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Original Research Report

Effects of Preretirement Work Complexity and Postretirement Leisure Activity on Cognitive Aging

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Abstract

Objectives: We examined the influence of postretirement leisure activity on longitudinal associations between work complexity in main lifetime occupation and trajectories of cognitive change before and after retirement.
Methods: Information on complexity of work with data, people, and things, leisure activity participation in older adulthood, and four cognitive factors (verbal, spatial, memory, and speed) was available from 421 individuals in the longitudinal Swedish Adoption/Twin Study of Aging. Participants were followed for an average of 14.2 years (*SD* = 7.1 years) and up to 23 years across eight cognitive assessments. Most of the sample (88.6%) completed at least three cognitive assessments.
Results: Results of growth curve analyses indicated that higher complexity of work with people significantly attenuated cognitive aging in verbal skills, memory, and speed of processing controlling for age, sex, and education. When leisure activity was added, greater cognitive and physical leisure activity was associated with reduced cognitive aging in verbal skills, speed of processing, and memory (for cognitive activity only).
Discussion: Engagement in cognitive or physical leisure activities in older adulthood may compensate for cognitive disadvantage potentially imposed by working in occupations that offer fewer cognitive challenges. These results may provide a platform to encourage leisure activity participation in those retiring from less complex occupations.

Keywords: Cognitive aging—Growth curve analysis—Leisure activity—Retirement—Work complexity

Intellectual engagement, specifically intellectual engagement reflected in leisure activities (Baer et al., 2013; Lee et al., 2013; Verghese et al., 2003) or occupation (Adam, Bonsang, Grotz, & Perelman, 2013; Finkel, Andel, Gatz, & Pedersen, 2009; Schooler, Mulatu, & Oates, 2004) has been linked to favorable late-life cognitive outcomes (better function, slower decline, lower risk of dementia) in a great number of studies, presenting itself as one target for intervention to support cognitive function with age. Although there are questions regarding whether these associations are due to the influence of intellectual engagement on cognition itself or due to inherently higher mental ability in those who engage in cognitive stimulating activity (Salthouse, 2006), it could still be argued that knowledge regarding the role of intellectual engagement in cognition and aging may be a catalyst in an effort to maintain normal cognitive function with age.

Two overlapping theoretical concepts have been used as conceptual foundation of these relationships—cognitive reserve and environmental complexity. According to the concept of cognitive reserve (Stern, 2002), intellectual engagement promotes reserve in brain function that can later be used to delay clinical signs of cognitive decline despite substantial dementia-related neuropathology. Similarly, the environmental complexity hypothesis (Kohn & Schooler, 1983) posits that prolonged exposure to complex environments that tend to challenge the individual to perform intellectually demanding tasks has a measurable, positive influence on cognitive function.

Although work and leisure environments seem to affect cognitive aging outcomes, neither dimension can provide a full picture of the intellectual engagement-cognitive aging link by itself. Therefore, we set out to examine the two dimensions of intellectual engagement simultaneously within one study in relation to age-related changes in several major cognitive domains. Given the central role of retirement in this type of study, we modeled change as a function of retirement. We presumed that this comprehensive look at levels of intellectual engagement within and outside of work could provide a better foundation for strategies to modify work and leisure environment to support cognitive function with age.

Most adults spend a substantial amount of time at work. Therefore, employment is one of the central tenets of adult life in modern society with a vital role in shaping the course of one's adult development (Schlultz & Wang, 2011). With a gradual increase in retirement age (Szinovacz, Martin, & Davey, 2013), the importance of work for cognitive aging will likely grow even further. Together, this suggests that work environment needs to be considered among important factors in the search for ways to modify trajectories of cognitive change (Bonsang, Adam, & Perelman, 2012).

Previously, work environment characterized by higher levels of occupational complexity was related to greater intellectual flexibility (Schooler et al., 2004), better cognitive function (Andel, Kareholt, Parker, Thorslund, & Gatz, 2007), and a reduced risk of cognitive impairment (Andel et al., 2005). Most relevant to this study, Finkel et al. (2009) used a subset of data from the Swedish Twin Registry that included up to 18 years of follow-up across up to five waves of cognitive assessment and occupation-based data regarding work complexity. The results indicated that greater complexity of work with people was related to faster speed of processing and better verbal and spatial ability. In addition, the examination of trajectories of cognitive change that were modeled in two phases with retirement as the pivot point indicated a slower rate of decline in verbal ability in the years leading up to retirement and a greater rate of decline in spatial ability after retirement as a function of greater complexity of work with people. Recently, two similar retirement-based analyses with data from the nationally representative Health and Retirement study found that higher levels of "mental demands" (Fisher et al., 2014) or self-direction at work (Andel et al., 2015) were associated with better episodic memory before retirement as well as a slower rate of memory decline in the years following retirement. It should be noted that although gender differences have been observed in psychological outcomes relative to retirement (Calvo, Sarkisian, & Tamborini, 2013), research points consistently to the lack of gender differences in the association between work characteristics and cognitive change before versus after retirement (Finkel et al., 2009; Fisher et al., 2014).

Overall, there is evidence for the role of intellectual and social engagement at work in cognitive function and cognitive aging. However, it could be argued that looking at work environment alone presents only part of the picture or that intellectual benefits of work environment cannot be easily separated from engagement outside of work. Therefore, we set out to examine modification of the effects of complex work environment on trajectories of cognitive change before and after retirement using data from the Swedish Adoption/Twin Study of Aging (SATSA). Specifically, we examined whether the influence of complexity of the main lifetime occupation on the level and trajectory of change in cognitive functioning before/after retirement may be a function of the level and type of leisure activity. We measured occupational complexity as complexity of work with data, people, and things and used principal components analysis to generate latent components for verbal, spatial, memory, and speed cognitive domains.

This is the first longitudinal study to consider the influence of leisure activity on the association between complex work environments and cognition. Recently, Andel, Silverstein, and Kåreholt (2014) tested parallel roles of work complexity and leisure activity in late-life cognition (assessed at one time point). They found that greater work complexity and more engagement in leisure activity related to cognition independent of one another. Further, leisure activity played a compensatory role in the work complexity–cognition link, whereby above-average levels of leisure activity compensated for less complex work. Based on this research, we hypothesized that leisure activity would compensate for low work complexity in relation to overall cognitive performance and trajectory of cognitive change. We also expected that leisure activity would add to the prediction of cognitive decline over and above the predictive value of occupational complexity. This is the first study to consider the role of retirement in this context, and we expected leisure activity engagement to play an increased role in cognitive aging after retirement.

Method

Participants

Ascertainment procedures for SATSA have been described previously (Finkel & Pedersen, 2004). In brief, the sample is a subset of twins from the population-based Swedish Twin Registry. The base population comprises all pairs of twins who indicated that they had been separated before the age of 11 and reared apart, and a sample of twins reared together matched on the basis of gender and date and county of birth. Twins were mailed questionnaires and a sample of those pairs aged 50 years or older in which both twins responded was invited to participate in an additional in-person examination of health and cognitive abilities. In-person testing (IPT1) took place in a location convenient to the twins during a single 4-h visit. IPT was repeated every 2 or 3 years, although funding limitations resulted in a reduced sample at IPT4. Up to IPT5, new participants were added at each wave as they reached age 50. A total of 8 IPT waves were included in the present analyses, for a total potential follow-up of 23 years. In addition, participants were mailed questionnaires at irregular intervals. The leisure activity data included in this analyses was first collected at the fourth questionnaire wave (Q4) in 1993 and included in waves Q5 (2004), Q6 (2007), and Q7 (2010).

Dementia status was determined by clinical diagnosis based on current diagnostic criteria (Gatz et al., 1997) and data from participants who developed dementia at any point during their participation was excluded after diagnosis. Combining the data from the IPTs, Qs, and a baseline questionnaire in 1984 resulted in a sample of 421 individuals with cognitive, leisure, and occupational data. The current sample was 53.2% female and 88.6% of the sample had data from three or more waves of testing. Sample size and mean age at each IPT are presented in Table 1.

Measures

Cognitive components

Four cognitive domains are represented in the SATSA cognitive test battery included in the IPTs (Pedersen, Plomin, Nesselroade, & McClearn, 1992): verbal, spatial, memory, and processing speed abilities. Verbal abilities are tapped by Information, Synonyms, and Analogies. Figure Logic, Block Design, and Card Rotations assess spatial abilities. Memory tests include Digit Span, Picture Memory, and Names & Faces. Finally, Symbol Digit and Figure Identification measure processing speed. Reliabilities for these tests range from 0.82 to 0.96 (Pedersen et al., 1992). Principal components analysis was used to construct latent components from the individual tests within each domain: verbal, spatial, memory, and speed. To avoid the issue of measurement variance (cf. Wicherts et al., 2004), an invariant definition of components at each testing occasion was created by standardizing the cognitive measures relative to the respective means and variances at IPT1 and the loadings from the principal components analyses conducted at IPT1 were used to construct the components. Finally, for ease of interpretation, all component scores were translated to T-scores, using means and variances from IPT1.

Table 1. Sample Statistics

Wave	*N*	Mean Age (*SD*)
IPT1	272	63.99 (6.9)
IPT2	292	64.27 (8.2)
IPT3	306	66.54 (8.8)
IPT4	29	67.24 (9.3)
IPT5	312	68.88 (9.0)
IPT6	277	71.23 (8.6)
IPT7	242	73.50 (8.2)
IPT8	212	75.14 (8.0)
Retirement age	421	62.87 (4.4)
Leisure activities	421	73.4 (10.6)

Occupational complexity

In the 1984 SATSA-mailed questionnaire, the respondents were asked “What kind of occupation did you have during the major part of your working life?” The measure of complexity of work included three specific dimensions—complexity of work with data (processing information), people (managing and mentoring), and things (working with machinery). Occupation was originally coded according to categories from the 1980 Swedish Population and Housing Census. To assess complexity of work, we first matched each occupational category from the 1980 Swedish Census to the best-fitting category in the 1970 U.S. Census (Roos & Treiman, 1980; U.S. Bureau of the Census, 1973) using category descriptions. Then, we used the score matrix for complexity of work with data, people, and things available in the 1970 U.S. Census (see Roos & Treiman, 1980). A detailed description of the conversion method and general characteristics of complexity measures can be found in Andel et al. (2005).

Leisure activities

Starting at Q4, participants were asked how often, on a scale of 1 (daily) to 5 (never), they participated in a list of 8 leisure activities. Factor analysis indicated that responses clustered into three factors: Physical activities (athletics and walks), Social activities (club meetings, church activities, and courses), and Cognitive activities (reading books and playing puzzles or chess). The factors explained 20%, 25%, and 20% of the total variance, respectively. Interfactor correlations ranged from 0.12 to 0.15. The same factor structure was found at each measurement wave. Factors were transformed to T-scores such that high scores indicated more activity. To focus on leisure activity after retirement, responses to the activities items from each person’s last wave of participation were used in the present analyses. Mean age of leisure activities assessment was 73.4 (*SD* = 10.6) and for 92.25% of the sample leisure activities were assessed after retirement.

Retirement age

Combining self-report of retirement year with birth year, we calculated retirement age for 342 individuals from the current sample. Of the 79 individuals who had not reported a retirement year, 66 had not participated in an IPT measurement occasion after the typical Swedish retirement age of 65 and 13 individuals failed to complete that item on the questionnaire (note that all individuals included in the current analyses worked outside the home at some point). For these individuals, retirement was estimated at age 65. Mean retirement age was 62.9 (*SD* = 4.4).

Education

Education was included as a covariate in the growth curve models. In SATSA, education is rated on a 4-point scale from 1 (elementary school) to 4 (university or higher). Mean education was 1.79 (*SD* = 0.95).

Statistical Method

A growth curve model was used to examine the impact of occupational complexity on cognitive aging. The structural model can be considered as a multilevel random coefficients model (Bryk & Raudenbush, 1992). The model provides estimation of fixed effects, that is, fixed population parameters as estimated by the average growth model of the entire sample, and random effects, that is, interindividual variability in intraindividual change in growth model parameters. Growth curve models take into account missing data by giving more weight to individuals with the most time points.

A two-slope latent growth curve model (LGCM) was applied to the data: centering age was set at each individual's retirement age with one linear slope before retirement age and a separate linear slope after retirement age. As a result, retirement age serves as the intercept, or pivot point, between the two estimated slopes. Individual scores on the cognitive factors at any one time are a function of a latent intercept, slope 1, slope 2, and random error. Age basis coefficients are calculated separately for each individual, based on age at testing and age of retirement. Values of the first age basis were set to zero for any age greater than retirement age, thereby defining slope 1 as the rate of change up to retirement. Similarly, values of the second age basis were set to zero for any age less than retirement age, defining slope 2 as the rate of change after retirement. The model fitting procedure entails fitting individual growth models to all available data. The random errors represent unaccounted variation from fitting the growth model to the cognitive measures; these time-specific residual variances were constrained to be equal over time. The means growth curve parameters are the estimates of the average performance and average amount of change. The random and fixed effects parameter estimates were obtained using PROC Mixed in SAS 9.2. Models were corrected for twinness by including a common twin pair identifier in the SUBJECT statement along with the unique individual identifier.

Results

Five growth curve models were fit to each combination of cognitive factor, occupational complexity factor, and leisure activity factor. First education and sex were included as covariates of all three LGCM parameters: intercept, slope 1, and slope 2. Second, either the occupational complexity factor was added as a covariate of all 3 LGCM parameters (model 2a), or the leisure factor was added as a covariate to intercept and slope 2 (model 2b). Leisure was not added as a covariate of slope 1 because the leisure factors were measured primarily after retirement age. Comparing the fit of model 1 and model 2a or 2b provided a test of the contribution of the occupational complexity or leisure factor, respectively, to describing cognitive aging. As expected from previous research (Andel et al., 2005; Finkel et al., 2009), of the occupational complexity factors, only complexity with people was significantly associated with trajectories of cognitive aging (model 2a vs. model 1). Therefore, additional model fitting focused on building on models that included education, sex, and complexity with people. In the third LGCM, both the complexity with people and the leisure factor were added as covariates to the LGCM parameters. Comparing the fit of models 2a or 2b with model 3 provided a test of the extent to which each type of factor (occupational complexity or leisure) was associated with trajectories of cognitive aging, over and above education, sex, and the other type of factor (leisure or occupational complexity). Finally, in the fourth model, interaction terms between complexity with people and the leisure factor were added to the intercept and slope 2 parameters to determine whether an improvement of fit resulted (model 4 vs. model 3).

Model-fit statistics for testing the five LGCM are presented in Table 2. Slightly different sample sizes were used due to missing values across the leisure factors (n = 421 for the cognitive leisure factor; n = 420 for the social leisure factor; n = 418 for the physical leisure factor). This resulted in variation in the fit of models 1 and 2a depending on which leisure factor was involved. In the first section of the table, the results for testing the contribution of complexity with people and the *social* leisure factor to the LGCM for the four cognitive factors was tested. Results indicate that complexity with people adds significantly to the LGCM for the verbal, memory, and speed factors, but not the spatial factor. Moreover, complexity with people makes a significant contribution regardless of whether it was added before or after any of the leisure factors. In contrast, the social leisure factor does not contribute significantly to the cognitive aging trajectories, and thus no interaction between complexity with people and the social leisure factor achieved significance.

Next, the contribution of the *physical* leisure factor was assessed. The physical leisure factor made a significant contribution to the LGCM of the verbal and speed factors, and this contribution was significant both before and after inclusion of the complexity with people factor. Finally, the *cognitive* leisure factor demonstrated the most consistent relationship with cognitive factors, adding significantly to the LGCM for all four cognitive factors, both before and after inclusion of complexity with people. In no case did the interaction of the leisure factor and complexity with people contribute significantly to the LGCM.

Parameter estimates and standard errors for occupational complexity and leisure covariates for the verbal, memory, and speed factors are presented in Table 3;

Table 2. Results of Latent Growth Curve Model Fitting with Complexity of Work with People and Social, Physical, or Cognitive Leisure Activity: Log Likelihoods

Models	Number of Parameters	Cognitive Factor			
		Verbal	Spatial	Memory	Speed
1. Education and sex	19	10,509.3	11,292.8	12,694.4	12,128.3
2a. Add people to I, S1, S2	22	10,499.9[a]	11,290.0	12,685.3[a]	12,119.7[a]
2b. Add social to I, S2	21	10,506.3	11,287.1	12,693.9	12,125.4
3. Add both people and social	24	10,496.8[c]	11,284.1	12,684.7[c]	12,116.3[c]
4. Add interaction terms	26	10,492.2	11,284.0	12,683.7	12,115.9
1. Education and sex	19	10,480.4	11,265.3	12,660.7	12,095.3
2a. Add people to I, S1, S2	22	10,470.6[a]	11,262.3	12,651.3[a]	12,086.3[a]
2b. Add physical to I, S2	21	10,472.0[a]	11,259.9	12,659.6	12,088.7[a]
3. Add both people and physical	24	10,462.5[bc]	11,256.8	12,650.4[c]	12,079.4[bc]
4. Add interaction terms	26	10,461.4	11,256.3	12,648.8	12,078.8
1. Education and sex	19	10,519.2	11,301.4	12,716.7	12,145.2
2a. Add people to I, S1, S2	22	10,509.8[a]	11,298.6	12,707.7[a]	12,136.5[a]
2b. Add cognitive to I, S2	21	10,428.2[a]	11,276.2[a]	12,680.7[a]	12,107.2[a]
3. Add both people and cognitive	24	10,416.5[bc]	11,273.0[b]	12,670.6[bc]	12,097.6[bc]
4. Add interaction terms	26	10,415.4	11,272.5	12,669.5	12,097.6

Notes: I = intercept; S1 = rate of change up to retirement; S2 = rate of change after retirement.
[a]Model fit is significantly different from model 1 at $p < .05$; individual covariate contributes to LGCM.
[b]Model fit is significantly different from model 2a at $p < .05$; leisure covariate contributes after complexity of work with people.
[c]Model fit is significantly different from model 2b at $p < .05$; complexity of work with people contributes after leisure covariate.

Table 3. Parameter Estimates (*SE*) for the Occupational and Leisure Covariates in the Relevant LGCM

Cognitive Leisure	*N*	People × Intercept	People × Slope 1	People × Slope 2	Leisure × Intercept	Leisure × Slope 2
Verbal						
Physical	418	0.76 (0.28)**	−0.02 (0.02)	−0.006 (0.02)	−0.07 (0.04)*	0.005 (0.002)**
Cognitive	421	0.78 (0.27)**	−0.02 (0.02)	−0.006 (0.02)	0.29 (0.04)**	0.004 (0.002)**
Memory						
Cognitive	421	0.89 (0.32)**	0.003 (0.04)	−0.004 (0.03)	0.16 (0.04) **	0.008 (0.003)**
Speed						
Physical	418	0.59 (0.35)	0.001 (0.03)	−0.01 (0.02)	−0.01 (0.04)	0.006 (0.003)*
Cognitive	421	0.60 (0.35)	0.001 (0.03)	−0.01 (0.02)	0.11 (0.05)*	0.008 (0.002)**

Notes: LGCM, latent growth curve model; people, complexity of work with people.
*$p < .05$, **$p < .01$.

complete parameter estimates for all models are available from the authors. Results presented in Table 3 allow us to isolate the locus of the impact of including complexity with people and the leisure factors in the LGCM. In these models, complexity with people has an impact only on the intercept: higher levels of complexity result in higher levels of cognitive performance. Although complexity with people adds significantly to the overall LGCM for processing speed, the effect on the intercept does not achieve significance. In contrast, the leisure factor (either physical or cognitive) affects slope 2 in every case, resulting in a smaller (shallower) rate of decline after retirement. In addition, the leisure factors affected the intercept in every case except physical leisure factor by processing speed. Higher levels of cognitive leisure activity resulted in higher levels of cognitive function; whereas higher levels of physical leisure activity tended to produce lower mean cognitive function.

To generate Figures 1–3, a median split was used to recode complexity with people and the leisure factors into dichotomous variables, dividing the sample into individuals scoring high and low on those factors. Sample size in each resulting cell ranged from 91 to 126; thus participants were fairly equally distributed across the possible combinations of occupational complexity with people and leisure activities. The LGCM were then repeated with the dichotomous variables to generate separate aging trajectories for individuals with high and low values on the covariates. In Figure 1, the upper panel presents the impact of complexity with people and the physical leisure factor on the LGCM for verbal ability. The figure demonstrates a modest impact

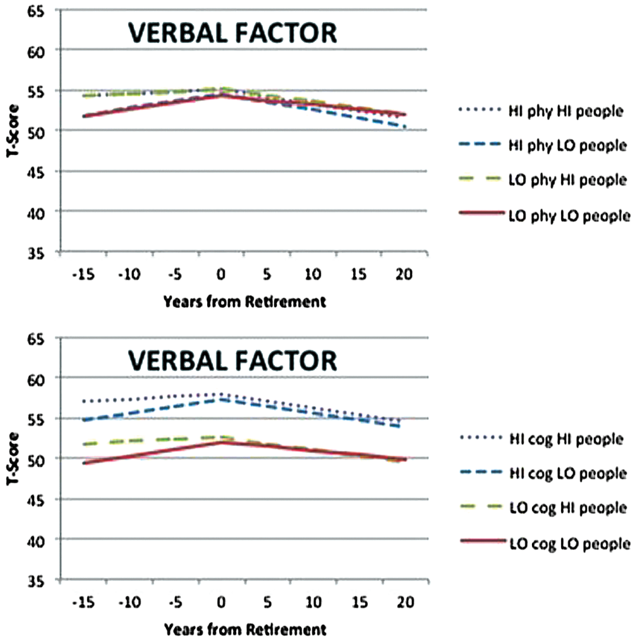

Figure 1. Age trajectories for the verbal factor with occupational complexity with people as a covariate and either the physical leisure factor (upper panel) or the cognitive leisure factor as covariates (lower panel).

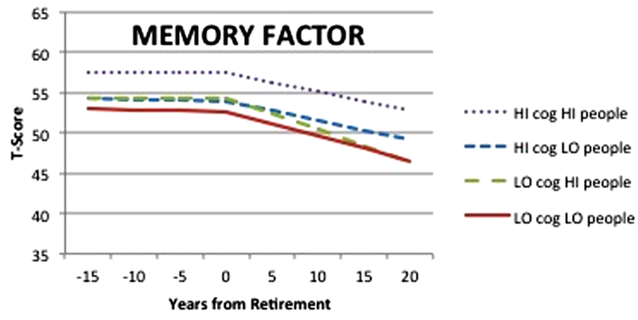

Figure 2. Age trajectories for the memory factor with occupational complexity with people as a covariate and the cognitive leisure factor as covariates.

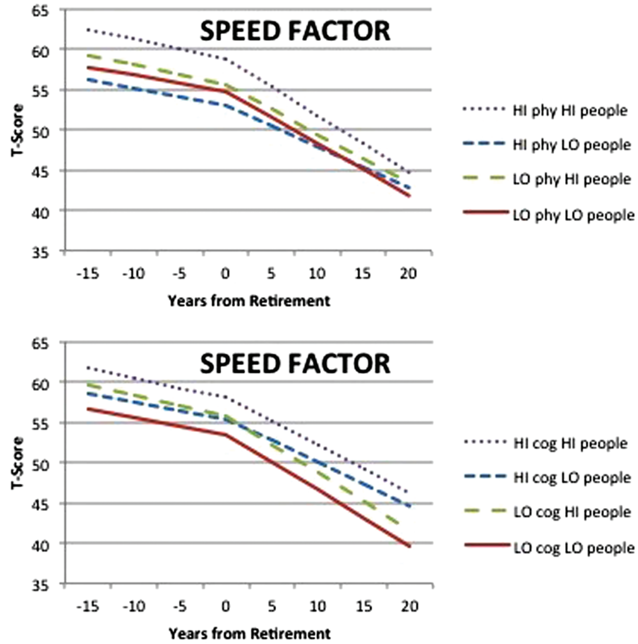

Figure 3. Age trajectories for the Speed factor with occupational complexity with people as a covariate and either the physical leisure factor (upper panel) or the cognitive leisure factor as covariates (lower panel).

of the physical leisure factor; primarily, individuals high on complexity with people had higher mean levels of verbal ability prior to retirement, but all aging trajectories converge after retirement. The lower panel presents the impact of complexity with people and the cognitive leisure factor on LGCM for verbal ability. Before retirement, four different trajectories are evident, with the highest levels of performance found for people who are high on both complexity with people and cognitive leisure activities. After retirement, trajectories converge, suggesting a stronger impact of the cognitive leisure factor than occupational complexity with people.

Because none of the leisure factors contributed to the LGCM for spatial ability, these results are not presented in figure form. Only the cognitive leisure factor had an impact on cognitive aging trajectories for the memory factor (Figure 2). Although complexity with people supported memory functioning prior to retirement, the impact waned after retirement. Instead, cognitive leisure activity played a role in maintaining memory ability after retirement. We tend to see similar patterns in Figure 3, presenting the results for processing speed and the physical and cognitive leisure factors.

Discussion

We examined the role of leisure activity engagement in the association between work complexity and cognitive aging. By considering work complexity and leisure activity within one study, we were able to incorporate two of the most common daily sources of intellectual engagement. By incorporating retirement as a pivot point, we were able to capture trajectories of change in cognitive functioning before and after retirement. By measuring leisure activity postretirement, we were able to capture intellectual engagement when it cannot be influenced by differences in the level of occupational complexity. We found that higher complexity of work with people significantly attenuated cognitive aging in the domains of verbal skills, memory, and speed of processing above and beyond age, sex, and education. When leisure activities were considered within the same models, cognitive and physical leisure activities affected verbal skills and speed of processing regardless of the level of complexity of work with people. Cognitive leisure activities also affected memory. Therefore, complexity of work with people appears important for cognitive aging. However, greater cognitive and physical leisure activity in older adulthood can significantly reduce the rate of cognitive aging regardless of work complexity.

Overall, change in cognitive functioning across all tested domains was most visible during the postretirement years. During this time, the trajectories of cognitive change for participants who retired from jobs characterized by low versus high complexity of work with people converged while the trajectories for participants with high versus low engagement in cognitive leisure activities continued to retain the difference in performance observed earlier in the study. Therefore, cognitive and/or physical leisure activity can be considered a useful intervention tool to offset adverse influences on cognitive aging attributable to low complexity of work with people. In this context, the influence of cognitive and physical leisure activities on memory and speed of processing is particularly compelling as these two domains represent cognitive abilities that are likely fundamental to cognitive aging processes (Finkel, Reynolds, McArdle, & Pedersen, 2007; Petersen, 2004).

This work builds on research indicating that work complexity relates to more favorable cognitive aging outcomes (Andel et al., 2007; Finkel et al., 2009; Schooler et al., 2004) as well as lower risk of dementia (Andel et al., 2005), either as a function of exposure to complex environments (Kohn & Schooler, 1983) or as a boost to cognitive reserve (Stern, 2002), or both. We cannot confirm or dispute the idea that a lack of bidirectionality exists (Salthouse, 2006). However, our findings point to the potentially important role of cognitive and/or physical leisure activity in cognitive aging in the postretirement period above and beyond the effects attributable to exposure to complex work environments.

This is only the second study to pursue the simultaneous examination of intellectual engagement via both leisure and work-related pursuits. Using a one-time assessment of cognition in advanced old age, Andel et al. (2014) previously reported independent associations of leisure activity and work complexity with cognition. The present study, by using comprehensive, multiple assessments of cognitive performance before and after retirement, indicated that cognitive aging is altered as a function of variability in cognitive and physical leisure activity above and beyond the effects of work complexity. This is particularly important given that leisure pursuits are relatively amenable to change. Future research should further explore variability in engagement in cognitive or physical leisure activities into every life upon retirement in relation to cognitive aging.

Several study limitations should be mentioned. First, we used a relatively small, convenience sample. Large, representative studies may be needed to confirm or refute our findings. Second, we measured work complexity with an occupation-based matrix based on main lifetime occupation. While this type of objective measurement avoids subjective reporting bias, it also precludes direct assessment of the intellectual effort exerted by different individuals in the same occupation. However, this approach has been used frequently and yields presumably valid findings (Andel et al., 2015; Karp et al., 2009; Kroger et al., 2008; Potter, Plassman, Helms, Foster, & Edwards, 2006). If anything, it moves results towards null. Third, we were able to incorporate only one measurement occasion of leisure activity. Future research assessing the influence of change (or lack thereof) in leisure activity on the work complexity–cognitive aging link may provide for a more refined understanding of these interrelationships. Fourth, we used a self-report of retirement age. It is possible that some individuals re-entered the workforce on a part-time basis or were involved in other work-related activities such as volunteering. However, operationalizing the various possible transitions to retirement was not possible in this study, and may not be feasible given the coding complexities. It is of note that previous related research has also defined retirement as a single time point (Andel et al., 2015; Calvo et al., 2013). Finally, it is possible that some participants changed jobs after their main lifetime occupation was recorded. However, it is known that this cohort was characterized by low occupational mobility (Oyer, 2008) and, even if a job change occurred, it was unlikely to affect what would constitute the main lifetime occupation.

In conclusion, this study supports the notion that high complexity of work with people facilitates cognitive function with age. It also provides novel evidence suggesting that participation in cognitive or physical leisure activities in older adulthood may compensate for the variability in work complexity, thus altering the trajectory of cognitive change in the postretirement years. In other words, postretirement engagement in cognitive or physical leisure activities may compensate for cognitive disadvantage imposed by working in simpler occupations that offer fewer cognitive challenges. These results may provide a platform from which to encourage leisure activity participation in those retiring from less complex occupations.

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Conflict of Interest

Drs Finkel and Pedersen have no additional support to disclose.

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