Published in final edited form as:
Act Adapt Aging. 2012 January 1; 36(3): 242–260. doi:10.1080/01924788.2012.702306.

Lifestyle Activities in Sociodemographically at-risk Urban, Older Adults Prior to Participation in the Baltimore Experience Corps® Trial

Jeanine M. Parisi[1], **George W. Rebok**[1,7], **Teresa E. Seeman**[2], **Elizabeth K. Tanner**[3,7], **Erwin J. Tan**[4], **Linda P. Fried**[5], **Qian-Li Xue**[6,7], **Kevin D. Frick**[1], and **Michelle C. Carlson**[1,7]

[1]Johns Hopkins University Bloomberg School of Public Health, Baltimore, MD

[2]David Geffen School of Medicine at the University of California at Los Angeles, Los Angeles, CA

[3]Johns Hopkins University School of Nursing, Baltimore, MD

[4]The Corporation for National and Community Service, Washington, D.C.

[5]Columbia University Mailman School of Public Health, New York City, NY

[6]Johns Hopkins University School of Medicine, Baltimore, MD

[7]Johns Hopkins Center on Aging and Health, Baltimore, MD

Abstract

Experience Corps® places teams of trained volunteers in elementary school classrooms to promote academic achievement in children, and serve as a health promotion intervention for older adults. Prior to randomization, individuals reported participation in several activities of varying cognitive, physical, and social demands. Maintaining an active lifestyle, particularly in intellectually demanding activities, was associated with physical, mental, and cognitive health in adulthood. Establishing how individuals allocated their time before randomization to this program provides insight to prevalent health behaviors for at-risk older adults, and can provide the basis for examining intervention-related changes in lifestyle as a result of volunteer participation

Keywords

Engagement; Activities; Intervention; Cognition; Aging; Volunteers

Researchers have long been intrigued by the importance of maintaining an active lifestyle for aging successfully. Early theories, such as activity theory suggested that maintaining an active lifestyle may be a key component in the preservation of physical and psychological health well into late adulthood (Lemon, Bengtson, & Peterson, 1972; Rowe & Kahn, 1998). This notion is further supported by empirical evidence demonstrating the health risks of a sedentary lifestyle (Hu, Li, Colditz, Willett, & Manson, 2009; Stamatakis, Hamer, & Dunstan, 2011), and the potential benefits of remaining actively engaged in later life. For instance, greater involvement in a variety of lifestyle activities has been linked to life satisfaction and subjective well-being, as well as to a reduced risk of dementia, disease, and

Corresponding Author: Jeanine M. Parisi, PhD, Johns Hopkins University Bloomberg School of Public Health, Department of Mental Health, 624 N. Broadway Ave., Baltimore, MD 21205 jparisi@jhsph.edu.

Please note this manuscript represents work done while Dr. Erwin Tan was at the Johns Hopkins Center on Aging and Health; now at the Corporation for National and Community Service. The opinions expressed in this article are those of the authors and do not represent the official position of the Corporation for National and Community Service.

even mortality (e.g., Konlaan, Theobald, & Bygren, 2002; Menec, 2003; Scarmeas, Levy, Tang, Manly, & Stern, 2001; Wang, Karp, Winblad, & Fratiglioni, 2002).

Given the lack of effective pharmacologic agents to reduce or delay risk for disability and dementia with increasing age (DeKosky et al., 2008; Meinert & Breitner, 2008; Shumaker et al., 2003; Snitz et al., 2009), the role of lifestyle activities is receiving greater attention as a modifiable risk factor. However, the research is still unclear as to the exact amount of activity needed to influence trajectories of health and well-being or whether specific activities are differentially related to cognitive and physical health (e.g., Hultsch, Small, Hertzog, & Dixon, 1999; Jopp & Hertzog, 2007; Parisi, Stine-Morrow, Noh, & Morrow, 2009). Although greater participation in a variety of activities may be beneficial for cognitive maintenance (Carlson et al., 2011), another possibility is that this protective effect depends on the intellectual demand of engagement (Hultsch et al., 1999; Wilson & Bennett, 2003). Accordingly, activities that foster a higher cognitive demand may have more of an association with cognition than activities low in cognitive complexity (environmental complexity hypothesis: Schooler, 1987); however, the existing evidence has not provided support for such definitive conclusions (Salthouse, 2006).

Assuming that remaining actively engaged is beneficial for cognitive and physical health, the individuals most likely to benefit from participation may be high-risk older adults, including urban, African-American elders and those with lower education and income levels (He & Baker, 2005; Whitt-Glover, Taylor, Heath, & Macera, 2007). Further, these individuals tend to have a high prevalence of chronic health conditions (e.g., diabetes, stroke, hypertension, and vascular disease) placing them at a disproportionately greater risk for cognitive and physical impairments (Alzheimer's Association, 2010; Clark & Maddox, 1992; Clark, Mungai, Stump, & Wolinsky, 1997; Evans et al., 2003; Ford, Haug, Jones, Roy, & Folmar, 1990; Tang et al., 1998; Whitt-Glover et al., 2007). As early preventive interventions may result in reducing disability and ultimately health care costs (Fried, in press; Verbrugge & Jette, 1994), identifying opportunities that allow for active engagement (and potentially help to maintain or enhance cognitive and physical health) is of utmost importance. Unfortunately, the majority of studies has been conducted with European-American, middle-class populations; thus, much less is known about the determinants and consequences of remaining active in diverse populations (but see Allison, 2000; Barnes, Wilson, Mendes de Leon, & Bennett, 2006; Floyd, Shinew, McGuire, & Noe 1994; Philipp, 2000; Stamps & Stamps, 1985; Wilson et al., 1999).

Experience Corps® (EC), a community-based intergenerational program, was designed to promote the health of high-risk older adults, while simultaneously addressing unmet social and academic needs in public elementary schools (Fried et al., 2004; Rebok et al, 2004). Older adult volunteers (aged 60 and older) are trained and placed in public elementary schools to serve as coaches, tutors, and mentors in roles including literacy and mathematical support and behavioral management skills. The volunteers are required to devote a minimum of 15 hours per week for an entire academic year, providing over 450 hours per year of sustained volunteer activity working with individual or small groups of children. The Experience Corps roles were intentionally designed to enhance physical, cognitive, and social activity, with generalizable impact on health and well-being for older adults (Fried et al., 2004).

In order to appreciate how participation in this high-impact volunteer program may alter activity patterns and trajectories of health and well-being, we need to first understand patterns of engagement within this group of high-risk, diverse older adults. The purpose of this paper is to characterize the extent and nature of participation in a wide variety of lifestyle activities prior to participation in the Experience Corps® study.

Methods

Sample

Participants (n = 675) were drawn from the Baltimore Experience Corps® trial and were selected for the present study if they completed the Lifestyle Activities Questionnaire (LAQ; Carlson et al., 2011) as part of the baseline assessment. Recruitment for the Baltimore Experience Corps® trial has been described previously (Tan et al., 2010). On average, participants were 67 years of age (range = 60 to 89 years), had 13.9 years of education, and had intact global cognitive function based on a score of greater than 23 on the Mini-Mental State Exam (MMSE; Folstein, Folstein, & McHugh, 1975). Additionally, the majority of participants were female (84.6%), African American (90.5%), and reported their current health as excellent, very good, or good (89.1%) (Table 1). Compared to individuals included in the present study, those who did not complete the LAQ at baseline tended to be older, reported poorer health, and demonstrated lower cognitive performance (as measured by the MMSE and WRAT) (p's < 0.05).

Measures

Activity—The Lifestyle Activity Questionnaire (Carlson et al., 2011) assessed self-reported frequency of participation in a wide range of activities during the past year. Participants were asked to rate their typical frequency of participation in various daily activities (e.g., cooking, singing, gardening, listening to music, reading) on a 6-point scale (*never/less often than once a month, once a month, 2 to 3 times a month, once a week, a few times a week, and every day*).

Cognition—As part of the baseline evaluation, measures were administered to assess global cognitive status (MMSE; Folstein et al., 1975) and several distinct cognitive processes. Specifically, *reading ability* was assessed by the reading subtest of the Wide Range Achievement Test (WRAT; Wilkinson & Robertson, 2006), in which participants are asked to read aloud a list of 15 letters and 55 words increasing in difficulty level (from cat to terpsichorean). *Processing speed* was assessed by the Pattern Comparison task (Salthouse & Babcock, 1991), in which participants are asked to make "same" or "different" judgments as quickly as possible (for 30 seconds) for sequences of pairs of patterns. *Memory performance* was assessed by the Rey Auditory Verbal Learning Test (Rey, 1964; Schmidt, 2004), which captures both immediate and delayed recall. Using a word-list learning paradigm, participants are first presented with a 15-word list (List A) and asked to recall the list (this process is repeated for five trials). Participants are then presented with one trial of a second 15-word list (List B; interference) with recall. Finally, participants are asked to recall the words on the initial list (List A) after a 20-minute delay (delayed recall trial). For scoring, immediate recall reflects the sum of words recalled on trials 1 to 5 and delayed recall reflects total number of words recalled after a 20-minute delay. For each of these outcome measures, higher scores reflect greater memory ability.

In addition to participant demographics (e.g., age, education, ethnicity/race), we also collected self-reported information on physical and mental health status. Individuals rated their physical health status on a 5-point scale (1 = Poor to 5 = Excellent). Mental health was defined by the number of depressive symptoms reported on the Geriatric Depression Scale (15-item; Sheikh & Yesavage, 1986). Lower values indicate fewer depressive symptoms.

Procedures

To describe the nature of activities that older adults were engaged in prior to participation in the Baltimore Experience Corps® trial, the frequency distributions of each of the activity

items were first examined. Additionally, we considered three measures of behavioral participation in activities: the *frequency* of participation (how often an activity was performed), the *variety* of activities (total number of activities endorsed), and the *nature* of activities reported. To explore the possibility that specific types of activities differentially influence health and well-being, activities were classified into five domains (intellectual, social, physical, creative, and passive) based on review of the existing literature (e.g., Aartsen, Smits, van Tilberg, Knipscheer, & Deeg, 2002; Bielak, Hughes, Small, & Dixon, 2007; Carlson et al., 2011; Hultsch et al., 1999; Jopp & Hertzog, 2007; Parisi et al., 2009; Wilson et al., 1999). Summary scores for activity domains were created by averaging responses to individual activity items (*frequency*) and by summing the number of endorsed items, i.e., those reported at least once a month or more (*variety*) within each activity domain (see Table 2).

Using the indicators defined above, we examined the bivariate correlations among activity and individual characteristics (age, education), self-reported physical and mental health status, and various aspects of cognition (MMSE, WRAT, processing speed, and memory). Bonferroni corrections were applied to correct for the large number of comparisons (Miller, 1981). We report data from the Baltimore Experience Corps® trial that were collected as part of the baseline examination administered prior to randomization to the EC program or a low-activity control condition. All data presented were obtained in compliance with institutional regulations.

Results

Activity participation

During the year prior to enrollment in the Baltimore Experience Corps® trial, participants reported being actively engaged in a variety of activities.[1] Individuals reported that they frequently engaged in passive activities (i.e., those that do not elicit high levels of cognitive stimulation), such as listening to music (99.1%) and watching television (99.1%). However, activities that are typically thought of as more intellectually challenging, such as reading (88.7%) and discussing local and national issues (96.0%), as well as essential daily activities such as preparing food (97.6%) and shopping (98.8%) were also highly reported (Table 2).

Correlations among participant characteristics, activity, and cognition

Table 3 presents the correlations among participant characteristics, activity, and measures of cognition. We found that age was unassociated with overall frequency of participation or the variety of activities performed (p's > 0.05). However, we consistently found that education, health, and cognitive measures were related to greater and more diverse participation in activities. Specifically, individuals who reported greater participation in a variety of activities also completed more years of education, were in better physical health, and exhibited fewer depressive symptoms (p's < 0.01). Interestingly, neither greater total participation nor the variety of activities was related to performance on the MMSE or WRAT, but were related to measures of processing speed and memory; which may reflect more cognitively complex processes.

When the nature of activity was considered, we found differential relations between activity domains and education, physical and mental health, and measures of cognition. For instance, individuals with more years of education reported greater frequency and variety of participation in intellectually and physically demanding activities. Additionally, greater

[1]It should be noted that the data were reanalyzed including only African-American participants, which did not significantly alter the pattern of findings.

participation (as indicated by both frequency and variety) in specific activity domains was related to better reported health (for intellectual, social and physical activities) and fewer depressive symptoms (for intellectual, social, physical, and creative activities). Although frequency and variety demonstrated similar patterns of findings for most activity domains, for passive activities, only variety (and not frequency) of participation was associated with self-reported physical and mental health status.

Consistent with the environmental complexity hypothesis (cf., Schooler, 1987), greater frequency and variety of participation in intellectually demanding activities was most consistently related to cognitive performance (correlations ranged from 0.11 to 0.21; p's < 0.01). Participation in social and creative activities was also related to performance on select cognitive tasks (Table 3).

To address the possibility that the associations between activities and cognition could be fully accounted by demographic factors, we also examined these associations after adjusting for age, education, self-reported heath, and number of depressive symptoms. The majority of relationships shown in Table 3 were slightly attenuated, but remained significant (p's < 0.05), in the adjusted model, indicating that the relationships between activity and cognition were not entirely accounted for by these demographic factors. There were some associations (in terms of both frequency and variety), however, that fell below significance. Specifically, participation in intellectual activities was no longer significantly associated with performance on the MMSE and the RAVLT delayed memory recall task. Likewise, participation in social activities was no longer associated with processing speed and participation in creative activities was no longer associated with the RAVLT delayed memory recall task.

Discussion

With a growing aging population, selection of and participation in lifestyle activities represents a modifiable risk factor; whereby favorable choices can potentially lead to a reduction in disability in later adulthood. Within this group of older adults at an elevated sociodemographic risk for disability and dementia, our findings support the notion that maintaining an active lifestyle is associated with physical, mental, and cognitive health in adulthood. As relatively few studies have been conducted within primarily minority samples, examining relationships between activity and health in diverse populations is of utmost importance.

During the year prior to participation in the Experience Corps program, individuals reported being actively engaged with several activities varying in cognitive, physical, and social demands. The activities reported by these participants were highly similar to those previously reported in studies examining engagement patterns in adulthood, with television watching, reading, socializing, and essential daily activities (e.g., preparing food) among those activities most frequently endorsed (e.g., Arbuckle, Gold, Chaikelson, & Lapidus, 1994; Dotson, Schinka, Brown, Mortimer, & Borenstein, 2008; Parisi, 2010; Salthouse, Berish, & Miles, 2002). A few differences were noted; specifically, individuals in the present study reported high levels of religious involvement, replicating other findings suggesting that African-Americans center many of their activities around religious involvement (e.g., Krause, 2006; Taylor, Chatters, McKeever Bullard, Wallace, & Jackson, 2009). The fact that our sample generally demonstrated similar activity patterns despite number of significant sociodemographic risk factors (including low income and greater risk of health disparities) suggests there are some activities that represent targets for broad, large-scale health promotion.

Regardless of race, however, other determinants of engagement, such as education and perceived health, may be more closely related to activity selection and continued participation. As such, early education or other social leaning opportunities may establish lifelong patterns of activity by developing the necessary skills and competencies to pursue such challenges (Strain, Grabusic, Searle, & Dunn, 2002; Wilson et al., 1999); whereas, depressed mood or decreasing physical health may negatively impact the selection and maintenance of activities in later adulthood (Adler et al., 1994; Iwasaki & Smale, 1998; Ross & Wu, 1995). Although impaired physical and mental health may limit participation, it is equally reasonable to assume that maintaining an active lifestyle results in several health benefits. Participation in activities may provide a sense of mastery and control, influence self-esteem, or increase feelings of happiness; thereby buffering against the negative impact of stress in order to maintain physical and psychological health (Iso-Ahola, 1997).

Interestingly, the frequency and variety of participation resulted in similar associations with health and cognitive measures, suggesting that greater and more varied participation may be equally beneficial for promoting health and well-being in adulthood. It may be that increasing the frequency and variety of activities results in interacting with a greater number and type of environments, which may positively influence cognitive functioning (Carlson, Saczynski, et al., 2008; Friedland et al., 2001). The Experience Corps program was designed to engage individuals in a variety of roles (e.g., literacy and math activities, cooperative problem solving, library support), thereby exercising a number of cognitive abilities (i.e., a substantively complex environment). As this commitment requires a minimum of 15 hours per week of volunteer service in an elementary school classroom, it is highly likely that the frequency of activities, number of activities, or the type of lifestyle activities typically performed may be altered over time. Further, characterizing the variety of lifestyle activities in which older adults participated at baseline may help predict those who will readily adhere to the Experience Corps program, as these individuals may be more likely to adapt to the multiple demands of the program and various volunteer roles.

In addition to frequent and diverse engagement, our findings suggest that it may be even more important for older adults to engage in cognitively complex endeavors for maintaining (or perhaps promoting) cognition in adulthood. Consistent with the environmental complexity hypothesis, we found that participation in intellectually stimulating activities was related to higher performance across several cognitive abilities. The majority of these associations remained significant after adjusting for age, education, self-reported health, and number of depressive symptoms. These findings generally agree with previous studies examining these relationships in highly educated, European-American samples (e.g., Hultsch et al., 1999), as well as in biracial populations (Barnes et al., 2006; Wilson et al., 2003). Although the exact mechanisms are unclear, greater participation in intellectually demanding activities may strengthen or build neural connections, provide continued practice of cognitive strategies, or increase cognitive flexibility (e.g., Stern, 2009; Stern, Albert, Tang, & Tsai, 1999; Stine-Morrow, 2007; Stine-Morrow, Parisi, Morrow, Greene, & Park, 2007; Verghese et al., 2003; Willis et al., 2006).

We also found select relationships between participation in social and creative activities and cognitive performance, perhaps highlighting the cognitively complex nature of these activities. Previous research suggests that older people who are more socially engaged tend to have a higher level of cognitive function (Barnes, Mendes de Leon, Wilson, Bienias, & Evans, 2004; Bassuk, Glass, & Berkman, 1999; Seeman, Lusignolo, Albert, & Berkman, 2001). Additionally, social support has been shown to exert beneficial effects on physiological systems, including cardiovascular, endocrine, and immune systems (Uchino, Cacioppo, & Kiecolt-Glaser, 1996), which may also impact cognitive function. The Experience Corps program creates a social environment for volunteers in which

interpersonal relationships may be established; successful and sustained volunteer participation may be dependent upon building this type of support system (e.g., Martinez et al., 2006). For instance, Experience Corps volunteers working in teams may provide emotional support for one another by motivating and encouraging each other throughout the volunteer experience. Other engagementprograms found similar social benefits for attracting and retaining participants (Parisi, Greene, Morrow, & Stine-Morrow, 2007), demonstrating the importance of creating health promotion programs that capitalize on individuals' social and emotional goals in later adulthood (Carstensen, 2006).

Additionally, other studies have suggested an association between creative activities and cognition (Levy & Langer, 1999; Sternberg & Lubart, 1991). Creative activity involves the intellectual processes of defining and redefining problems, choosing appropriate problem-solving strategies, and using insight processes to solve these problems (Sternberg & Lubart, 1991). In order to arrive at a solution, individuals need to incorporate relevant knowledge, basic reasoning, and memory skills (i.e., an intellectually challenging activity). Creative individuals may enjoy activities that facilitate this process and seek out additional opportunities for intellectual challenges (Parisi et al., 2009) or create complexity in otherwise simple environments, as even everyday activities (such as cooking) often contain a creative component.

It is not completely surprising that participation in physical activities was not related to cognitive performance as our measure of physical activity only included three items (shopping, gardening, and hunting/fishing/camping) and one item (hunting/fishing/camping) was not widely endorsed (3.7 % of individuals reported ever performing this activity). This finding should be interpreted with caution as our finding may reflect restricted measurement sensitivity or limited power to detect true relationships. Nonetheless, this finding is consistent with other studies by this group and by others who have documented that intellectually demanding activities (e.g., reading, doing crossword puzzles), but not physical activities (e.g., dancing, bicycling, swimming), were inversely related to cognitive decline or risk of developing dementia (Carlson, Helms, et al., 2008; Fratiglioni, Paillard-Borg, & Winblad, 2004; Sturman, Morris, Mendes de Leon, Bienias, Wilson, & Evans, 2005; Trieber et al., 2011). Direct examination of a broader range of physical activities is warranted.

In practice, our findings can potentially be useful for activity professionals and practitioners interested in selecting and designing activity programs for older adults. As such, our findings suggest that greater participation in diverse activities should be encouraged. However, participation in intellectual (e.g., discussing local or national issues; reading a book or newspaper), social (e.g., visiting; clubs/organizations), and creative (e.g., cooking; singing, playing an instrument) activities may be especially promising for promoting health and well-being later in life. Many of these activities can easily be incorporated into existing activity programs for older adults or into one's repertoire of daily behaviors (see Table 2 for full list of activities).

Although these findings add to the literature, a few limitations should be noted. First, the LAQ contains only a select number of items and, therefore, does not fully capture all of the activities an individual performs. Further, as the LAQ relies on retrospective, self-reports of activity participation, it is highly possible that data may be incomplete, inaccurate, or distorted. As such individuals may be under- or over-reporting their frequency of participation in specific activities (Salthouse et al., 2002). However, the LAQ has been used effectively to examine activity and cognitive decline in other at-risk samples (e.g., Carlson et al., 2011; Trieber et al., 2011). Second, we recognize that the classification of activities is complex. For instance, we classified 'discussing local or national issues' as an intellectual endeavor; yet, this activity undoubtedly also contains a social component. With all the

challenges, however, classifying activities allowed us to explore the differential effects of specific activities on cognitive, physical, and mental health. Lastly, from our cross-sectional, correlational analyses, we cannot determine the direction of these relations. Although current activity levels may be related to cognition and health in adulthood, it is also plausible that high-ability, healthy adults have always led active lives and that their health, in particular, allows them to continue to lead active lives (e.g., Hultsch et al., 1999; Schooler & Mulatu, 2001).

In conclusion, the current findings provide a better understanding of the nature and extent of participation in various lifestyle activities prior to selecting to participate in the Experience Corps® study. Our findings further support the notion that maintaining an active lifestyle, particularly engagement with intellectually demanding activities, is associated with physical, mental, and cognitive health in later life. When longitudinal data become available, an appreciation of how individuals allocate their time before randomization to the Experience Corps® program can provide the basis for analyzing several related issues; these include: examining intervention-related changes in lifestyle as a result of volunteer participation, whether baseline activity helps predict adherence and/or the ability to benefit from exposure, or how activities are related to other cognitive, psychosocial, and mental health factors. If, as suggested earlier, involvement in activities is related to older adults' well-being, a clearer understanding of various engagement patterns for cognitive and physical maintenance is needed.

Acknowledgments

Funding support for this manuscript was provided in part by NIA P01 AG027735, the John A. Hartford Foundation, and by the Johns Hopkins Older Americans Independence Center under contracts P30-AG02133 and R37-AG19905 from the National Institute on Aging, National Institutes of Health. Dr. Parisi was supported, in part, by a National Institute of Mental Health Prevention Research Training Grant (T-32 MH018834; Nicholas Ialongo, Principal Investigator).

The authors would also like to thank the Greater Homewood Community Corporation, Experience Corps National, Civic Ventures, the Baltimore City Public School System, the City of Baltimore, the Commission on Aging and Retirement Education, the Baltimore City Retirees Association, AARP, the Harry and Jeanette Weinberg Foundation and The John D. and Catherine T. MacArthur Foundation for ongoing vision and support.

Special thanks to all the staff and volunteers of the Baltimore Experience Corps who have made this all possible.

References

Aartsen MJ, Smits CMH, van Tilberg T, Knipscheer KCPM, Deeg DJH. Activity in older adults: Cause or consequence of cognitive functioning? A longitudinal study of everyday activities and cognitive performance in older adults. Journal of Gerontology: Psychological Sciences. 2002; 57:153–162.

Adler NE, Boyce WX, Chesney MA, Cohen S, Folkman S, Kahn RL, Syme SL. Socioeconomic status and health: The challenge of the gradient. American Psychologist. 1994; 49:15–24. [PubMed: 8122813]

Allison MT. Leisure, diversity, and social justice. Journal of Leisure Research. 2000; 32:2–6.

Alzheimer's Association. 2010 Alzheimer's disease facts and figures. Chicago: Alzheimer's Association; 2010.

Arbuckle TY, Gold DP, Chaikelson JS, Lapidus S. Measurement of activity in the elderly. Canadian Journal on Aging. 1994; 13:550–565.

Barnes LL, Mendes de Leon CF, Wilson RS, Bienias JL, Evans DA. Social resources and cognitive decline in a population of older African Americans and whites. Neurology. 2004; 63:2322–2326. [PubMed: 15623694]

Barnes LL, Wilson RS, Mendes De Leon CF, Bennett DA. The relation of lifetime cognitive activity and lifetime access to resources to late-life cognitive function in older African Americans. Aging, Neuropsychology, and Cognition. 2006; 13:516–528.

Bassuk SS, Glass TA, Berkman LF. Social disengagement and incident cognitive decline in community-dwelling elderly persons. Annals of Internal Medicine. 1999; 131:165–173. [PubMed: 10428732]

Bielak AAM, Hughes TF, Small BJ, Dixon RA. It's never too late to engage in lifestyle activities: Significant concurrent but not change relationships between lifestyle activities and cognitive speed. Journal of Gerontology: Psychological Sciences. 2007; 62:331–339.

Carlson MC, Helms MJ, Steffens DC, Burke JR, Potter GG, Plassman BL. Midlife activity predicts risk of dementia in older male twin pairs. Alzheimer's & Dementia. 2008; 4:324–331.

Carlson MC, Parisi JM, Xia J, Xue QL, Rebok GW, Bandeen-Roche K, Fried LP. Lifestyle activities and aging: Variety may be the spice of life. Journal of the International Neuropsychological Society. 2011; 18:1–9. [PubMed: 22152338]

Carlson MC, Saczynski JS, Rebok GW, Seeman T, Glass TA, McGill S, Fried LP. Exploring the effects of an "everyday" activity program on executive function and memory in older adults: Experience Corps. The Gerontologist. 2008; 48:793–801. [PubMed: 19139252]

Carstensen LL. The influence of a sense of time on human development. Science. 2006; 312:1913–1915. [PubMed: 16809530]

Clark DO, Maddox GL. Racial and social correlates of age-related changes in functioning. Journal of Gerontology: Social Sciences. 1992; 47:222–232.

Clark DO, Mungai SM, Stump TE, Wolinsky FD. Prevalence and impact of risk factors for lower body difficulty among Mexican Americans, African Americans, and Whites. Journal of Gerontology: Medical Sciences. 1997; 52:97–105.

Dekosky ST, Williamson JD, Fitzpatrick AL, Kronmal RA, Ives DG, Saxton JA, Furberg CD. Ginkgo biloba for prevention of dementia: A randomized controlled trial. JAMA. 2008; 300:2253–2262. [PubMed: 19017911]

Dotson VM, Schinka JA, Brown LM, Mortimer JA, Borenstein AR. Characteristics of the Florida Cognitive Activities Scale in older African Americans. Assessment. 2008; 15:72–77. [PubMed: 18258733]

Evans DA, Bennett DA, Wilson RS, Bienias JL, Morris MC, Scherr PA, Schneider J. Incidence of Alzheimer disease in a biracial urban community: Relation to apolipoprotein e allele status. Archives of Neurology. 2003; 60:185–189. [PubMed: 12580702]

Floyd MF, Shinew KJ, McGuire FA, Noe FP. Race, class, and leisure activity preferences: Marginality and ethnicity revisited. Journal of Leisure Research. 1994; 26:158–173.

Folstein MF, Folstein SE, McHugh PR. Mini-mental state: A practical method for grading the cognitive state of patients for the clinician. Journal of Psychiatric Research. 1975; 12:189–198. [PubMed: 1202204]

Ford AB, Haug MR, Jones PK, Roy AW, Folmar SJ. Race-related differences among elderly urban residents: A cohort study, 1975–1984. Journal of Gerontology: Social Sciences. 1990; 45:163–171.

Fratiglioni L, Paillard-Borg S, Winblad B. An active and socially integrated lifestyle in late life might protect against dementia. Lancet Neurology. 2004; 3:343–353. [PubMed: 15157849]

Fried, LP. What are the roles of public health in an aging society?. In: Prohaska, TR.; Anderson, LA.; Binstock, RH., editors. Public health for an aging society. Baltimore, MD: Johns Hopkins University Press; (in press)

Fried LP, Carlson MC, Freedman M, Frick KD, Glass TA, Hill J, Zeger S. A social model for health promotion for an aging population: Initial evidence on the Experience Corps model. Journal of Urban Health. 2004; 81:64–78. [PubMed: 15047786]

Friedland RP, Fritsch T, Smyth KA, Koss E, Lerner AJ, Chen CH, Debanne SM. Patients with Alzheimer's disease have reduced activities in midlife compared with healthy control-group members. Proceedings of the National Academy of Sciences. 2001; 98:3440–3445.

He XZ, Baker DW. Differences in leisure-time, household, and work-related physical activity by race, ethnicity, and education. Journal of General Internal Medicine. 2005; 20:259–266. [PubMed: 15836530]

Hu FB, Li TY, Colditz GA, Willett WC, Manson JE. Television watching and other sedentary behaviors in relation to risk of obesity and type 2 diabetes mellitus in women. JAMA. 2009; 289:1785–1791. [PubMed: 12684356]

Hultsch DF, Small BJ, Hertzog C, Dixon RA. Use it or lose it: Engaged lifestyle as a buffer of cognitive decline in aging? Psychology and Aging. 1999; 14:245–263. [PubMed: 10403712]

Iso-Ahola, SE. A psychological analysis of leisure and health. In: Haworth, JT., editor. Work, leisure and well-being. London: Routledge; 1997. p. 131-144.

Iwasaki Y, Smale BJA. Longitudinal analyses of the relationships among life transitions, chronic health problems, leisure, and psychological well-being. Leisure Sciences. 1998; 20:25–52.

Jopp D, Hertzog C. Activities, self-referent memory beliefs, and cognitive performance: Evidence for direct and mediated relationships. Psychology and Aging. 2007; 22:811–825. [PubMed: 18179299]

Konlaan BB, Theobald H, Bygren LO. Leisure time activity as a determinant of survival: A 26-year follow-up of a Swedish cohort. Public Health. 2002; 116:227–230. [PubMed: 12087482]

Krause NM. Exploring race and sex differences in church involvement during late life. International Journal for the Psychology of Religion. 2006; 16:127–144.

Lemon BW, Bengston VL, Peterson JA. An exploration of the activity theory of aging: Activity types and life satisfaction among inmovers to a retirement community. Journal of Gerontology. 1972; 27:511–523. [PubMed: 5075497]

Levy, B.; Langer, E. Aging. In: Pritzker, MARS., editor. Encyclopedia of creativity. New York: Academic Press; 1999. p. 45-52.

Martinez IL, Frick K, Glass TA, Carlson M, Tanner E, Ricks M, Fried LP. Engaging older adults in high impact volunteering that enhances health: Recruitment and retention in the Experience Corps Baltimore. Journal of Urban Health: Bulletin of the New York Academy of Medicine. 2006; 83:941–953. [PubMed: 16758336]

Meinert CL, Breitner JCS. Chronic disease long-term drug prevention trials: lessons from the Alzheimer's Disease anti-inflammatory prevention trial (ADEPT). Alzheimer's & Dementia. 2008; 4:7–14.

Menec VH. The relation between everyday activities and successful aging: A 6-year longitudinal study. Journal of Gerontology. 2003; 58:74–82.

Miller, RG. Simultaneous statistical inference. McGraw Hill; New York: 1981.

Parisi JM. Engagement in adulthood: Perceptions and participation in daily activities. Activities, Adaptation, & Aging. 2010; 34:1–16.

Parisi JM, Greene JC, Morrow DG, Stine-Morrow EAL. The Senior Odyssey: Participant experiences of a program of social and intellectual engagement. Activities, Adaptation, & Aging. 2007; 31:31–49.

Parisi JM, Stine-Morrow EAL, Noh S, Morrow DG. Predispositional, engagement, activity engagement, and cognition among older adults. Aging, Neuropsychology, and Cognition. 2009; 16:485–504.

Philipp SF. Race and the pursuit of happiness. Journal of Leisure Research. 2000; 32:121–124.

Rebok GW, Carlson MC, Glass TA, McGill S, Hill J, Wasik BA, Rasmussen M. Short-term impact of Experience Corps participation on children and schools: Results from a pilot randomized trial. Journal of Urban Health. 2004; 81:79–93. [PubMed: 15047787]

Rey, A. L'examen clinique en psychologie. Paris, France: Presses Universitaires de France; 1964.

Ross CE, Wu C. The links between education and health. American Sociological Review. 1995; 60:719–745.

Rowe, JR.; Kahn, RL. Successful aging. New York: Pantheon; 1998.

Salthouse TA. Mental exercise and mental aging: Evaluating the validity of the "use it or lose it" hypothesis. Perspectives on Psychological Science. 2006; 1:68–87.

Salthouse TA, Babcock RL. Decomposing adult age differences in working memory. Developmental Psychology. 1991; 27:763–776.

Salthouse TA, Berish DE, Miles JD. The role of cognitive stimulation on the relations between age and cognitive functioning. Psychology and Aging. 2002; 17:548–557. [PubMed: 12507353]

Scarmeas N, Levy G, Tang MX, Manly J, Stern Y. Influence of leisure activity on the incidence of Alzheimer's disease. Neurology. 2001; 57:2236–2242. [PubMed: 11756603]

Schmidt, M. Rey Auditory and Verbal Learning Test: A handbook. Los Angeles, CA: Western Psychological Services; 2004.

Schooler, C. Psychological effects of complex environments during the life-span: A review and theory. In: Schooler, C.; Schaie, KW., editors. Cognitive functioning and social structure over the life course. Norwood, NJ: Ablex; 1987. p. 24-49.

Schooler C, Mulatu SM. The reciprocal effects of leisure time activities and intellectual functioning in older people: A longitudinal analysis. Psychology and Aging. 2001:466–482. [PubMed: 11554524]

Seeman TE, Lusignolo TM, Albert M, Berkman L. Social relationships, social support, and patterns of cognitive aging in healthy, high-functioning older adults: MacArthur studies of successful aging. Health Psychology. 2001; 20:243–255. [PubMed: 11515736]

Sheikh JI, Yesavage JA. Geriatric Depression Scale: Recent evidence and development of a shorter version. Clinical Gerontologist. 1986; 5:165–172.

Shumaker SA, Legault C, Rapp SR, Thal L, Wallace RB, Ockene JK, Wactawski-Wende J. Estrogen plus progestin and the incidence of dementia and mild cognitive impairment in postmenopausal women; The Women's Health Initiative Memory Study: A randomized controlled trial. JAMA. 2003; 289:2651–2662. [PubMed: 12771112]

Snitz BE, O'Meara ES, Carlson MC, Arnold AM, Ives DG, Rapp SR, DeKosky ST. Ginkgo biloba for preventing cognitive decline in older adults: A randomized trial. JAMA. 2009; 302:2663–2670. [PubMed: 20040554]

Stamatakis E, Hamer M, Dunstan DW. Screen-based entertainment time, all-cause mortality, and cardiovascular events population-based study with ongoing mortality and hospital events follow-up. Journal of the American College of Cardiology. 2011; 57:292–299. [PubMed: 21232666]

Stamps S, Stamps M. Race, class and leisure activities of urban residents. Journal of Leisure Research. 1985; 17:40–56.

Stern Y. Cognitive reserve. Neuropsychologia. 2009; 47:2015–2028. [PubMed: 19467352]

Stern Y, Albert S, Tang MX, Tsai WY. Rate of memory decline in AD is related to education and occupation: Cognitive reserve? Neurology. 1999; 53:1942–1947. [PubMed: 10599762]

Sternberg RJ, Lubart TI. An investment theory of creativity and its development. Human Development. 1991; 31:197–224.

Stine-Morrow EAL. The Dumbledore hypothesis of cognitive aging. Current Directions in Psychological Science. 2007; 16:289–293.

Stine-Morrow EAL, Parisi JM, Morrow DG, Greene JC, Park DC. An engagement model of cognitive optimization through adulthood. Journal of Gerontology: Psychological Sciences. 2007; 62:62–69.

Strain LA, Grabusic CC, Searle MS, Dunn NJ. Continuing and ceasing leisure activities in later life: A longitudinal study. The Gerontologist. 2002; 42:217–233. [PubMed: 11914465]

Sturman MT, Morris MC, Mendes de Leon CF, Bienias JL, Wilson RS, Evans DA. Physical activity, cognitive activity, and cognitive decline in a biracial community population. Archives of Neurology. 2005; 62:1750–1754. [PubMed: 16286550]

Tan EJ, Tanner EK, Seeman TE, Xue QL, Rebok GW, Frick KD, Fried LP. Marketing public health through older adult volunteering: Experience Corps as a social marketing intervention. American Journal of Public Health. 2010; 100:727–734. [PubMed: 20167888]

Tang MX, Stern Y, Marder K, Bell K, Gurland B, Lantigua R, Mayeux R. The APOE-epsilon4 allele and the risk of Alzheimer disease among African Americans, Whites, and Hispanics. JAMA. 1998; 279:751–755. [PubMed: 9508150]

Taylor RJ, Chatters LM, McKeever Bullard K, Wallace JM, Jackson JS. Organizational religious behavior among older African Americans: Findings from the National Survey of American Life. Research on Aging. 2009; 31:440–462. [PubMed: 21052487]

Trieber KA, Carlson MC, Corcoran C, Norton MC, Breitner JCS, Piercy KW, Tschanz JT. Cognitive stimulation and cognitive and functional decline in Alzheimer's Disease: The Cache County Dementia Progression Study. Journal of Gerontology: Psychological Science. 2011; 66:416–425.

Uchino BN, Cacioppo JT, Kiecolt-Glaser JK. The relationship between social support and physiological processes: A review with emphasis on underlying mechanisms and implications for health. Psychological Bulletin. 1996; 119:488–531. [PubMed: 8668748]

Verbrugge LM, Jette AM. The disablement process. Social Science and Medicine. 1994; 38:1–14. [PubMed: 8146699]

Verghese J, Lipton RB, Katz MJ, Hall CB, Derby CA, Kuslansky G, Buschke H. Leisure activities and the risk of dementia in the elderly. New England Journal of Medicine. 2003; 348:2508–2516. [PubMed: 12815136]

Wang HX, Karp A, Winblad B, Fratiglioni L. Late-life engagement in social and leisure activities is associated with a decreased risk of dementia: A longitudinal study from the Kungsholmen project. American Journal of Epidemiology. 2002; 155:1081–1087. [PubMed: 12048221]

Whitt-Glover MC, Taylor WC, Heath GW, Macera CA. Self-reported physical activity among Blacks estimates from national surveys. American Journal of Preventive Medicine. 2007; 33:412–417. [PubMed: 17950407]

Wilkinson, GS.; Robertson, GJ. Wide Range Achievement Test. 4. Lutz, FL: Psychological Assessment Resources; 2006.

Willis SL, Tennstedt SL, Marsiske M, Ball K, Elias J, Koepke KM, Wright E. Long-term effects of cognitive training on everyday functional outcomes in older adults. JAMA. 2006; 296:2805–2814. [PubMed: 17179457]

Wilson RS, Bennett DA. Cognitive activity and risk of Alzheimer's Disease. Current Directions in Psychological Science. 2003; 12:87–91.

Wilson RS, Bennett DA, Beckett LA, Morris MC, Gilley DW, Bienias JL, Evans DA. Cognitive activity in older persons from a geographically defined population. Journals of Gerontology: Psychological Sciences and Social Sciences. 1999; 54:155–160.

Table 1

Participant Characteristics (N = 675)

	%	*M*	*SD*
Age (years)		67.49	5.95
Education (years)		13.85	2.94
Cognition			
Cognitive status (MMSE)		28.11	1.58
Reading ability (WRAT)		56.87	6.75
Speed (Pattern Comparison)		25.57	6.01
Memory (RAVLT)			
Immediate		39.82	8.14
Delayed		6.74	3.12
Income (past 12 months)			
Less than $5,000		6.1	
$5,000–14,999		23.1	
$15,000–34,999		35.2	
$35,000–74,999		27.4	
$75,000 or greater		6.8	
Sex			
Male	15.4		
Female	84.6		
Race			
African-American	90.5		
European-American	5.1		
Depressive symptoms(number of reported symptoms)			
Less than 5	96.9		
5 to 10	2.5		
More than 10	0.5		
Health conditions			
Hypertension	74.0		
Diabetes	31.6		
Transient ischemic attack	6.9		
Physical Health			
Excellent	9.6		
Very Good	44.3		
Good	35.2		
Fair	10.7		
Poor	0.3		

Note. MMSE = Mini-mental State Exam; WRAT = Wide Range Achievement Test; RAVLT = Rey Auditory Verbal Learning Test. Depressive symptoms were measures by the number of reported symptoms on the Geriatric Depression Scale (GDS); higher scores are associated with greater likelihood of depressive symptomatology.

Table 2

Frequency of Self-reported Activities Over the Past Year

Activities	Percentage of individuals reporting activity	M	SD
Intellectual			
Discussing local or national issues	96.0	3.9	1.3
Reading a book	88.7	3.1	1.8
Reading a newspaper	87.7	3.6	1.7
Balancing checkbook	82.6	2.0	1.5
Using a computer	57.0	2.2	2.2
Crossword puzzles	49.0	1.6	2.0
Taking courses or classes	25.7	0.6	1.2
Social			
Attending church/religious service	91.3	3.0	1.3
Visiting	87.2	2.3	1.4
Caretaking	83.4	2.7	1.7
Clubs/organizations	78.6	2.2	1.6
Volunteering[a]	67.0	2.0	1.8
Baby-sitting	52.7	1.5	1.8
Playing cards or games	49.4	1.2	1.5
Going to movies	33.9	0.5	0.9
Going to plays/concerts	33.5	0.4	0.7
Physical			
Shopping	98.8	3.3	1.0
Gardening	46.9	1.5	1.8
Hunting, Fishing, Camping	3.7	0.1	0.3
Creative			
Preparing food	97.6	4.2	1.1
Sewing, mending, fixing things	78.2	2.2	1.6
Singing, playing instrument	66.6	2.5	2.0
Drawing or Painting	21.0	0.5	1.1
Passive			
Listening to music	99.1	4.6	0.9
Watching TV	99.1	4.8	0.6
Listening to radio (not music)	89.3	3.8	1.6
Looking at art	58.9	1.4	1.6

Note.

[a]Volunteering added during the third year of the study; 197 cases available. Averages based on 6-point scale; 1 = never, 6 = everyday.

Table 3

Correlations among Participant Characteristics, Cognition, and Self-Reported Activity

					Cognition				
	Age	**Education**	**Health**	**Depressive Symptoms**	**MMSE**	**WRAT**	**Speed**	**Memory: Immediate**	**Memory: Delayed**
Activity Level									
Frequency	−0.04	0.16 **	0.20 **	−0.25 **	0.07	0.05	0.14 **	0.12 **	0.10 *
Variety	−0.07	0.15 **	0.15 **	−0.26 **	0.06	0.04	0.12 **	0.11 **	0.06
Activity Type									
Intellectual	0.04	0.26 **	0.17 **	−0.14 **	0.12 **	0.21 **	0.15 **	0.14 **	0.11 **
	−0.01	0.24 **	0.14 **	−0.15 **	0.12 **	0.18 **	0.12 **	0.16 **	0.11 **
Social	−0.04	−0.04	0.09 *	−0.25 **	−0.01	−0.15 **	0.08 *	0.05	0.03
	−0.10 *	0.05	0.09 *	−0.22 **	0.02	−0.04	0.11 **	0.04	0.02
Physical	0.04	0.14 **	0.19 **	−0.19 **	−0.03	0.06	0.04	0.04	0.01
	0.02	0.13 **	0.14 **	−0.16 **	−0.03	0.05	−0.01	0.00	−0.01
Creative	−0.05	−0.01	0.07	−0.15 **	0.02	−0.07	0.06	0.12 **	0.10 *
	−0.04	0.01	0.05	−0.18 **	0.06	−0.08 *	0.06	0.13 **	0.08 *
Passive	−0.04	0.07	0.06	−0.06	−0.02	−0.03	0.03	−0.02	0.00
	−0.06	0.07	0.08 *	−0.10 **	0.01	0.02	0.02	0.02	0.01

Note.

* $p < 0.05$.

** $p < 0.01$.

MMSE = Mini-mental state exam; WRAT = Wide Range Achievement Test. For each activity type, correlations for both Frequency (top values) and Variety (bottom values) are presented.

Act Adapt Aging. Author manuscript; available in PMC 2013 September 18.