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The Contribution of Generative Leisure Activities to Cognitive Function among Sri Lankan Elderly

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Abstract

OBJECTIVES—Although a substantive body of research has shown a protective association between leisure activities and cognitive function, consistent evidence is lacking about which specific types of activities should be promoted. The objective of this analysis was to examine the unique contribution of generative leisure activities, defined as activities motivated by “*a concern for others and a need to contribute something to the next generation*” (Erikson).

DESIGN—Cross-sectional survey.

SETTING—Peri-urban and rural area in southern Sri Lanka.

PARTICIPANTS—Community dwelling adults aged 60+ (n=252).

MEASUREMENTS—Main predictors were leisure activities grouped into generative, social, or solitary. Main outcome was cognitive function assessed with Montreal Cognitive Assessment (MoCA) and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE).

RESULTS—We found that more frequent engagement in generative leisure activities was associated with higher levels of cognitive function, independent of the impact of other social and solitary leisure activities. In a fully adjusted model combining all three leisure activities, generative activities independently predicted cognitive function as measured with the MoCA ($\beta = 0.47$ (0.11 to 0.83) and the IQCODE ($\beta = -0.81$ (-1.54 to -0.09)). In this combined model, solitary activities were also independently associated with slower cognitive decline with the MoCA (β

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=0.40 (0.16, 0.64), but not with IQCODE ($\beta = -0.38$ (-0.88, 0.12)); the association with social activities did not reach statistical significance with either measure. These associations did not differ meaningfully by gender.

CONCLUSION—Generative leisure activities are a promising area for the development of interventions aimed at reducing cognitive decline among the elderly.

Keywords

generativity; successful aging; rapidly aging; Sri Lanka

INTRODUCTION

Although a substantive body of research has shown a protective association between leisure activities and cognitive function, it remains unclear which specific types of activities are most important to prevent or delay the cognitive decline associated with increasing age^{1, 2}. Studies of the association between leisure activities and cognitive function or decline use categories ranging from physical leisure activities, including walking³, through cognitively challenging activities (such as playing chess or crossword puzzles), to social activities, including religious activities^{4, 5}.

It is also not clear whether a *specific type* of activity is most salubrious for maintaining cognitive function or whether all activities are equally beneficial, as long as an individual stays active⁶. Both physical and social activities have variably been found to be protective^{6, 7} or not^{8, 9} against cognitive decline. These inconsistencies may be due to the fact that the specific methodologies used to group leisure activities have not been consistent or guided by well-defined, theoretical approaches¹⁰. As examples, activities as disparate as swimming and babysitting have been combined into a physical activities subscale⁸, while religious activities and volunteering are split into those requiring low vs. high cognitive effort, respectively¹¹. In fact, many specific activities include physical, social and cognitive aspects, and the same leisure activity may vary in its sociability or cognitive effort between individuals. To reduce this concern, a few studies have included a type of matrix for activities that fall into multiple categories, such as low vs. high cognitive effort and simultaneously, social vs. individual¹¹. To better inform prevention or early intervention, and to understand the underlying mechanisms linking a specific type of activity with cognitive function, it is worth revisiting how leisure activities should be grouped.

Recent approaches to studying successful aging, based on a life-course developmental perspective, may provide better theoretical guidance into the role of leisure activities in late life, as well as their potential impacts on cognitive function and decline. This research emphasizes the underlying *purpose* and *meaning* of an activity in contrast to the specific characteristics of the activity itself (e.g., physical vs. social)¹². Research on motivation has shown that, as individuals age, they increasingly prioritize relationships and activities that they consider meaningful, including increased interest in spirituality/religiosity as well as in activities such as volunteering^{13, 14}. In contrast, younger adults may be more motivated by novel experiences¹³⁻¹⁵. If this is so, then leisure activities with higher potential for deeper meaning may constitute a useful category to focus on when examining the relation between

leisure activities and cognitive function. This idea is indirectly supported by research showing that similar activities were associated with higher cognitive function only when they were performed as part of ‘leisure’ and not when they were part of ‘work’¹⁶.

Generativity is a concept that may relate to such meaningful activities. A small, but growing, body of aging literature has examined *generativity*, first described by Erikson, as “*a concern for others and a need to contribute something to the next generation*”^{12, 17}. Generativity functions as a means through which an adult may guide, educate or nurture the next generation and thus produce outcomes that can benefit society at large and can continue on through future generations¹⁸. In the private realm of the family unit, an elder, in particular, may be “grand-generative” through various activities related to parenting and grandparenting^{12, 18, 19}. Cultural norms about family relationships are likely to influence the likelihood, and types of, generative activities that a grandparent engages in. The benefits of generative activities need not be limited to one’s direct offspring²⁰ and may include volunteering, being committed to civic and political duties, participating in religious and political organizations and protecting the environment. It is important to note that some of these generative activities fall within the categories of social, productive and leisure activities, which already have been found to have positive associations with well-being among adults¹⁰. In our current research, we are especially interested in generative *actions*, specific behaviors that express generativity. (Generative actions are complementary to, yet distinct from, more attitudinal concepts such as generative *concern* or generative *commitment*^{18, 19}.)

Generativity, both qualitatively described and measured in quantitative surveys, is highly correlated with subjective well-being and self-reported experiences of successful aging^{19, 21-24}. Fewer studies have explored the link with physical outcomes, with the exception of Gruenewald and colleagues who found in the MIDUS study that generativity independently predicted lower risk of activities of daily living limitations (ADL) and mortality over a 10-year period²⁵.

We were therefore particularly interested in studying the relationship between *generative actions* and cognitive impairment, in the context of our Sri Lankan study. In this setting, where familial ties and familial piety are considered to be strong, the concept of generativity may be especially salient among the elderly, although we believe the findings could be applicable cross-culturally. The objective of the analysis presented here is to assess the extent to which generative leisure activities, as well as solitary and other social leisure activities, contribute to cognitive function among Sri Lankan elderly.

METHODS

Study Sample

The data came from the Sri Lanka Healthy Minds Study, a community-based survey of elderly (aged 60+) and their caregivers residing in a peri-urban and rural area in Southern Sri Lanka (n=252 dyads). The present analysis was based on data pertaining to the elderly only. A household was eligible to participate if an individual over 60 (the index elderly person) resided there together with an actual, or potential, caregiver and both individuals were

willing to participate in the 60-minute interview. Of 413 households approached with elders over 60, 47 were excluded because the elder lived alone, in 17 households either the elder or the caregiver was not home, and 30 households were excluded where the elder had significant health problems, including vision/hearing loss or cognitive impairment, resulting in 318 eligible households. Of these, 66 refused to participate (79% response rate), and one did not complete the interview, resulting in an analysis sample of 252 dyads. All interviews were conducted between August and September 2012. Institutional Review Board (IRB) approval for this study was obtained from the Duke University Health System IRB and University of Ruhuna Ethics Committee.

Measures

Leisure Activities—Elders were asked about the frequency of engagement in 17 different leisure activities. The list of 17 potential activities was informed by our qualitative work among elderly in this location and represented activities the elderly most frequently reported being engaged in²⁶. The activities were then grouped into three mutually exclusive categories: generative, social, and solitary activities. *Generative activities* consisted of four questions that were considered to be most likely primarily generative: babysitting or taking care of grandchildren, gardening, charity work, and involvement with religious group activities (volunteering). *Social activities* consisted of five social activities that were deemed less likely to be generative: going to temple, socializing, playing sports, attending government meetings, and playing cards. Of note, ‘going to temple’ was a separate question from ‘activities with one’s religious group (volunteering)’ with the first primarily connoting going for prayers or ceremonies while the second rather implying volunteering and helping, although it is possible that these activities do overlap. Finally, *solitary activities* consisted of seven most likely non-generative, non-social activities: watching television, listening to the radio, walking, knitting and weaving, reading, handicrafts, and raising a pet. The frequencies given of each activity were transformed to a categorical scale from zero to two in which zero represented not engaging in that activity (i.e. responding ‘I do not do this’), one indicated occasionally engaging in that activity (‘rarely’ to ‘a few times a month’), and two represented engaging in that activity often (‘weekly’ or more often). These values for each activity were then summed to create each of the three scales.

Cognitive Function—The two main measures of cognitive function were the Montreal Cognitive Assessment (MoCA, administered to the elder)²⁷ and the Informant Questionnaire on Cognitive Decline in the Elderly (IQCODE)²⁸. The MoCA is an objective test of cognitive function covering 11 domains (e.g., verbal fluency, memory)²⁷. It has been widely used internationally in community surveys and has been used previously in Sri Lanka²⁹⁻³¹. The domains assessed by the MoCA include visuo-spatial, executive function, short term memory, attention, concentration, working memory, language and orientation^{27, 29}. The final MoCA score ranges from zero to 30 where a higher score indicates higher cognitive function. We used a cutoff score of 24 as indicative of dementia, consistent with the Sinhala validation study²⁹.

The IQCODE is a 21-item informant-based assessment that inquires about changes in the elder’s cognitive functions in the last 10 years, such as remembering recent events and the

ability to work familiar machines such as a TV ^{28, 32}. The informant in this case is the co-resident caregiver. The score ranges from “much improved” to “much worse” (1-5), with higher scores indicating declining cognitive function over time. Responses to the 21 questions are averaged and an IQCODE value of 3.38 or greater is indicative of dementia ^{28, 32}. These mean values can also be grouped so that scores below 3.0 indicate improvement, scores of 3.01 – 3.50 slight decline, 3.51-4.0 moderate decline and scores above 4 is indicative of severe decline. We chose to utilize both of these measures as they offer two complementary perspectives on cognitive function: the MoCA provides an objective assessment of *current levels* while the IQCODE assesses observed changes in the last 10 years.

Additional Variables—Other variables for which we adjust in our analyses include age, gender, self-rated health (1-5 Likert scale), marital status (married vs. not), a count of household assets as an indicator of socioeconomic status, and education (primary, secondary vs. more than secondary).

Analysis

We used OLS regression models to examine the association between generative, social, and individual leisure activities and cognitive function (Stata 12.1, StataCorp, College Station, TX). Initial models (models 1-3 in Tables 2 and 3) included only one leisure activity scale, while the final model (model 4) included all three leisure scales. We report beta coefficients and standard errors corresponding to a point increase in the MoCA or IQCODE score associated with a one standard deviation increase in a given activity scale. All models are adjusted for age, gender, marital status, self-rated health, household assets, and education. In order to assess possible differences in the relationship from leisure activity to cognitive function between men and women (effect modification by gender), we modeled the association between leisure activity and cognitive function stratified by gender.

RESULTS

Sample characteristics are presented in Table 1. The 252 individuals in the sample had a mean age of 71.8 (range 60-92). 67% were female and 91% identified as Sinhalese. The mean cognitive function score as assessed with the MoCA was 18.7 (71% were considered cognitively impaired with a score of 24 or less). This high level of impairment is consistent with the relatively low educational level of our sample. Most caregivers (57%) reported that the elderly person had, on average, slightly declined in cognitive function over the last 10 years. Less than a quarter (23%) of elders were declining moderately or severely. The mean IQCODE score was 3.29 (33% of elders were considered to have dementia based on a cutoff of 3.38). Both measures were correlated with age ($r=0.37$ for MoCA and 0.36 for IQCODE) and women had slightly lower cognitive function (MOCA = 17.8 women, 20.6 men) and were more likely to be perceived as declining by their caregivers (38.8% women judged to be declining vs. 19.5% men).

There was a wide range of engagement in leisure activities. The most common generative activity was babysitting grandchildren, which 67% of elders reported doing frequently. “Socializing” and talking with grandchildren were the most common social activities, and

watching TV was the most frequent solitary activity. The three leisure scores were moderately correlated with each other; the highest correlation ($r=0.48$) was between the generative and social activities.

Engagement in all three types of activities was associated with higher cognitive function. Tables 2 and 3 present results from fully adjusted models of the association between each type of leisure activity with either the MoCA score (Table 2) or the IQCODE score (Table 3). A one point increase in generative activities was associated with a 0.76 higher score on the MoCA, and a 0.94 lower score on the IQCODE (both indicating better cognitive function) after adjusting for age, gender, self-rated health, marital status, education and household assets (Tables 2 and 3, model 1). Similarly, higher scores on the social and solitary leisure activities were correlated with higher MoCA scores (models 2 and 3), although social activities were not correlated with the IQCODE scores. Model 4 in both Tables 2 and 3 includes all three leisure activity variables and shows that generative activities continue to make an independent contribution to cognitive function as measured with the MoCA ($\beta = 0.47$ (0.12 to 0.83) and the IQCODE ($\beta = -0.81$ (-1.54 to -0.09)). In this combined model, solitary activities were correlated with better MoCA scores but not significantly better IQCODE scores. These associations did not differ meaningfully by gender.

DISCUSSION

The goal of the present analysis was to explore whether grouping leisure activities by their generative and social features might yield insights into the association between leisure activities and cognitive function in an elderly sample. In a context where family ties are strong, our Sri Lankan study focused on the family context and cognitive function, and so offered a unique opportunity to examine this topic. In addition to more traditionally used counts of social and solitary leisure activities, we created a score of generative leisure activities, defined as activities whose purpose is the benefit of future generations or society^{12, 18}. We found that more frequent engagement in generative leisure activities was associated with higher levels of cognitive function. This association was independent of the impact of other social and solitary leisure activities and it remained after controlling for other potential confounders. The results were consistent for both an objective measure of cognitive function (MoCA) as well as informant reported (IQCODE) and across genders.

These findings corroborate the value of the generativity construct in the study of leisure activities and cognitive function among the elderly. From a theoretical perspective, generative activities may protect cognitive function through several related, and not mutually exclusive, mechanisms. One such mechanism may be through the experience of positive emotions, such as joy, gratitude, pride, hope, inspiration, or love³³. Positive emotions have been linked with numerous health outcomes³⁴⁻³⁶ and may be a key mechanism through which social engagement in general is salubrious. Especially pertinent to the study of cognitive decline, positive emotions are also thought to lead to improved cognitive flexibility and other cognitive functions^{37, 38}. If generative activities are likely to lead to positive emotions, these might, in turn, have a protective effect on cognitive function. There is indirect support for this idea from leisure studies and the finding that

intergenerational family leisure time is one type of leisure that is associated with the highest reports of positive emotions ³⁹.

A second potential mechanism is that generative activities may be especially effective at keeping elderly individuals engaged with their community, which in turn maintains their social support networks ⁴⁰. Because of the ‘service’ nature of generative activities, the ties created with members of one’s network may be stronger than those resulting from more recreational activities. The implicitly reciprocal processes between individuals that are activated through making a contribution to others’ well-being may partly explain the connection between volunteering and better health among elderly ^{41, 42}. In other words, people who contribute to others’ well-being may have greater access to future social support.

Importantly for the study of cognitive function cross-culturally, the concept of generativity appears to have cross-cultural validity, and generativity itself, or concepts closely related to it, have been discussed in the international literature ⁴³. This makes generativity useful for the study of successful aging globally. The specific choices of what to include in the present study’s generativity score were based on our understanding of which activities were most likely to have generative qualities, but these choices still include a certain amount of subjectivity. Future research that categorizes leisure activities based on a combination of their purpose or meaning in addition to the cognitive/physical/social demands of that activity may prove especially fruitful in identifying salubrious factors among elderly ¹⁰. To assess the relative importance of these factors, it is necessary to inquire not only about the specific behavior of knitting or cooking, for example, but also about why, and for whom, the individual is knitting or cooking, and not least the importance these activities may have in a person’s life. This may lead to a different categorization of activities that have often been grouped together. For example, while a social leisure activities scale is likely to combine activities such as playing bingo and spending time with grandchildren, a generativity measure might not combine these and would instead count only the grandchildren activity.

Efforts to Support Generativity among Elderly

If it is confirmed that activities which are generative in nature have more health benefits than comparable activities which are not, this would have important implications for interventions. In most communities, a range of opportunities for generative activities already exist and can be supported by making it easier for elderly to participate in them ^{39, 44}. The Experience Corps is an excellent example of a program that places elderly individuals in schools where they interact with and tutor young students ⁴⁵. Similar models can be adapted to different cultural contexts to encourage engagement with youth in settings beyond school. Religious communities across cultures and traditions are also natural repositories of potential generative activities. However, efforts must be taken not to treat the elderly as an unlimited resource or to simply encourage the elderly to ‘sign up’ for a particular volunteering activity for the sake of their cognitive health. Generative activities need not be explicitly service oriented. For example, multigenerational family leisure time is one context that naturally supports generativity³⁹. The association between generative activities and positive outcomes is likely mediated by perceptions, both their own and those of the people

they interact with, that their actions are valued. For example, Cheng reported that elders who did not feel valued and respected for their efforts did not show any positive benefits of engagement and were more likely to stop being active⁴⁶. Studies on volunteering and health among the elderly often observe a U-shaped association between intensity of volunteering effort and health problems, and confirm the importance of role-strain and meaningfulness in the subjective experience of the volunteer^{47, 48}.

To our knowledge, this is the first study to examine the association between generativity and cognitive function in a non-Western setting. Our findings are based on a relatively small, cross-sectional dataset: it is not possible to determine whether generative activities predict slower cognitive decline in this population. Because of the focus of our study, we excluded a smaller group of elders who lived alone (11% of all households with elders approached), and these elders might be different both in terms of their generative leisure activities and cognitive function. The reliance on self-report for leisure activities in these elderly with a relatively high prevalence of cognitive impairment potentially contributed to a misclassification of frequency of engaging in leisure activities. Although elderly with some cognitive impairment are more likely to over report activities⁴⁹, both over and underreporting is possible. It is also possible that the measures of cognitive function in this sample that we relied on (MoCA and IQCODE) may not accurately capture cognitive function this Sri Lankan population. However, the distribution of the MoCA and IQCODE scores are within range of previously reported population samples and the MoCA had been validated previously in Sri Lanka^{50, 51}. Our community based sample of elderly is representative of peri-urban areas in Sri Lanka and so these findings might be generalizable to other South Asian settings. In conclusion, our findings present some of the first cross-cultural evidence that generative activities may have a unique contribution to an important component of successful aging⁵².

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Table 1
Elder Characteristics, Sri Lanka Healthy Minds Study

	No. (%)	Mean ($\pm$ SD)	Range
Gender (n=252)			
Female	170 (67)		
Age (n=252)		71.7 (8.2)	60-92
60-64	63 (25)		
65-69	53 (21)		
70-74	45 (18)		
75-79	35 (14)		
>80	56 (22)		
Ethnicity (n=252)			
Sinhala	230 (91)		
Tamil	14 (6)		
Other	8 (3)		
Education (n=252)			
Never schooled	12 (5)		
Primary (Grade 1-5)	74 (29)		
Secondary (Grade 6-10)	83 (33)		
Passed GCE (O/L)	52 (21)		
Passed GCE (A/L)	23 (9)		
Graduate/Post-Graduate	8 (3)		
Household Assets		6.6 (2.2)	0-10
Television	239 (95)		
Cellular telephone	231 (92)		
Radio/tape recorders	223 (88)		
Electric fan	212 (84)		
Refrigerator	184 (73)		
Telephone (landline)	181 (72)		
Expensive furniture	121 (48)		
Two-wheeler (scooter/motorbike)	109 (43)		
Computer	96 (38)		
Car	33 (13)		
Three-wheeler	30 (12)		
Air conditioner	2 (1)		
Marital Status (n=252)			
Married	178 (71)		
Widowed	58 (23)		
Never married	16 (6)		
Self-Rated Health (n=252)			
Excellent	4 (2)		
Good	103 (41)		

	No. (%)	Mean ($\pm$ SD)	Range
Fair	76 (30)		
Poor	69 (27)		
Leisure Activities			
Generative		3.6 (1.7)	0-8
Social		4.8 (1.4)	1-9
Solitary		6.9 (2.5)	0-12
MoCA^a Score (n=252)		18.7 (6.4)	4-30
Impaired (<24)	180 (71)		
Unimpaired (≥ 24)	72 (29)		
IQCODE^b (n=252)		3.3 (0.5)	1.5-5.0
Dementia (≥ 3.38)	82 (33)		
No dementia (<3.38)	170 (67)		

^aMoCA: Montreal Cognitive Assessment

^bIQCODE: Informant Questionnaire on Cognitive Decline in the Elderly

Table 2

The Relationship of Generative, Social, and Solitary Leisure Activities with Assessed Cognitive Function (MoCA^a)

MoCA ^a	Model 1 ^b		Model 2 ^b		Model 3 ^b		Model 4 ^b	
	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value
Generative	0.65 (0.31, 0.98)	<0.01					0.47 (0.12, 0.83)	<0.01
Social			0.49 (0.01, 0.96)	0.04			0.09 (-0.39, 0.58)	0.71
Solitary					0.50 (0.26, 0.74)	<0.01	0.40 (0.16, 0.64)	<0.01
Married	0.75 (-0.5, 2.0)	0.24	1.03 (-0.24, 2.30)	0.11	0.89 (-0.34, 2.13)	0.15	0.79 (-0.44, 2.02)	0.21
Assets total	-0.00 (-0.26, 0.25)	0.97	0.06 (-0.21, 0.32)	0.67	0.01 (-0.24, 0.27)	0.11	-0.02 (-0.27, 0.24)	0.88
Education: Primary	-7.68 (-9.12, -6.23)	<0.01	-7.54 (-9.04, -6.04)	<0.01	-7.11 (08.59, -5.64)	<0.01	-7.11 (-8.58, -5.64)	<0.01
Education: Secondary	-3.25 (-4.60, -1.90)	<0.01	-3.09 (-4.48, -1.69)	<0.01	-3.16 (-4.51, -1.82)	<0.01	-3.10 (-4.44, -1.76)	<0.01
Female	-2.30 (-3.48, -1.11)	<0.01	-1.91 (-3.13, -0.69)	<0.01	-1.84 (-3.02, -0.66)	<0.01	-2.00 (-3.19, -0.81)	<0.01
Age	-0.15 (-0.22, -0.08)	<0.01	-0.13 (-0.20, -0.06)	<0.01	-0.15 (-0.21, -0.08)	<0.01	-0.14 (-0.21, -0.07)	<0.01
Self-rated health	-1.35 (-2.04, -0.67)	<0.01	-1.47 (-2.17, -0.79)	<0.01	-1.30 (-1.98, -0.62)	<0.01	-1.18 (-1.86, -0.50)	<0.01
Constant	35.60 (30.14, 41.06)	<0.01	34.53 (28.07, 40.99)	<0.01	33.39 27.67, 39.11)	<0.01	31.82 (25.43, 31.20)	<0.01
R-squared	0.55		0.53		0.55		0.56	

^aMoCA: Montreal Cognitive Assessment, higher values = higher cognitive function^bModel 1 examines the association between generative leisure activities and MoCA; Model 2 examines the association between social leisure activities and MoCA; Model 3 examines the association between solitary activities and MoCA; Model 4 examines the association between all three leisure activities and MoCA simultaneously.

Table 3

The Relationship of Generative, Social, and Solitary Leisure Activities with Informant-reported Cognitive Function (IQCODE^a)

IQCODE ^a	Model 1 ^b		Model 2 ^b		Model 3 ^b		Model 4 ^b	
	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value	β (95% CI)	p-value
Generative	-0.89 (-1.56, -0.22)	<0.01					-0.81 (-1.54, -0.09)	0.03
Social			-0.24 (-1.19, 0.71)	0.62			0.30 (-0.70, 1.30)	0.55
Solitary					-0.50 (-0.98, -0.02)	0.04	-0.38 (-0.88, 0.12)	0.14
Married	-0.13 (-2.64, 2.38)	0.92	-0.42 (-2.97, 2.11)	0.74	-0.34 (-2.86, 2.17)	0.79	-0.06 (-2.58, 2.46)	0.96
Assets	-0.53 (-1.05, -0.00)	0.05	-0.61 (-1.13, -0.08)	0.02	-0.57 (-1.09, -0.04)	0.03	-0.50 (-1.02, -0.02)	0.06
Education: Primary	3.91 (1.00, 6.82)	0.01	3.95 (0.96, 6.95)	<0.01	3.39 (0.40, 6.39)	0.03	3.57 (0.59, 6.57)	0.02
Education: Secondary	1.03 (-1.69, 3.75)	0.46	1.01 (-1.77, 3.80)	0.47	0.98 (-1.76, 3.71)	0.48	1.07 (-1.69, 3.82)	0.45
Female	3.27 (0.89, 5.66)	<0.01	2.91 (0.47, 5.35)	0.02	2.75 (0.34, 5.15)	0.03	3.18 (0.73, 5.62)	0.01
Age	0.34 (0.20, 0.49)	<0.01	0.34 (0.19, 0.48)	<0.01	0.34 (0.20, 0.48)	<0.01	0.35 (0.21, 0.49)	<0.01
Self-rated health	1.08 (-0.29, 2.45)	0.12	1.33 (-0.05, 2.71)	0.06	1.11 (-0.28, 2.49)	0.12	0.96 (-0.43, 2.35)	0.17
Constant	44.36 (33.36, 55.36)	<0.01	41.87 (30.13, 53.61)	<0.01	46.13 (34.88, 57.38)	<0.01	45.40 (32.33, 58.48)	<0.01
R-squared	0.24		0.22		0.23		0.24	

^aIQCODE: Informant Questionnaire on Cognitive Decline in the Elderly, lower values = slower decline

^bModel 1 examines the association between generative leisure activities and IQCODE; Model 2 examines the association between social leisure activities and IQCODE; Model 3 examines the association between solitary activities and IQCODE; Model 4 examines the association between all three leisure activities and IQCODE simultaneously.