very healthy and full of energy?" Senior Games participants experienced an average of 5.5 ($SE = 0.7$, $p < .0001$) more days of feeling healthy and full of energy than Good Life Expo participants. Age, sex, race/ethnicity, education, and marital status were not significant, so they were dropped from the model. We have already seen that Senior Games participants had significantly lower BMI and history of diabetes and depression than Good Life Expo participants.

Table 2. General Health, Obesity, Diabetes, High Blood Pressure, High Cholesterol, and Depression Among Senior Games and Good Life Expo Participants and in the United States.

	Senior Games	Good Life Expo	χ^2	United States[a]
Age	%	%	*p* value	%
General health excellent or very good				
45-54	76.8	51.6	<.0001	50.6
55-64	80.8	52.1	<.0001	47.5
65+	78.3	48.9	<.0001	41.4
p value[b]	.9226			
Obese (BMI ≥ 30)				
45-54	10.7	23.5	.1039	34.1
55-64	11.0	33.3	.0001	34.6
65+	14.4	30.5	.0002	26.7
p value[b]	.0374			
Ever been told by a doctor or health professional that you have diabetes				
45-54	5.4	3.1	.6169	9.6
55-64	6.7	6.2	.9170	15.8
65+	6.2	21.4	<.0001	20.9
p value[b]	.0536			
Ever been told by a doctor or health professional that you have high blood pressure				
45-54	21.8	18.8	.7334	32.8
55-64	29.6	30.4	.9104	47.0
65+	40.5	50.0	.1069	62.5
p value[b]	.7571			
Ever been told by a doctor or health professional that you have high cholesterol				
45-54	40.7	54.6	.2100	40.0
55-64	44.9	46.8	.8132	50.7
65+	53.8	62.0	.1557	55.4
p value[b]	.6887			
Ever been told by a doctor or health professional that you have depression				
45-54	9.3	28.1	.0220	21.6
55-64	14.4	26.1	.0545	21.8
65+	8.9	16.1	.0390	14.8
Test for homogeneity *p* value[b]	.5576			

Note. BMI = body mass index.
[a]Centers for Disease Control and Prevention (2014). Data reflect the 2013 survey.
[b]Based on the Breslow–Day test for homogeneity. This test indicated no significant interactions (effect modification) involving sex, so we did not stratify the results by male and female.

These variables were added to the model because of their statistical significance. In this final model, Senior Games participants experienced an average of 4.3 ($SE = 0.7$, $p < .0001$) more days of feeling healthy and full of energy than Good Life Expo participants.

Among those previously told they had diabetes, high blood pressure, high cholesterol, or depression, 74.2%, 72.2%, 70.4%, and 60.6%, respectively, said that it motivated them to increase their physical activity. These percentages did not significantly differ between Senior Games and Good Life Expo participants, after adjusting for age and sex. Those who said they were motivated to increase their physical activity because of a diagnosis of diabetes compared with those who were not motivated had greater average aerobic (112 min) and anaerobic (69 min) activity per week after adjusting for age and sex. Corresponding increases according to being motivated versus not motivated were 55 min versus 27 min for high blood pressure, 12 min versus 13 min for high cholesterol, and 28 min versus 14 min for depression.

Agreement with selected motivators of physical activity is presented in Table 4. The most commonly agreed reasons were "to feel physically better now," "to feel mentally better now," "to prevent or slow down physical health problems in the future," and to "prevent or slow down cognitive decline in the future." Other motivators for physical activity were "to provide social opportunity," "to help manage stress," and "family history of disease," but the level of agreement with these reasons was lower. Senior Games participants were more likely than Good Life Expo participants to agree with the motivators of physical activity, especially "to provide social opportunities," except for "to help manage stress" and "family history of disease," which did not significantly differ between the two groups.

Table 3. Physical Activity Among Senior Games and Good Life Expo Participants and in the United States.

	Senior Games	Good Life Expo	χ^2	United States[a]
	%	%	*p* value	%
During the past month, participated in any physical activity (e.g., running, calisthenics, golfing, gardening, or walking)				
Age				
45-54	93.4	81.8	.0216	77.5
55-64	98.5	83.3	<.0001	74.1
65+	95.7	76.1	<.0001	68.0
p value[b]	.6872			
Sex				
Male	98.3	77.3	<.0001	75.6
Female	94.6	80.4	<.0001	72.6
p value[b]	.0243			
2008 Physical Activity Guidelines—Aerobic (150+ minutes per week)				
Age				
45-54	60.0	9.1	<.0001	48.5
55-64	60.9	18.8	<.0001	45.0
65+	58.9	34.1	<.0001	37.5
p value[b]	.0154			
Sex				
Male	62.2	27.3	<.0001	54.0
Female	56.6	23.6	<.0001	46.6
p value[b]	.9166			
2008 Physical Activity Guidelines—Anaerobic (2+ days per week)				
Age				
45-54	68.5	23.3	<.0001	21.4
55-64	51.9	31.9	.0170	19.8
65+	49.6	30.5	.0016	16.1
p value[b]	.2736			
Sex				
Male	62.2	27.3	.0028	28.4
Female	55.2	28.3	.0001	20.0
p value[b]	.4033			

[a]U.S. estimates based on survey results from the Centers for Disease Control and Prevention (2014) and the National Center for Health Statistics (2014).
[b]Based on the Breslow–Day test for homogeneity.

Table 4. Factors That Motivate Physical Activity for Senior Games and Good Life Expo Participants.

	Senior Games	Good Life Expo	χ^2	Prevalence ratio[a]	95% CI[a]
What motivates you to be physically active?	%	%	*p* value		
To feel physically better now	97.3	88.1	<.0001	1.11	[1.04, 1.18]
To feel mentally better now	95.2	85.5	<.0001	1.12	[1.04, 1.21]
To prevent or slow down physical health problems in the future	93.0	81.3	<.0001	1.15	[1.06, 1.24]
To prevent or slow down cognitive decline in the future	92.1	80.7	<.0001	1.15	[1.06, 1.26]
To provide social opportunities	73.4	42.0	<.0001	1.85	[1.47, 2.34]
To help manage stress	62.9	67.2	.3569	1.01	[0.88, 1.16]
Family history of disease	40.9	53.4	.0093	0.82	[0.67, 1.00]

Note. CI = confidence interval.
[a]Adjusted for age and sex.

Estimates of the average number of years of regular physical activity, minutes of aerobic activity each week, and minutes of anaerobic activity each week for Senior Games and Good Life Expo participants are shown in Table 5. Corrected Models 1 adjusted the group by physical activity models by age and sex if they were significant.

Table 5. Regression Models Showing the Associations Between Three Physical Activity Outcome Variables and Senior Games Versus Good Life Expo Groups and Other Selected Variables.

	Years of regular physical activity		Minutes of aerobic activity per week		Minutes of anaerobic activity per week	
	Estimate	*p* value	Estimate	*p* value	Estimate	*p* value
Corrected Models 1						
Intercept	9.28	.1410	100.91	<.0001	30.37	.0019
Senior Games vs. Good Life Expo	14.37	<.0001	130.75	<.0001	42.68	<.0001
Age (years)	0.25	.0052	NS		NS	
Male vs. Female	6.63	<.0001	NS		NS	
Corrected Models 2						
Intercept	19.14	.0569	238.32	<.0001	83.27	.0047
Senior Games vs. Good Life Expo	7.42	.0028	115.94	<.0001	28.70	.0102
Age (years)	0.37	.0004	NS		NS	
Male vs. Female	7.44	<.0001	NS		NS	
Told you have high blood pressure (yes vs. no)	3.42	.0762	NS		NS	
Told you have depression (yes vs. no)	NS		NS		−31.09	.0158
BMI	−0.86	<.0001	−7.31	<.0001	−2.09	.0293
Feel physically better now (yes vs. no)	11.97	.0032			NS	
Provide social opportunities (yes vs. no)	4.43	.0282	36.60	.0399	NS	
Prevent physical decline in future (yes vs. no)	NS		44.37	.0995	NS	
Help manage stress (yes vs. no)	NS		NS		24.62	.0055
Family history of disease (yes vs. no)	−4.36	.0188	NS		NS	

Note. Estimates were simultaneously computed for the other variables shown in each model. Non-significant variables at the 0.1 level were sequentially dropped from the models. Variables not entering any of the models included history of diabetes, history of high cholesterol, physical activity to prevent or slow down cognitive decline in the future, and physical activity to feel mentally better now. BMI = body mass index. NS = nonsignificant.

Senior Games participants experienced 14.4 more years of regular physical activity, 130.8 more minutes of aerobic activity per week, and 42.7 more minutes of anaerobic activity per week than Good Life Expo participants, on average. Corrected Models 2 adjusted the group by physical activity models by age, sex, chronic disease and disease-related conditions (see Table 2), and motivators of physical activity (see Table 3). Only significant variables were retained in the models. BMI was significantly negatively associated with all three of the outcome variables. To provide social opportunities as a motivator of physical activity was significantly positively associated with years of regular physical activity and minutes of aerobic activity per week. Other variables in the left-hand column of the table were only associated with one of the outcome variables. To potentially influence the association between the group and outcome variables, thereby explaining some of this relationship, the variable needed to be associated with both the group variable and the outcome variable. Blood pressure, stress, and family history variables did not satisfy this requirement, as they are significantly associated with the group variable, as seen earlier.

Discussion

The current study extends previous research conducted over a decade ago to consider chronic disease or disease-related conditions as motivators of physical activity. The study also compares these motivators, as well as other selected motivators for physical activity, between Senior Games participants and the general population. Identifying where differences in motivators of physical activity exist and understanding why they exist may provide insights helpful in motivating greater physical activity in the general population.

Senior Games participants experienced more years of physical activity and higher levels of current aerobic and anaerobic activity than the general population. They also reported better general health, and lower levels of obesity, diabetes, and depression. Better health outcomes among Senior Games participants are consistent with their more years and higher levels of physical activity.

Above 80% of Senior Games participants and the general population agreed that they were motivated to be physically active to feel physically and mentally better now and to prevent or slow down physical health problems and cognitive decline in the future. Consistent with the health benefits now known to be associated with physical activity (CDC, 2011; Gill et al., 2013; Middleton, Barnes, Lui, & Yaffe, 2010; Middleton et al., 2011), a large portion of individuals in the current study identified with these potential benefits of physical activity. However, the level of agreement was significantly greater among Senior Games participants than in the general population, even after adjusting for selected demographic and health history variables. Senior Games participants may have been more likely to believe in the physical and mental health benefits of physical activity as they experienced

both better physical and mental health and more years of physical activity. Lower levels of chronic disease and health-related conditions may have also been recognized among Senior Games participants, and attributed to their physical activity and related healthy lifestyle choices. For example, increased energy, weight management, and social benefits can make physical activity more satisfying, rewarding, and fun, thereby contributing to the maintenance of the behavior.

Senior Games participants experienced a greater number of years of regular physical activity and higher levels of current aerobic and anaerobic activity than the general population. Adjustment for differences in age, sex, race/ethnicity, BMI, and IMT, as well as the presence of diabetes, high blood pressure, high cholesterol, and depression, explained some but not most of the higher levels of physical activity among Senior Games participants. The most consistent and strongest factor associated with their greater number of years of regular physical activity and current aerobic and anaerobic activity was lower BMI. Lower BMI may be associated with weight management efforts, lower chronic disease and disease-related conditions, and greater ease, enjoyment, and fun in physical activity. Given that Senior Games participants previously ranked recreational enjoyment or fun as the greatest motivator for physical activity (Merrill, et al., 2004), much of the unexplained higher level of physical activity among these individuals may be due to this factor.

Participants from the Senior Games reported feeling healthy and full of energy for 5.5 more days in the past 30 days than those in the general population. Greater levels of physical activity, along with less obesity, diabetes, and depression among Senior Games participants, each shown in previous studies to improve quality of life (CDC, 2011; de Jonge et al., 2009; Healy et al., 2008; Johns, Hartmann-Boyce, Jebb, Aveyard, & Behavioral Weight Management Review Group, 2014; Mayo Clinic, 2012; Rubin & Peyrot, 1999; Schuch, Vasconcelos-Moreno, Borowsky, & Fleck, 2011; Vazquez et al., 2007), only explained 1.2 of these days. This result suggests that people who are physically active are more likely to also have other healthy behaviors such as better nutrition (Fleig, Kerschreiter, Schwarzer, Pomp, & Lippke, 2014; Institute for Health Metrics and Evaluation, 2014).

Among the Senior Games and general population samples that had previously been told by a doctor or other health professional that they had diabetes, high blood pressure, high cholesterol, or depression, 60% or more said that these extrinsic factors motivated them to be more physically active. The increased motivation for physical activity did not differ between Senior Games participants and the general population. Another study reported that health problems are a primary motivator of physical activity for physically active adults in rural environments (Kegler et al., 2013). However, unless this motivator is combined with eventual satisfaction, enjoyment, or fun in their physical acivity, it may not be sufficient to maintain the behavior. In another study, perceived severity among patients with coronary artery disease predicted exercise intentions and, in turn, exercise behavior (Tulloch et al., 2009).

People tend to link physical and mental health with physical activity. Above 95% of Senior Games participants and 85% of the general population agreed that they were motivated to be physically active to feel physically and mentally better now and to prevent or slow down physical health problems and cognitive decline in the future. Senior Games participants may have been more likely to believe in the physical and mental health benefits of physical activity as they experienced more years of physical activity and a greater level of current physical activity, as well as better physical and mental health. Lower levels of chronic disease and health-related conditions may have been attributed to their physical activity and other healthy lifestyle choices. In turn, better health may have made physical activity more satisfying, enjoyable, and fun. The level of agreement with these quality of life indicators was significantly greater than seen in the general population, even after adjusting for selected demographic and health history variables.

Previous research has identified social interactions as an important motivator for participation in physical activity (Capalb, O'Halloran, & Liamputtong, 2014; Kahn et al., 2002). In a previous study of Senior Games participants, the level of agreement that physical activity was motivated by social reasons rounded out the top five of 14 possible reasons for being physically active (Merrill, et al., 2004). In the current study, 73.4% of Senior Games participants said that social opportunities motivated their physical activity. Senior Games participants were 85% more likely than the general population to agree that social opportunities motivated their physical activity. These results support the idea that the social opportunities provided by the Senior Games likely contributed to feelings of competence, autonomy, and relatedness. Ryan and Deci (2000) found in their review of the literature that these feelings help maintain intrinsic motivation, as well as cause one to become more self-determined in his or her consequential social opportunities.

Although 62.9% of Senior Games participants and 67.2% of Good Life Expo participants agreed that they were motivated to be physically active to help manage stress, this level of agreement was lower compared with agreement of being physically active to feel physically and mentally better today or to slow physical and cognitive decline in the future. Research has shown that physical activity can help manage stress (Manger & Motta, 2005; Nabkasorn et al., 2006; P. Salmon, 2001), and studies have linked chronic stress with certain health problems such as decline in verbal learning and memory

(Agbenyikey et al., 2015), digestive diseases (Lee et al., 2015), and heart disease (Kurd et al., 2014). It is unclear whether the comparatively lower level of agreement that physical activity is done to help manage stress is because stress is less common than a desire to feel mentally and physically good today and to relieve physical and mental decline in the future or because the link between chronic stress and related health consequences is less understood.

Level of agreement with the statement that a family history of disease motivates physically active was lowest among Senior Games participants and second lowest in Good Life Expo participants. Other studies have shown family history of disease to be a weak motivator of physical activity (Shuval et al., 2013; Slattery, Schumacher, Hunt, & Williams, 1993). This may be because a family history of disease is more vague and difficult to relate to compared with how you feel today or the social benefits associated with the activity. This appears to be even more pronounced among Senior Games participants, although the difference in agreement with this item is not significant after adjusting for age and sex.

The primary limitation of this study is that the results are based on a convenience sample. However, the Good Life Expo participants who we used to represent the general population had similar levels of general health, obesity, diabetes, depression, and selected health-related conditions as the general population. In addition, because responses were self-reported, response bias is a possibility. However, the survey response rates were high, and all participants were informed that the survey was anonymous prior to completing the questionnaire. The survey also failed to collect certain information (e.g., income, neighborhood, psychosocial factors), which may have further been informative. Finally, generalization of the results is limited, as the study population primarily reflected educated, White, married individuals.

Conclusion

This study compared physical activity behaviors between Senior Games participants and the general population. Senior Games participants experienced more years of regular physical activity and higher levels of current aerobic and anaerobic behavior than the general population. They also experienced better general health with lower prevalence of obesity, diabetes, and depression than the general population. Physical and mental health was associated with physical activity by most individuals. However, the connection was stronger among Senior Games participants, possibly because they experienced more years and a greater level of current physical activity, as well as better quality of life.

The extrinsic motivators of a diagnosis of diabetes or a chronic condition motivated physical activity similarly between Senior Games participants and the general population. However, Senior Games participants were more likely to be motivated to be physically active for better physical and mental health now, to prevent physical and cognitive decline, and to provide social opportunities. This may be because they were more likely to have experienced the benefits of physical activity. That is, longer duration of physical activity promotes a greater appreciation for the benefits it can have in terms of physical and mental health and social opportunities. Better physical and mental health and social opportunities can, in turn, promote the intrinsic benefits of skill development, satisfaction of learning, enjoyment, and fun.

A primary aim should be to help individuals who are extrinsically motivated to be physically active to develop intrinsic rewards that can lead to lifelong behavior change. The Senior Games facilitates extrinsic motivators to positively influence intrinsic promoters. Further research may consider how to increase the number and accessibility of such venues to older adults.

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