Physical Activity and Senior Games Participation:

Benefits, Constraints, and Behaviors

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Abstract

The purpose of this paper is to examine the physical activity perceptions and behaviors of older adults who were active participants in a statewide senior games (i.e., North Carolina Senior Games; NCSG) program with its focus on year-round involvement through activities in local communities. A random sample of 440 older adults (55 years and older) completed a questionnaire in 2006 about their participation in community-based senior games. A uniqueness of this study is the focus on active older adults, which provides insight into how to maintain physical involvement. Older adults who were most active perceived the most benefits from senior games, but did not necessarily have the fewest constraints. This study of NCSG as an organization designed to promote healthy living in communities offered an example of how a social ecological framework aimed at health promotion can be applied.

Keywords: benefits, constraints, leisure, social ecology
Physical Activity and Senior Games Participation: Benefits, Constraints, and Behaviors

The importance of physical activity (PA) as an element of healthy living for older adults has been widely addressed in the literature (e.g., Dionigi, 2006; King, Rejeski, & Buchner, 1998; U.S. Department of Health and Human Services, 2000). Physically active older adults can reduce or prevent functional declines linked to aging through improved cardiovascular functioning, reduced risk of osteoporosis, reduced risk of falling, and reduced loss of muscle mass and strength (Goggin & Morrow, 2001). However, surveys such as the Behavioral Risk Factor Surveillance System (BRFSS; Centers for Disease Control and Prevention, 2005) show that only one third of persons aged 65 years and older participate in regular sustained physical activity defined as 30+ minutes of moderate physical activity five or more days per week, or vigorous physical activity for 20+ minutes three or more days per week. Therefore, ways older adults can modify their behaviors or leisure lifestyles to be more active are critical to promoting their health and independence, preventing or delaying illness or disability, and supporting a better quality of life. Modifying lifestyles, however, includes more than just changing individual health behaviors.

A framework applied to understanding health behavior that moves beyond only a focus on the individual is the social ecological model (McLeroy, Bilbeau, Steckler, & Glanz, 1988; Stokols, 1992). This model posits that multiple facets of physical and social environments influence the well-being of people. Environments enhance a range of behaviors by promoting and sometimes requiring certain actions while discouraging or prohibiting other behaviors.

One program associated with community environments is Senior Games, which has the potential to influence the physical and social activity of older adults. The purpose of this paper
was to examine the PA behaviors and perceptions of older adults who were active participants in a statewide senior games (i.e., North Carolina Senior Games; NCSG) program with its focus on year-round participation through activities in local communities. Specific research questions included: a) what physical activity behaviors occur due to NCSG participation, b) what are the perceived benefits of and constraints to participation, and c) how are demographic characteristics, behaviors, and perceptions related to NCSG participation for older adults? This research offered a way to reflect on the importance of a social ecological model for promoting PA among older adults in communities. Studying active participants helped in understanding more about the motivations and environments for continuing involvement in a community organization such as NCSG.

Background

Some context for understanding the NCSG may be helpful in setting the stage for this research prior to describing the background literature and the theoretical framework. Senior Games is a national movement existing in many states that encourages older adults to be active in sports and fitness programs as well as creative arts. NCSG is one of the oldest and largest programs in the US, and has often been used as a model for other state programs. The vision of NCSG since its inception in 1983 has been to create a year-round health promotion and education program for North Carolinians 55 years of age and better. In 2006, over 60,000 participants in 52 Local Games programs were served in all 100 counties across the state. NCSG is designed to be a holistic approach to health through body, mind, and spirit that emphasizes staying fit and enjoying the company of friends, family, spectators, and volunteers (North Carolina Senior Games, 2007). Senior Games includes Local Games, SilverArts (visual, heritage, literary, and performing arts), SilverLiners (line dancing), SilverStriders (walking program),
Silver Classic (special events), and State Finals. Although NCSG includes State Finals each year and the opportunity for participants to qualify for national competition, the heart of the program is the Local Games and the training and preparation year-round for that involvement. In sum, NCSG promotes active participation in sports, physical activity, and creative arts with an emphasis on social interaction and active engagement for the state’s older adults.

Physical activity, and especially exercise adherence, has been examined from a number of theoretical frameworks and models (Glanz & Rimer, 1995). We selected the framework of social ecology as the overarching foundation for examining older adults’ participation in NCSG and their perceptions about PA. The social ecological model allowed us to examine individual, social, and community factors that influenced the perceptions and involvement of older adults in NCSG.

Theoretical Framework

Social ecology has been used in active living research in the past 15 years as a context for examining the possibilities for health and PA for all individuals including older adults (Sallis, Bauman, & Pratt, 1998). Li et al. (2005) suggested that a multilevel approach is necessary in studying the physical activity of older adults since most of this activity takes place in the community or neighborhood context. According to McLeroy et al. (1988), five factors comprise social ecology that affect how or why one might participate or fail to participate in a healthy behavior such as physically active leisure: intrapersonal, interpersonal, institutional, community, and public policy.

Intrapersonal factors include psychological and biological variables as well as the developmental history associated with an individual. Interpersonal refers to relationships with others such as family, friends, and coworkers. Institutional aspects of social ecology include
organizations such as schools, health organizations, and programs like NCSG. Community factors comprise social environments and the relationships among groups. Public policy concerns the laws and policies at local, state, and national levels (Sallis et al., 1998).

The ecological environment fosters constraints (i.e., barriers) as well as enablers (i.e., perceived benefits, social support, organizational structures) that affect behavior. We examined specifically the intrapersonal (i.e., individual), interpersonal (i.e., social), and institutional/community (i.e., local NCSG structure) factors associated with physical activity and this ecological model. Although intrapersonal elements are important, older adults live in social environments and in communities that offer both supports and barriers to their health. Further, Orsega-Smith, Payne, and Godbey (2003) noted that middle age and older adults most often participated in PA programs that are available through local community organizations. One aspect of the ecological model that cannot be overlooked, however, is perceived intrapersonal benefits and constraints.

Intrapersonal Issues

Researchers have examined various intrapersonal theories regarding why older adults may or may not participate in physical activity and sports. Many of these studies relate to perceived benefits and barriers or constraints. For example, Resnick (2005) used Bandura’s theory of self-efficacy (i.e., confidence that one can participate) to examine how psychological processes can create and strengthen expectations of personal efficacy in PA for older adults. Merrill, Shields, Wood, and Beck (2004) employed social cognitive theory in studying (world) senior games participants. They suggested that individual choices of behavior (i.e., participation in senior games) were preceded by rational decision-making process dictated by a combination of self-efficacy beliefs, outcome expectations, individual goal setting, and perceived
environmental facilitators and barriers. Few studies, however, have examined older adults’ PA experiences related to the opportunities offered by a community based organization such as NCSG.

Leisure researchers often refer to enablers as situations that afford opportunities for individuals to participate in an activity like PA (Mannell & Kleiber, 1997). Enablers also reflect the spectrum of the social ecological model in that enabling can occur in the form of perceived benefits and individual motivation or satisfaction, social support, and community opportunities. In the leisure time PA literature, benefits to exercise has been commonly examined (e.g., Dergance, Calmbach, Dhanda, Miles, Hazuda, & Mouton, 2003; Payne, Mowen, & Montoro-Rodriquez, 2006). However, fewer efforts have focused specifically on active older adults who are involved in competitive sport opportunities (Dionigi, 2006). Researchers (e.g., Dionigi; Merrill et al., 2004; Newton & Fry, 1998) concluded that a variety of personal reasons exist for competitive sport activities, but most are related to enjoyment and social reasons in addition to the health benefit expectations.

Another intrapersonal construct widely studied relative to recreation and physical activity is constraints. Constraints, which are also referred to as barriers, are not the complete opposite of benefits or enablers. Constraints are not immovable static obstacles to participation (Jackson, 2005) such as might be connoted by the notion of barriers. Rather, constraints to leisure are defined as anything that inhibits people’s ability to participate in leisure activities, to spend more time doing so, to take advantage of leisure services, or to achieve a desired level of satisfaction (Jackson, 1988). Therefore, constraints for older adults are about more than just not participating. Constraints relate to how much participation, what supports and services are available to
encourage or discourage participation, and the satisfactions and benefits derived from the experiences.

Researchers have frequently examined why older adults do not participate in PA. For example, Dergance et al. (2003) found that self-consciousness, lack of time, knowledge, companionship, and facilities were the greatest barriers to exercise. Henderson and Ainsworth (2000) ascertained that seasons and weather, safety, being physically and/or emotionally tired, and not having exercise partners were the major reasons why older minority women did not participate in the moderate activity of walking. Lees, Clark, Nigg, and Newman (2005) conducted focus groups with older adults who were exercisers as well as those who were not. The nonexercisers mentioned falling, inertia (i.e., getting started or getting going), and negative affect as reasons for not exercising. The exercisers saw the barriers as inertia, time constraints, and physical ailments. Interestingly, even though exercisers reported somewhat similar barriers, they continued to be active. Leisure researchers have referred to this idea as constraints negotiation (Jackson, 2005). Constraints do not necessarily mean that individuals do not participate. These studies also showed that constraints encompass intrapersonal (e.g., time, self-consciousness, physical (dis)abilities) aspects as well as social (e.g., companionship or exercise partners) and community (e.g., facilities, lack of information) factors.

Interpersonal Relationships

Many studies of older athletes have focused on psychological perspectives moreso than sociocultural factors (Dionigi, 2006). However, social support and interpersonal relationships with family and friends are key elements in the social ecology model. For this study, we also considered some of the social group categories (e.g., race, residence, gender) that have shown a relationship to physical activity involvement.
Researchers have advocated for the important role that social support plays in maintaining well-being and in sustaining activity (e.g., Gibson, Ashton-Shaeffer, Green, & Autry, 2003/2004; King, 2001; Li et al., 2005; Lyons & Dionigi, 2007). Giles-Corti and Donovan (2002) found that for adults in general, individual and social environmental determinants were more important than community opportunities. Having access to activities and recreation spaces was important but not sufficient to encourage PA without social support in the form of exercise partners or through recreation-focused organizations. Further, Lyons and Dionigi found that a shared interest and comrades in continued activity were important for Masters’ sports participants. King’s research showed that older adults prefer to do physical activities alone, but women more than men were likely to prefer group-based PA. Having companions is generally an enabler of PA, although for some older adults having caregiving roles may make other people a constraint (e.g., having an ill spouse that requires around the clock assistance).

When considering any aspect of the social ecological model relative to intrapersonal and interpersonal aspects, great variation obviously exists within diverse older populations (Prohaska et al., 2006). For example, younger older adults (i.e., 60-69 years) are more likely to participate in PA than older persons (i.e., 70 years and older; Prohaska et al.). Older men are more likely than older women to participate in PA, although this measure often relates to leisure time PA and women may be active in their daily lives in other ways (e.g., housework; Henderson, Bialeschki, Shaw, & Freysinger, 1996). In addition, White rather than Black or Hispanic aging persons are more likely to be active (U.S. Department of Health and Human Services, 1996). Rural women tend to be less active than urban women (Wilcox, Bopp, Oberrecht, Kammermann, &
McElmurray, 2003). These social group membership categories also relate to the community environments that influence people’s lives every day.

Supportive Community Environments

A third dimension in the social ecology model is how PA is encouraged and maintained for older adults through institutions (i.e., organizations like NCSG) and communities. Sallis et al. (1998) as well as Li et al. (2005) described the need for supportive environments for individuals to be physically active such as community settings, facilities, and programs. Program factors related to activity are closely associated with convenience and opportunities close to home (Brawley, Rejeski, & King, 2003). The structure of NCSG may be particularly important because of its locally based focus, even though individuals have opportunities to participate in state, national, and even world competitions.

Prohaska et al. (2006) indicated questions requiring further exploration about physical activity and aging include the types and levels of PA, the health benefits and factors that influence participation, and the interventions (i.e., programs) that can be developed to promote PA in older adults. Through examining perceived behaviors, benefits, and constraints in the context of NCSG, we aimed to uncover information to better understand how a community focused program can enable PA and therefore, improve the health for older adults.

Methods

Participants

Although the definitions of older adult vary greatly, we used 55 years and older in this study since 55 years is the age minimum for NCSG participation. After approval from the Institutional Review Board, a random sample of 1000 participants was drawn. Each local community submitted a list of names and addresses of participants from the 2006 local spring
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A random sample was drawn from the 10,000 names that were submitted. Each participant drawn was sent a survey along with a cover letter that described the study. Participants were given an opportunity to enter a drawing for $100 cash if they completed the questionnaire and included their name and address on a separate printed page. A self-addressed stamped envelope was included with the mailing. A follow-up post card reminder was sent two weeks after the first mailing.

A total of 444 usable surveys (i.e., 30 surveys were undeliverable) were returned for a response rate of 46%. The number of women and men who responded was almost the same (52%, 48% respectively). Almost 81% were white and not of Hispanic origin with 10% African American and 5% American Indian. Both the mean and the median age were 70 years with a range of 55-96 years. About 69% were married. All but 6% had a high school education with 44% having at least a bachelor’s degree. One quarter of the respondents had household incomes over $60,000 per year and about 30% had incomes under $29,999 per year. Almost two-thirds of the sample was from rural areas of the state and 36% from urban areas.

Overall this group of respondents mirrored the composition of NCSG based on the annual demographic data collected from local NCSG coordinators. This sample was somewhat reflective of the state census data with a few exceptions (U.S. Census Bureau, 2000). The NCSG participants did not represent the 21% of the state that is African American but overrepresented the 1% American Indian population. The income level for NCSG participants who made over $60,000 was the same for the state but the state percentage overall of households with incomes under $30,000 was higher in the general population (38%). The educational level of NCSG respondents was much higher since the state average of individuals without a high school education is 22% and only 23% have a Bachelors degree or higher. Overall, these NCSG survey
participants were more highly educated with more disposable income than the state general population.

Instrument Development

NCSG evaluates its program every four years. We started with a template that had been used in 2002 to measure various market driven questions about satisfaction, reasons for participating, perceptions about organizational effectiveness, and demographics. Additional questions were added to address benefits and constraints specifically.

The draft survey was developed in collaboration with NCSG staff. Several specialists from the North Carolina aging network reviewed the survey and provided feedback to aid in determining face validity. One of the researchers took the draft instrument to a focus group of NCSG Ambassadors (i.e., participants from Local Games trained to promote participation in their geographic area) who provided verbal feedback about the questions that we proposed. After this feedback was considered and modifications made, a pilot survey was mailed to 60 additional Ambassadors who completed it and provided further comments about wording and question meanings. Minor changes were made to finalize the instrument.

The survey items addressed in this paper include participation in the programs offered (e.g., SilverArts, Local Games, State Games), a benefits scale, a constraints scale, questions about moderate and vigorous physical activity as well as health compared to others as asked in the Behavioral Risk Factor Surveillance System (BRFSS; Centers for Disease Control and Prevention, 2005), physical and social behaviors attributed to NCSG, and demographic questions. The questionnaire was four pages in length (in 12 point font) and took about 15-20 minutes to complete. Additional scales related to reasons for participation and evaluation of the program were asked but not analyzed in this paper.
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Few reliable and valid measures of social environments for physical activity for older adults exist (Li et al., 2005). Although objective measures (e.g., pedometers, accelerometers) of physical activity for these NCSG participants would have yielded interesting information, we chose to focus on subjective data due to cost limitations. We were also interested in the perceptions of physical and social involvement from the NCSG participants themselves.

The two scales in the questionnaire related to benefits and constraints were adapted and modified from the San Diego Health and Exercise Questionnaire (Dergance et al., 2003) that focused on benefits and barriers. We adapted 13 NCSG benefits agreement statements for our study with $\alpha=.94$ for these NCSG participants. Our perceived constraints to PA instrument included 12 questions ($\alpha=.86$) from the original 15 items in Dergance et al.’s study. We chose not to use the constraints items about energy, enjoyment, and weather since the pilot study indicated some misunderstanding of these statements. The benefits scale used a 5-point Likert scale (i.e., 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree) and the constraints scale also used a 5-point Likert scale with 1 = never, 2 = almost never, 3 = neutral, 4 = often, and 5 = very often.

To examine the behaviors of older adults attributed to NCSG experiences, we used items from the BRFSS (Centers for Disease Control and Prevention, 2005) as well as other questions about physical and social behavior as a result of NCSG. Since this study was cross-sectional and not experimental, we wanted some basis for comparing the NCSG participants to the general aging population in the state in terms of their perceived health and perceived moderate physical activity behaviors. The BRFSS items used in our study pertained to perceived health (i.e., How would you rate your present health compared with others your age? Excellent, very good, good, fair, poor) and to the amount of moderate and vigorous activity. The BFRSS asks three questions
about moderate activities (i.e., Do you do moderate activities for at least 10 minutes at a time such as brisk walking, bicycling, vacuuming, gardening, or anything else that causes some increase in breathing or heart rate? How many days per week do you do these moderate activities for at least 10 minutes at a time? On days when you do moderate activities for at least 10 minutes at a time, how much total time per day do you spend doing these activities?) The same questions were asked for vigorous activity except that vigorous was defined as running, aerobics, heavy yard work, or anything else that causes large increases in breathing or heart rate.

Other questions that examined NCSG behaviors included whether training or preparing for NCSG was a part of weekly activities (yes/no) and perceptions of whether NCSG provides motivation to be more physically or socially active (yes/no). These items along with the benefits, constraints, and demographic questions (i.e., age, race, rural verses urban, gender, level of education, and annual household income) provided the variables for addressing the third research question about associations among the variables that would help to understand the dimensions of PA involvement.

Data Analysis

Survey questions were coded and analyzed using SPSS 15. The behaviors of older adults in NCSG were analyzed primarily using descriptive statistics. The amount of physical activity was calculated for those older adults who said they did moderate activities at least 10 minutes of activity at a time. The total number of days a week was examined relative to minutes per day to determine how many people met the PA recommendation. Regular sustained PA was defined as 30+ minutes of moderate physical activity five or more days per week, or vigorous physical activity for 20+ minutes three or more days per week. After examining the results we obtained from the questions about vigorous activity, we suspected that some respondents were not making
a distinction between vigorous and moderate activity (e.g., several individuals listed 4 hours of vigorous activity associated with playing golf). Therefore, we decided to use only the moderate PA data from this study. The older adults were divided into two groups based on moderate PA: individuals who met the recommendation and individuals who did not.

The senior games benefits scale resulted in a one factor solution that explained 59% of the variance. A list of the questions included can be found in Table 1.

Table 1 about here

Constraints to physical activity yielded a three factor solution that addressed various dimensions within the social ecological model. The three factors were labeled: *community linked constraints* (i.e., equipment, skills, facilities, and knowledge), *social influence constraints* (i.e., interest, time, company, and discouragement) and *intrapersonal constraints* (self-consciousness, self-discipline, good health, and injury). The constraints were moderately correlated with one another: *community linked* were correlated with *social influences* with $r = .61$, *community linked* were correlated with *intrapersonal* with $r = .56$, and *social influences* were correlated with *intrapersonal* with $r = .69$. (See Table 2) The factor structure for constraints did not directly mirror the three social ecological categories of community, interpersonal, and intrapersonal but the three factors did reflect these definitions to some extent. The moderate correlation among these factors indicated the apparent overlap in these categories. Each of the items in the factors were summed and divided by the number of items in that factor. In this case, the mean scores closest to 1.0 reflected the least constraints or barriers.

Table 2 about here

Relationships among the benefits and constraints perceptions, behaviors associated with NCSG, and demographic characteristics were analyzed with appropriate bivariate statistics such
as t-tests and analysis of variance. We attempted to examine these data using regression analysis, but the predictive outcome explained little variance. Therefore, we were only able to describe associations among the variables.

In addition, several demographic questions were recoded for these analyses. Age information was collected using birth date as a continuous variable. We recognized that since people are living longer, the functioning of a 55 year old may be quite different than someone who is 85 years old. For purposes of this analysis, we initially divided age into two groups, 55-64 years and 65 years and older. This division aimed to separate individuals who might be employed from individuals who had reached “retirement” age. The living arrangements question was recoded into three groups: living alone, living with spouse, or living with other(s) such as with a relative or in a facility such as assisted living. Because the numbers of people of color for specific racial and ethnic backgrounds was small, we made race a dichotomous variable with white and people of color as the two distinctions. By examining zip code information relative to the North Carolina Rural Economic Development Center designations, the categories of rural and urban were ascertained. The education variable included less than high school, high school, some college including community college or technical school, and college graduate. Annual household income per year included under $19,999, $20,000-39,999, $40,000-59,999, and over $60,000. The five categories of health status suggested by the BRFSS were used (i.e., excellent, very good, average, fair, poor).

Results

The results of this survey are discussed related to the research questions: behaviors of NCSG participants, perceived benefits and constraints regarding NCSG involvement, and participant demographic characteristics associated with perceptions and behaviors.
NCSG Participant Behaviors

Some individuals who responded to the questionnaire had participated in NCSG since its existence while others were new to the program. The greatest participation occurred at the local level with an average of 6 years ($SD = 5.41$). Over half had participated in State Finals for an average of 5 years ($SD = 4.85$) with 13% participating in the National Senior Games ($M = 3.23$, $SD = 3.85$) at some point during their NCSG tenure. Although the focus of NCSG has traditionally been on “competitive” sports, NCSG offers programs to keep older adults active in a variety of physical, social, and creative ways. Among the other activities, 22% of the respondents participated in SilverArts, 6% in SilverStriders, and about 1% in SilverLiners. About 11% said they had volunteered for Senior Games and another 9% had participated in Clinics and Workshops sponsored by NCSG.

Three-quarters (75%) of the NCSG respondents rated their health as very good to excellent. In the 2005 BRFSS (Centers for Disease Control and Prevention, 2005) data for North Carolina, 43% of those residents age 55-64 years and 32% who were 65 years and older rated their health as very good to excellent. The NCSG participants rated their health better than the NC older adult population in general. Our data also indicated that 60% of the 55-64 year olds were moderately active compared to 40% of that age group found in the 2005 BRFSS. For individuals 65 years and older, 64% of the NCSG respondents said they were moderately active compared to the BRFSS data statistics that indicated only 34% of the state’s residents were moderately active.

In addition, 61% of the respondents answered “yes” to Does your participation in SG motivate you to be more physically active and 66% indicated “yes” to Does your participation in SG motivate you to be more socially active (that is, be more involved with other people)? Of
particular importance to examining the influence of a community based program was the finding that almost three-quarters (73%) said that training and preparation for NCSG was a part of their regular weekly activities. Therefore, NCSG participants perceived themselves as more active and healthier than other older adults in the state. In addition, they attributed NCSG to enhancing these healthy behaviors.

Benefits and Constraints

The benefits scale yielded one factor that we labeled simply benefits. The item that was rated highest was SG helps me to meet more people followed closely by SG games makes me feel good about life (See Table 1). The least agreement in terms of benefits but still averaging on the agree side of the scale included SG keeps me from getting sick and SG helps me cope with pain. The average score on all benefits items for the group was 3.9 based on the 5-point Likert scale. These benefit items focused primarily on intrapersonal aspects of participation (e.g., improves health, increases physical strength, increases my self-esteem) but the benefits also addressed interpersonal outcomes including meeting more people and getting out more.

The least constraining issues involved the community linked factor. The social influences were the most constraining, although all the individual constraints items averaged about 2 (i.e., almost never) on the five point Likert scale. The highest rated constraints items were lack of time followed by lack of self discipline. The constraint of lack of time is commonly found in research results. Generally this stated constraint is linked to other reasons that underlie time (e.g., care giving roles; Henderson & Ainsworth, 2000). Nevertheless, Table 2 provides a summary of the means and standard deviations of all the constraints items and the three factors.

Characteristics Related to Behaviors and Perceptions
As a group these participants in NCSG perceived high benefits and some constraints to their involvement in NCSG. We were interested further in how well NCSG was addressing individuals from different demographic groups defined by characteristics such as gender, age, living arrangements, income, educational level, race, health status, actual physical activity involvement, and centrality of NCSG to people’s lives.

In our analyses, the benefits of NCSG were rated statistically significantly higher for women than men. For example, a statistically significant difference was found between the men ($M = 3.79, SD = .65$) and the women ($M = 4.02, SD = .58$) participants with women having higher benefit scores with a small effect size, $t(335) = 3.35, p = .001, d = .37$. No differences were found based on gender regarding any of the constraints factors.

The ages of older adults in our sample were widely distributed as is true in the older adult population in general. Therefore, we examined benefits and constraints by dividing the sample into two groups: 55-64 years and 65 and over. Interestingly, participants aged 55-64 years ($M = 1.67, SD = .78, M = 1.93, SD = .76$, respectively) had more *community linked*, $t(391) = 2.68, p = .008, d = .29$, and *social influences*, $t(395) = 3.19, p = .002, d = .34$ as constraints than participants over 65 years ($M = 1.46, SD = .65, M = 1.69, SD = .63$, respectively). The effect sizes were small on the respective constraints factors indicating a small magnitude of differences.

Living arrangements, income, educational level, race, and geographic (i.e., rural/urban) were compared in relation to benefits and constraints to physical activity within NCSG. Living arrangements reflected differences in the benefits scale but not related to any of the constraints. Individuals who lived alone ($M = 4.07, SD = .71$) reported greater benefits from their involvement in NCSG than individuals living with a spouse ($M = 3.84, SD = .61$), $F(2,332) = 3.61, p = .03$. Income and educational level also offered some statistically significant differences
related to benefits but no differences for any of the constraints factors. NCSG participants with a high school education or less ($M = 4.1, SD = .56$) reported a higher benefits score than college graduates ($M = 3.8, SD = .64$), $F(3,334) = 5.32, p = .001$. Similarly, participants with incomes less than $19,000 ($M = 4.04, SD = .59$) reported more benefits than individuals with household incomes over $60,000 ($M = 3.75, SD = .64$), $F(3,293) = 3.43, p = .02$. Benefits and constraints were not statistically significant for either race (i.e., people of color, white) or for geographic location (i.e., rural, urban).

Perceived health was an area of interest relative to benefits and constraints. Fewer constraints were associated with better health although health did not have a direct relationship to benefits. As might be expected, individuals who described their health as excellent ($M = 1.37, SD = .56$) perceived that they had fewer community linked constraints to physical activity than individuals who described their health as good ($M = 1.74, SD = .79$), $F(3,392) = 5.77, p = .001$. Similarly, individuals in excellent health ($M = 1.61, SD = .59$) had fewer social influence constraints than people in either good ($M = 2.03, SD = .62$) or fair ($M = 2.08, SD = .81$) health, $F(3,394) = 8.32, p = .00$. Further, NCSG participants in excellent health ($M = 1.39, SD = .40$) had fewer intrapersonal issues compared in individuals who rated themselves in poor health ($M = 2.25, SD = .82$), $F(3,399) = 31.28, p < .000$.

Several relationships with moderate physical activity were related to benefits and constraints. NCSG participants who indicated that they received the recommended amount of moderate physical activity each day according to the BRFSS ($M = 1.54, SD = .54$) had fewer intrapersonal constraints than individuals who did not meet that daily recommendation ($M = 1.67, SD = .62$), $t(342) = 2.01, p = .045, d = .21$. Individuals who said that they were more physically active because of NCSG ($M = 4.13, SD = .50$) perceived much greater benefits than
people who did not think NCSG helped them be any more physically active ($M = 3.41, SD = .62$), $t(335) = 11.47, p < .000, d = 1.27$. The magnitude of the effect size was high indicating a large difference between more active and less active participants. Therefore, beliefs about benefits of NCSG had a strong relationship to recommended physical activity level.

Individuals were also asked about whether training and preparing for NCSG was a part of their daily routines. Older adults who indicated training was a part of their daily routine ($M = 4.00, SD = .59$) perceived greater benefits than individuals who answered no to the question ($M = 3.5, SD = .64$), $t(337) = 6.09, p = .001, d = .81$. Participants with NCSG training as part of their daily routines ($M = 1.69, SD = .62$) also had fewer social influences as constraints than individuals who did not have training and preparation as part of their routine ($M = 1.97, SD = .79$), $t(395) = 3.48, p = .001, d = .39$. Similarly, individuals who had NCSG training and preparation as part of their routine ($M = 1.56, SD = .56$) had fewer intrapersonal constraints than older adults who did not do such training ($M = 1.80, SD = .71$), $t(398) = 3.31, p = .001, d = .38$.

Discussion

King et al. (1998) suggested that further research about older adults was needed to adapt and refine the current physical activity recommendations to address issues targeted toward older adults. In addition, more research is needed to examine the generalizability of results to diverse populations (e.g., frail elderly, ethnic minorities, rural elderly) and to investigate the environmental and policy-level approaches to promote PA among older adults. Through addressing our research questions, this study contributed to several of these suggestions including an examination of diverse active older adult populations and in assessing the influence of a community-based PA program for older adults.
Understanding the results requires keeping in mind the nature of NCSG as an intervention. NCSG is focused on improving the health of older adults through opportunities to participate in year-round exercise, sport, and creative art programs in local communities. Local programs are organized differently but generally a parks and recreation department in cooperation with the local aging program coordinates the activities. In addition to the physical and creative opportunities for involvement, a number of NCSG participants in each local community are year-round volunteers responsible for the local training as well as the yearly Local Games competition. Some of these older adults take on roles as trainers or instructors for their peers. The incentives offered in terms of medals for age groups (i.e., 5-year men and women’s age groups from 55 to 95+ years) also provide extrinsic motivation for individuals who find these accolades rewarding. If the program only targeted participation in the once-a-year local competition that qualifies individuals for the state finals, then the benefits, constraints, and behaviors might be somewhat different.

Our findings were consistent with other research that has shown that older adults are most likely to be active in their communities when opportunities exist (Orsega-Smith et al., 2003). Older adults who responded in this survey indicated that preparing and training for NCSG was a part of their year-round weekly routines. These opportunities resulted in perceptions of better health and greater moderate PA involvement (i.e., defined as 30+ minutes of moderate physical activity five or more days per week), which was twice as high as the state’s BRFSS averages for older adults.

Participants said they were more physically and socially active because of NCSG. The benefits of NCSG particularly related to intrapersonal and interpersonal dimensions were highly rated. Similarly, Goggin and Morrow (2001) as well as Dergance et al. (2003) paralleled our
results in that they found individuals who perceived PA as very important were more likely to be active. The major benefits in our study related to meeting people and feeling good about oneself. Although health benefits (e.g., health, energy, lung and heart function) were important, the concomitant benefits associated with being a part of NCSG as an organization resulted in social benefits being the most highly rated item. Giles-Corti and Donovan (2002) similarly found that access to activities and recreation spaces was important but not sufficient to encourage PA without social support in the form of exercise partners or through recreation-focused organizations. Lyons and Dionigi (2007) also confirmed that a shared interest and comrades in continued activity were integral to sports participation.

Our results differed slightly from other studies such as Merrill et al. (2004) who found world senior games participants (i.e., primarily elite athletes) identified physical health to be the most important reason for participating followed by recreation and social elements. Dergance et al. (2003) found that improved health and function were the major benefits of PA. Our study was somewhat different in that we focused specifically on the benefits of involvement in NCSG in general rather than focusing only on exercise more specifically.

Although respondents indicated that constraints existed to their involvement in all aspects of the NCSG program, these results were mostly in the category of “almost never” and related to typical inactivity responses like lack of time and lack of discipline. Barriers and constraints to physical activity have been widely studied with somewhat similar results. For example, Dergance et al. (2003) found that self-consciousness, lack of time, knowledge, companionship, and facilities were the major barriers. In our study, we determined that lack of time, discipline, and lack of company were the greatest constraints. Interestingly, the older aged adults (65 years and older) had fewer overall constraints than did younger older adults. Unlike Dergance’s study
that focused specifically on physical activity, lack of good health and fear of injury were not major constraints with this group of NCSG respondents even among the oldest participants. The older adults studied were active older adults and even though they had constraints, none of them posed such barriers that they did not participate. The older adults were evidently successful at negotiating the constraints so that they could remain physically active (Jackson, 2005).

The associations among the behavior, benefits, and constraints variables and demographic group membership were not statistically significant except for several demographic groups who have typically not been as active as others (Prohaska et al., 2006; U.S. Department of Health and Human Services, 1996). The greatest differences existed related to women, people living alone, people with lower incomes, and people with less education. Each of these groups perceived the most benefits of involvement in NCSG compared to others and were generally well represented in NCSG (i.e., the only exception was that only 6% of the sample had a high school education or less). The finding that NCSG had greater benefits for these populations demonstrated its importance as a community based organization that is successful in promoting participation to a diversity of individuals. Although causal conclusions cannot be offered, this study overall also showed a strong relationship between benefits, fewer constraints, and the perceived physical activity of these individuals.

One interesting finding was that younger old people (i.e., those 55-64 years) had more community linked and social influence constraints than older (i.e., 65 years and over) people. Perhaps more of the younger individuals were still employed and not fully, or even partially, retired. Thus, their constraints were greater than older individuals who had more time and free choice associated with their involvement with PA through NCSG. Research has suggested that PA often decreases with age until adults reach the age of 65 when retirement and increased
leisure time may minimize some of the barriers (North Carolina Division of Public Health, 2002).

Although finding statistically significant differences among groups was useful, not finding differences also provided information that is useful in assessing the impact of an intervention like NCSG. No differences were found regarding benefits, constraints, or behaviors based on race (i.e., people of color, white) and geographic location (i.e., rural, urban). This finding suggested that involvement in NCSG provides similar benefits and opportunities regardless of race or location. The location was particularly important since rural areas are often underserved with structured opportunities to be physically active (Wilcox et al., 2003). Further, since no difference existed in community linked constraints between rural and urban residents, the data suggested that NCSG was addressing the needs of all participating residents of the state.

Organizational and Community Implications

The framing for this study came from social ecological theory. This study of NCSG participants focused on intrapersonal and interpersonal behavior within an organizational milieu. Since the focus of NCSG is at the community level, this multilevel approach to understanding the behaviors, benefits, and constraints of older adults seemed logical (Li et al., 2005). A pragmatic purpose of this study was to evaluate various dimensions of the NCSG program to aid in improvement for the future. The nature of this study, however, did not allow a direct examination of specific program components other than the broad perspective of NCSG as a grassroots organization at the community level. Nevertheless, taken together the results of this study underline the need to examine healthy behaviors in relation to how community resources enhance individual and group behavior. Without a program like NCSG, the older adults were likely to be less socially and physically engaged.
The model of NCSG as community based year-round program and the sanctioning of the quality by the state organization provides continuity across the local programs and seemed to provide the organizational/community aspects necessary to reinforce the social ecological model. Multi-agency (e.g., Parks and Recreation programs, Community Schools, Councils on Aging, Senior Centers) cooperation at the local level was needed to reach this diversity of older adults. The Local Games were particularly important in some rural areas of the state where few recreation opportunities existed. Because community linked factors such as equipment, skills, facilities, and knowledge were the greatest constraints to physical activity even for these active participants, communities that promote physical activity opportunities are more likely to get older adults to become active and to sustain that activity.

Limitations and Future Research

Several limitations existed for this study. First, the study was cross-sectional and not experimental or longitudinal. Thus, cause and effect can not be attributed to NCSG. Perhaps individuals who are healthier and more socially gregarious are attracted to this organization. In other cases, NCSG may contribute to the physical and social health of participants. That link, however, is not clear.

Another possible limitation of this study was that it involved only active older adults. As discussed earlier, knowing more about healthy active older adults may give clues regarding how to promote and maintain the involvement of others. However, this study did not examine non-participants and the issues that might influence their reasons for lack of involvement. Insights about nonparticipation in physical activity opportunities can be found in other studies (e.g., Dergance et al., 2003; Henderson & Ainsworth, 2001; Lees et al., 2005), but the relationship of nonparticipation to NCSG cannot be discerned from these data.
In addition, many of the older adults were thankful to have NCSG experiences and may have been reluctant to answer with other than positive responses. The amount of social desirability reflected in the answers is difficult to address as is the potential error in self reports about physical (Sims, Smith, Duffy, & Hilton, 1999) as well as social activity. People often tend to overestimate the amount of PA they get. Therefore, collecting objective data (e.g., pedometers, accelerometers) along with the subjective (i.e., self-report) may have been helpful. Unfortunately, time and resources did not allow for objective data collection.

Some variability exists among the 52 local NCSG programs in the state even though NCSG provides detailed guidelines. No analyses were done to compare the 52 local sites to see what differences might exist and to determine if some programs were more effective than others. Nevertheless, these results confirmed previous literature about the importance of physical activity and added support for why physical and social involvement aids the process of successful aging.

Future studies using longitudinal data would be helpful. For example, studying participants as they aged regarding their participation in NCSG would be important. In addition, qualitative (Dionigi, 2006) and case studies would provide a richer understanding of these individuals. Although one open-ended question and several partially open-ended questions were included on our survey, they did not generate enough data to warrant systematic analysis. Further, constraints negotiation in older people would be an interesting area for further research.

A need also exists to translate research results related to the proven efficacy and effectiveness of community-based programs into recommendations for other community interventions. The impact of NCSG or similar community based programs relative to the health care system and economic impacts would be an area for future consideration. In addition, more
leisure research could be done to examine more about how social and physical environments in communities influence individual behavior (Sallis et al., 1998).

In conclusion, this study of NCSG as an organization designed to promote healthy living in communities provided an example of how a social ecological framework aimed at health promotion can be applied. Although individuals made their own choices about involvement in NCSG, having the social support, the organizational structure, and the local as well as state-wide opportunities provided the infrastructure for involvement and enabled many participants to incorporate NCSG as a part of their weekly routines. The results of this study cannot confirm directly the importance of NCSG in health promotion and disease prevention, but participants in NCSG perceived that they benefited from their involvement in a number of ways. Despite the perceived and structural constraints that some individuals faced, most were physically and socially active regardless. A challenge to programming for any group, but especially older adults, may be to determine how to help individuals overcome the constraints they face as they age so that they can remain active and find benefits and satisfaction all through their later years.
References


Giles-Corti, B., & Donovan, R.J. (2002). The relative influence of individual, social and physical environment determinants of physical activity. *Social Science & Medicine, 54*(12), 1793-1812.


King, A.C. (2001). Interventions to promote physical activity by older adults. *Journal of Gerontology: Biological Sciences and Medical Sciences, 56*A (Special Issue II), 36-46.


Table 1

Benefits of Participating in North Carolina Senior Games

<table>
<thead>
<tr>
<th>Variable</th>
<th>N</th>
<th>M(^1)</th>
<th>SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meet more people</td>
<td>419</td>
<td>4.32</td>
<td>.67</td>
</tr>
<tr>
<td>Makes me feel good about life</td>
<td>422</td>
<td>4.27</td>
<td>.70</td>
</tr>
<tr>
<td>Improves my health</td>
<td>409</td>
<td>4.14</td>
<td>.81</td>
</tr>
<tr>
<td>Increases my self-esteem</td>
<td>414</td>
<td>4.14</td>
<td>.74</td>
</tr>
<tr>
<td>Motivates me to get out more</td>
<td>415</td>
<td>4.06</td>
<td>.87</td>
</tr>
<tr>
<td>Helps me to be more energetic</td>
<td>395</td>
<td>4.05</td>
<td>.83</td>
</tr>
<tr>
<td>Helps my heart and lungs function better</td>
<td>398</td>
<td>4.03</td>
<td>.86</td>
</tr>
<tr>
<td>Decreases my tension and/or stress</td>
<td>400</td>
<td>3.97</td>
<td>.84</td>
</tr>
<tr>
<td>Increases my physical strength</td>
<td>404</td>
<td>3.96</td>
<td>.88</td>
</tr>
<tr>
<td>Improve my shape/physique</td>
<td>394</td>
<td>3.83</td>
<td>.88</td>
</tr>
<tr>
<td>Makes me feel more attractive</td>
<td>388</td>
<td>3.43</td>
<td>.94</td>
</tr>
<tr>
<td>Keeps me from getting sick</td>
<td>388</td>
<td>3.35</td>
<td>.93</td>
</tr>
<tr>
<td>Helps me cope with pain</td>
<td>385</td>
<td>3.35</td>
<td>.98</td>
</tr>
</tbody>
</table>

\(^1\)Based on 5 point Likert scale with 1=strongly disagree to 5=strongly agree
Table 2

<table>
<thead>
<tr>
<th>Factor/Item</th>
<th>N</th>
<th>M^1</th>
<th>SD</th>
<th>Factor Loading</th>
</tr>
</thead>
<tbody>
<tr>
<td>Community linked</td>
<td>396</td>
<td>1.52</td>
<td>.69</td>
<td></td>
</tr>
<tr>
<td>Lack of equipment</td>
<td>406</td>
<td>1.53</td>
<td>.88</td>
<td>.79</td>
</tr>
<tr>
<td>Lack of facilities (places)</td>
<td>412</td>
<td>1.69</td>
<td>1.06</td>
<td>.78</td>
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<tr>
<td>Lack of knowledge</td>
<td>412</td>
<td>1.42</td>
<td>.76</td>
<td>.72</td>
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<tr>
<td>Lack of skills</td>
<td>410</td>
<td>1.51</td>
<td>.86</td>
<td>.67</td>
</tr>
<tr>
<td>Social influences</td>
<td>398</td>
<td>1.75</td>
<td>.67</td>
<td></td>
</tr>
<tr>
<td>Discouragement from friends</td>
<td>411</td>
<td>1.26</td>
<td>.59</td>
<td>.86</td>
</tr>
<tr>
<td>Lack of interest</td>
<td>411</td>
<td>1.72</td>
<td>.97</td>
<td>.77</td>
</tr>
<tr>
<td>Lack of time</td>
<td>410</td>
<td>2.27</td>
<td>1.14</td>
<td>.60</td>
</tr>
<tr>
<td>Lack of company</td>
<td>407</td>
<td>1.76</td>
<td>1.05</td>
<td>.57</td>
</tr>
<tr>
<td>Intrapersonal</td>
<td>403</td>
<td>1.62</td>
<td>.60</td>
<td></td>
</tr>
<tr>
<td>Lack of good health</td>
<td>415</td>
<td>1.72</td>
<td>.92</td>
<td>.81</td>
</tr>
<tr>
<td>Fear of injury</td>
<td>412</td>
<td>1.51</td>
<td>.81</td>
<td>.80</td>
</tr>
<tr>
<td>Self-conscious about looks</td>
<td>416</td>
<td>1.18</td>
<td>.57</td>
<td>.52</td>
</tr>
<tr>
<td>Lack of self discipline</td>
<td>410</td>
<td>2.08</td>
<td>1.16</td>
<td>.46</td>
</tr>
</tbody>
</table>

^1Based on 5-point Likert scale with 1=never and 5=very often