Longitudinal Associations of Need for Cognition, Cognitive Activity, and Depressive Symptomatology With Cognitive Function in Recent Retirees

Lawrence H. Baer, Nassim Tabri, Mervin Blair, Dorothea Bye, Karen Z. H. Li, and Dolores Pushkar

Centre for Research in Human Development and Department of Psychology, Concordia University, Montréal, Québec, Canada.

**Objectives.** This study investigated how interindividual differences in cognitive function are related to interindividual differences in the motivational trait of need for cognition, cognitive activity levels, and depressive symptomatology in a sample of young–old adults.

**Method.** The sample comprised 333 recent retirees from the Concordia Longitudinal Retirement Project (mean age = 69.06 years at entry into study), assessed at 4 annual time points. Cognitive function was measured at 2 time points with the Montreal Cognitive Assessment. We used structural equation modeling to examine a longitudinal mediation model controlling for age, education, years since retirement, and prior occupation.

**Results.** Need for cognition was positively associated with change in cognitive status 2 years later. Variety of cognitive activities was positively associated with level of cognitive status 1 year later. Depressive symptomatology was negatively associated with level of cognitive status 1 year later.

**Discussion.** Our findings indicate that motivational disposition plays a significant role in enhancing cognitive status in retirees, as do variety of cognitive activities. Additionally, subclinical depressive symptomatology can negatively influence cognitive status in young–old retirees. These results have implications for the design of interventions aimed at maintaining the cognitive health of retirees.

**Key Words:** Aging—Cognitive function—Depression—Longitudinal change—Montreal Cognitive Assessment—Need for cognition—Retirement.

**NEWLY** retired individuals adjust to multiple interrelated changes that vary widely among individuals and are influenced by cultural and economic contexts (Wang, Henkens, & van Solinge, 2011). Changes in such domains as finances, social relations, and physical and mental health have the potential to influence the trajectory of age-related cognitive decline.

Many cognitive functions, such as speed of processing and memory, decline by about one-half standard deviation by 65 years of age (Salthouse, 2004). Cognitive decline may follow different patterns depending on a number of variables, some of which may be affected by retirement; consequently, it is important to identify factors that either help or hinder cognitive function postretirement, as well as to examine how these positive and negative factors combine together to affect cognitive status. In this study, we investigated how the motivational trait of need for cognition, cognitive activity levels, and depressive symptomatology simultaneously influence cognitive status longitudinally across 4 years of retirement.

**POSITIVE INFLUENCES ON COGNITIVE STATUS**

Withdrawal from regular daily work can reduce effortful activity levels and increase passive activity levels (Nimrod, Janke, & Kleiber, 2009). The complexity of a former work environment appears to have some influence on the trajectories of change across several activity domains postretirement. Those who retired from managerial or professional work spent more time postretirement doing more cognitively demanding activities, such as reading, socializing, and travelling, compared with those who retired from jobs involving skilled labor or clerical work (Rosenkoetter, Garris, & Engdahl, 2001). Thus, the attitudes, skills, and sense of empowerment associated with more complex, higher socioeconomic status jobs can spill over into retirement functioning (Schooler, Mulatu, & Oates, 1999).

The relationship between cognitive activity and the maintenance of cognitive skills has been extensively tested. Reduced levels of intellectually stimulating activity have been associated with cognitive decline (Ghisletta, Bickel, & Lövdén, 2006; Hall et al., 2009). It has been posited that engaging in cognitive tasks involving basic executive functions or the acquisition of novel, complex skills can help increase and protect cognitive reserve against age-related declines (Stern, 2009). Similarly, the degree to which activities are novel and challenging for an individual may enhance the development of “compensatory scaffolding” (Park & Reuter-Lorenz, 2009), a form of cognitive...
reserve, which could help to maintain cognitive status in older adults. Engagement in a greater variety of cognitive activities has been associated with better cognitive function (Carlson et al., 2012). Therefore, in this study, we included a measure of variety of cognitive activities in our analysis.

Although many studies have found that activity and cognitive status are positively related, a lively debate has been generated about the use it or lose it hypothesis (Salthouse, 2007; Schooler, 2007), suggesting that other factors, such as well-being (Gerstorf, Lövdén, Röcke, Smith, & Lindenberger, 2007) and motivation (Forstmeier & Maercker, 2008), in addition to absolute levels of cognitive activity, influence age-related cognitive decline and maintenance. One candidate factor is the dispositional motivation to seek out intellectual challenge. Von Stumm and Deary (2011) reported that intellectual curiosity helped explain verbal fluency in older adults. Reed and colleagues (2011) found that people who had habitually engaged in cognitive activity in work and leisure in midlife were most likely to experience protective effects for the development of cognitive reserve. Education may help to develop cognitive capacity, but it appears the exercise of capacity over a lifetime fosters cognitive development (Stine-Morrow, 2007).

We propose that the motivational factor need for cognition, a stable dispositional tendency to seek out and engage in effortful cognitive activities (Cacioppo & Petty, 1982), helps develop and maintain cognitive activity levels as individuals adapt to retirement. Need for cognition has been examined primarily with young- and middle-aged adults in academic and organizational settings and in cross-sectional designs, where it has been shown to correlate positively with trait curiosity, openness to ideas, information processing, creativity, effective problem solving, a greater likelihood to seek out new information, and intrinsic motivation for cognitive exploration (Cacioppo, Petty, Feinstein, & Jarvis, 1996). Need for cognition has been associated with greater expenditure of cognitive effort in complex tasks (See, Petty, & Evans, 2009) and has been shown to be moderately associated with specific aspects of fluid intelligence (Fleischhauer et al., 2010).

In older adults, need for cognition is positively associated with openness to experience, conscientiousness, higher levels of cognitive activity, effective problem solving, and positive affect (Bye & Pushkar, 2009). A recent longitudinal investigation of change in physical and mental resources, motivation (including need for cognition), and activity engagement across adults aged 20–85 years old revealed that motivation partially mediated the relationship between declining resources and the pursuit of intellectually demanding activity (Hess, Emery, & Neupert, 2012). We believe that need for cognition can lead to greater cognitive reserve developed through preretirement engagement in cognitively demanding occupations (Schooler et al., 1999; Stine-Morrow, 2007) and a more cognitively engaged retirement lifestyle that fosters the development of compensatory scaffolding in retirement (Stine-Morrow, Parisi, Park, & Morrow, 2008). Retirees with a history of engagement in interactive complex processes are more likely to function with higher levels of information processing skills and other cognitive strategies that contribute to cognitive reserve. It is likely that such individuals would also continue to engage in more cognitively challenging activities in retirement, although it may require some time for them to find the appropriate supportive contexts for cognitively demanding activities after leaving the workplace. We predict that following retirement, higher levels of need for cognition will be positively associated with both level of and change in cognitive status, even after accounting for shared variance of education and occupational level.

Depressive Symptomatology and Cognitive Functioning

The protective influences mentioned previously should be considered together with deleterious factors that influence cognitive aging, such as depressive symptomatology. Between 15% and 30% of older adults reported clinically significant depressive symptoms (Jeste et al., 1999; Steffens et al., 2006), and compared with younger adults, they are more likely to report somatic symptoms, loss of interest, and cognitive changes (Fiske, Wetherell, & Gatz, 2009). Depression and depressive symptoms in older adults have been associated with disability, poor health outcomes, morbidity, and mortality (Steffens et al., 2006), as well as with contemporaneous cognitive deficits in episodic and visuospatial memory, information processing speed, executive function, and global cognitive functioning (Butters et al., 2004; Dotson, Resnick, & Zonderman, 2008).

Retrospective and prospective longitudinal studies have shown that both recent depressive symptomatology and a lifetime history of depression represent increased risk factors for cognitive decline, mild cognitive impairment, and dementia (Barnes, Alexopoulos, Lopez, Williamson, & Yaffe, 2006; Bielak, Gerstorf, Kiely, Anstey, & Luszcz, 2011; Jorm, 2001). However, other studies have not found a temporal relationship between depressive symptoms and cognitive decline (e.g., Dufouil, Fuhrer, Dartigues, & Alpérovitch, 1996). At present, the explanation of such mixed findings is not straightforward and likely depends on a number of moderating factors across studies, including the kind of populations sampled (clinical vs. community), measurement approaches (clinical diagnosis vs. test cutoff; duration of follow-up and frequency of assessment), and demographic factors of samples (age range and education level). Further, such disparate factors point to the absence of consistent global effects of depression on cognitive functioning and the importance of considering sample-specific factors, such as how individuals adapt to the lack of structured engagement that
Predictors of cognitive function in retirement

This Study
Several factors that may influence cognitive status and change in the transition years following retirement are considered in this research. Using data from a study of recent retirees who were tested at 4 yearly intervals, we examined whether the following three variables, (a) need for cognition, (b) variety of cognitive activities, and (c) depressive symptomatology, were associated with level and/or change in cognitive status up to 2 years later (Figure 1). We used structural equation modeling to test our longitudinal model and controlled for age, education, years since retirement, and previous occupational complexity. Our analysis is noteworthy for its investigation of the effect of a motivational trait on cognitive status, for its sample of young–old adults, and for its focus on the period of early retirement from active work.

Method
Participants
Individuals were recruited to participate in the Concordia Longitudinal Retirement Project through retiree associations, community groups, and community newspapers. Participants were tested annually across 4 years and completed questionnaires in a small group setting with individually administered cognitive tests at the university. They were compensated $50.00 CND per session. A total of 446 men and women contributed data in Year 1 and of these 13 were excluded because of difficulty understanding instructions. Data for this study were gathered for 387 participants in Year 1 and for 333 participants by the 4th year, for a retention rate of 86%; Year 1 was excluded from the analysis because some variables in our model were not included in that year’s data collection. Criteria for inclusion were retirement from at least 20 years of full-time employment, no current employment over 10 hr/week, and fluency in French or English. In Year 1, mean age was 59.06 (range: 50–77) years, close to the median age of retirement in Canada in 2005 (Turcotte & Schellenberg, 2006).

Measures
A brief demographic interview was administered to ascertain age, gender, education, retirement age, occupation, and marital status. Participants also completed other questionnaires as part of the larger project. In total, each session lasted approximately 3 hr, with a break midway through testing.

We used the Standard International Occupational Prestige Scale (SIOPS; Ganzeboom & Treiman, 1996) to code the status of participants’ former occupations. The SIOPS is a widely used measure of socioeconomic classification that assumes a hierarchy of job complexity placing professionals, senior officials, and large-scale managers at the top and semi-skilled manual laborers at the bottom.

The Montreal Cognitive Assessment (MoCA; Nasreddine et al., 2005) served as a general index of cognitive status. The items test short-term memory recall, visuospatial ability, executive function, verbal abstraction, sustained attention, working memory, language, and orientation to time and place. Scores of 26–30 are in the normal range. A correction for 12 or fewer years of education was made (+1 point; Nasreddine et al., 2005). Good test–retest reliability (correlation coefficient = 0.92) and internal consistency (Cronbach’s $\alpha = 0.83$) have been reported previously (Nasreddine et al., 2005). The MoCA was administered in Years 3 and 4.

The Center for Epidemiological Studies Depression Scale (CES-D; Radloff, 1977), used to assess depressive symptomatology, is a 20-item scale rating frequency of depressive symptoms (0 = rarely or none of the time; 4 = most or all of the time in the past week). Because the CES-D assesses current depressive symptoms, which may vary with time, test–retest correlations are moderate (.50–.70). Internal consistency scores were .80 for nonclinical samples (Radloff, 1977). The CES-D was administered in Years 2, 3, and 4.

The 18-item Need for Cognition scale (Cacioppo, Petty, & Kao, 1984) measures the tendency to engage in effortful
 intellectural pursuits and the extent to which individuals enjoy such activities. Participants endorse statements such as, “I prefer my life to be filled with puzzles that I must solve,” on a 5-point scale (1 = extremely uncharacteristic of me; 5 = extremely characteristic of me). High inter-item reliability (Cronbach’s α = .89) and test–retest reliability (r = .88, p < .001) have been reported previously (Bye & Pushkar, 2009). The Need for Cognition scale was administered in Years 2 and 4.

Nine items from the 23-item Everyday Activities Questionnaire (EAQ: Pushkar, Arbuckle, Conway, Chaikelson, & Maag, 1997) measure participation in reading, game playing, travel, continuing education, media and Internet usage, as well as general cultural, musical, and creative activities. This subset of activities involves discretionary tasks rather than necessary maintenance activities of daily living and has shown cross-sectional associations with need for cognition (Bye & Pushkar, 2009). For each item of the EAQ, participants rated the frequency, importance, perceived difficulty, and ability at present time. Given our focus on cognitive reserve and assuming that a wider variety of cognitive activities would be more enriching than frequency of participation (Carlson et al., 2012), we focused on the total number of different activities that participants reported doing.

RESULTS

Missing Data and Descriptive Statistics

A multiple analysis of variance comparing the 333 participants with complete data against the 54 who dropped out from the study revealed nonsignificant group differences on age, years of education, and SIOPS. F(3,383) = 0.83, p = .48. As well, a 2 (men vs. women) × 2 (missing data vs. no missing data) chi square test indicated no differences in terms of gender, χ² < 1. The analyses below were based on the 333 participants who had complete data for this study. On average, participants had 15.20 (SD = 2.57) years of education and were retired for 1.88 (SD = 1.83) years at Year 1 of the study. Average SIOPS score was 53.89 (SD = 9.05). Test–retest correlations for all variables were good (see Table 1). Inter-rater reliability coefficients for MoCA scores at Years 3 and 4 were .95 and .97, respectively.

Plan of Analysis

Structural equation modeling (SEM; Kline, 2010) was used to test the hypotheses. The measures for number of cognitive activities at Years 2, 3, and 4, need for cognition at Years 2 and 4, severity of depressive symptoms at Years 2, 3, and 4, and cognitive functioning at Years 3 and 4 were included in the SEM analysis as observed variables. Descriptive statistics and correlations among all variables appear in Table 1. Participants’ age at Year 1, years of education, years since retirement, and SIOPS were correlated with model variables (see bottom portion of Table 1). A regression analysis confirmed that participants’ age at Year 1, years of education, years since retirement, and SIOPS did not moderate the effects of cognitive activities, need for cognition, and depressive symptoms at Year 2 on cognitive functioning at Year 4 (see Supplementary Data). As such, the subsequent SEM analyses were conducted after residualizing each variable for participants’ age at Year 1, years of education, SIOPS, and years since retirement (see bottom diagonal in Table 1).

In the SEM analysis, a longitudinal mediation model (MacKinnon, 2008) was estimated. The model examined whether participants’ severity of depressive symptoms, degree of need for cognition, and number of different cognitive activities, would be associated with their level of cognitive status 1 year later and change in cognitive status 2 years later. In the tested model, each variable at Year 2 determined its counterpart at Years 3 and 4, and each variable at Year 3 determined its counterpart at Year 4. As well, contemporaneous associations between all measures in a given year (i.e., within cross-section) were estimated, allowing us to more accurately assess the longitudinal associations between the variables.

The hypotheses were expressed as paths in a model. Paths to cognitive status at Year 3 predicted level of cognitive status, whereas paths to cognitive status at Year 4 (other than that from cognitive status at Year 3) predicted change in cognitive status from Year 3 to Year 4. For Hypothesis 1, there were direct paths from need for cognition at Year 2 to cognitive status at Years 3 and 4. For Hypothesis 2, there were direct paths from number of cognitive activities at Years 2 and 3 to cognitive status at Years 3 and 4, respectively. We also examined whether cognitive activities at Year 2 were indirectly associated with higher cognitive status at Year 4 via higher cognitive status at Year 3. For Hypothesis 3, there were direct paths from severity of depressive symptoms at Years 2 and 3 to cognitive status at Years 3 and 4, respectively. We also examined whether depressive symptoms at Year 2 were indirectly associated with lower cognitive status at Year 4 via lower cognitive status at Year 3.

We used Mplus version 4 (Muthén & Muthén, 1998–2010) with maximum likelihood estimation procedures to analyze the covariance structures of the data. Model fit was assessed using the Satorra–Bentler scaled chi square (SBχ²); Mardia’s normalized estimate of multivariate kurtosis was greater than 5. We also used the comparative fit index (CFI) and root mean square error of approximation (RMSEA). An excellent fit is reflected in a nonsignificant SBχ², a CFI greater than .95, and a RMSEA less than .05 (Kline, 2010). We also tested Hypotheses 1, 2, and 3 by constraining their relevant direct paths to zero in the model and assessed model fit using the chi square difference test (Satorra & Bentler, 2001).
Test of the Hypotheses

The results of the SEM analysis indicated that the model provided an excellent fit to the data ($\chi^2(18) = 15.96$, $p = .60$, CFI = 1, RMSEA < .01). The model is presented in Figure 2 with standardized path coefficients such that solid lines indicate significant paths. The model accounted for 65% and 37% of the variance in cognitive status in Years 3 and 4, respectively.

Hypothesis 1 was that participants’ greater need for cognition would be associated with better cognitive status 1 year later and with positive change in cognitive status 2 years later. Need for cognition at Year 2 was not related to cognitive status at Year 3 ($\beta = .05, z = .86, p = .39$). Instead, need for cognition at Year 2 was positively associated with change in cognitive status from Year 3 to 4 ($\beta = .10, z = 2.51, p < .01$).

Hypothesis 2 was that participants’ greater variety of cognitive activities would be associated with better cognitive status 1 year later and with positive change in cognitive status 2 years later. Higher numbers of cognitive activities at Year 2 were associated with higher cognitive status in Year 3 ($\beta = .11, z = 1.99, p = .05$). However, number of cognitive activities at Year 3 was not related to change in cognitive status from Year 3 to 4 ($\beta = .01, z = .31, p = .76$).

Hypothesis 3 was that more severe depressive symptoms would be associated with lower cognitive status 1 year later and with negative change in cognitive status 2 years later. Indeed, greater severity of depressive symptoms at Year 2 was associated with lower cognitive status at Year 3 ($\beta = -.15, z = -2.77, p < .01$). However, severity of depressive symptoms at Year 3 was not associated with change in cognitive status from Year 3 to Year 4 ($\beta = -.06, z = -1.33, p = .18$).

Alternative Models

Four alternative models were tested (see Supplementary Table 1). The first model examined whether the impact of need for cognition at Year 2 on cognitive functioning at Year 4 would be mediated by number of cognitive activities at Year 3. The tested model was identical to the model in Figure 2 except that the direct path from need for cognition at Year 2 to cognitive functioning at Year 4 was constrained to zero. The model provided a good fit to the data ($\chi^2(19) = 20.73$, $p = .35$, CFI = 1, RMSEA = .02) but constraining the path from need for cognition at Year 2 to cognitive functioning at Year 4 significantly worsened model fit relative to the hypothesized model, $\Delta \chi^2(1) = 6.26, p = .01$.

The second alternative model examined whether the impact of severity of depressive symptoms at Year 2 on cognitive functioning at Year 4 would be mediated by number of cognitive activities at Year 3. The tested model was identical to the model in Figure 2 except that the direct paths from severity of depressive symptoms at Years 2 and 3 to cognitive functioning at Year 3 and 4, respectively, were constrained to zero. As well, direct paths from severity of depressive symptoms at Years 2 and 3 to number of cognitive activities at Years 3 and 4, respectively, were included in the tested model. The model provided a good fit to the data ($\chi^2(18) = 25.24, p = .12$, CFI = .99, RMSEA = .04), but the indirect effect of depressive symptoms at Year 2 on cognitive functioning at Year 4 via number of cognitive activities

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Table 1. Descriptive Statistics and Correlations Among Variables

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<th>Variables</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
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<td>1. Year 2 number of cognitive activities</td>
<td>—</td>
<td>.23**</td>
<td>-1.4*</td>
<td>.66**</td>
<td>.15**</td>
<td>-.11*</td>
<td>.59**</td>
<td>.14*</td>
<td>.17**</td>
<td>-0.8</td>
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<td>2. Year 2 need for cognition</td>
<td>.21**</td>
<td>—</td>
<td>-1.9**</td>
<td>.26**</td>
<td>.14*</td>
<td>-.15**</td>
<td>.23**</td>
<td>.20**</td>
<td>.81**</td>
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<td>-.17**</td>
<td>—</td>
<td>-.13*</td>
<td>-.20**</td>
<td>.71**</td>
<td>-.09</td>
<td>-.14*</td>
<td>-.15**</td>
<td>.67**</td>
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<td>4. Year 3 number of cognitive activities</td>
<td>.67**</td>
<td>.22**</td>
<td>-.12*</td>
<td>—</td>
<td>-.18**</td>
<td>-.14*</td>
<td>.69**</td>
<td>.15**</td>
<td>.26**</td>
<td>-.13*</td>
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<td>5. Year 3 cognitive status</td>
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<td>-.17**</td>
<td>.15**</td>
<td>-.18**</td>
<td>.16**</td>
<td>.62**</td>
<td>.10</td>
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<td>6. Year 3 depressive symptoms</td>
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<td>7. Year 4 number of cognitive activities</td>
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<td>-.07</td>
<td>.18**</td>
<td>.10†</td>
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<td>.11</td>
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*Note. SIOPS = standard international occupational prestige scale.

Correlations below the diagonal are for variables 1–10 after controlling for participants’ age at Year 1, years of education, occupational prestige, and years since retirement. Correlations above the diagonal are zero-order correlations between variables 1–10. Correlations in the bottom four rows are for variables 1–10 and each covariate. $N = 333$.

$†p = .06; * p < .05; ** p < .01$. 

The modelFit relative to the hypothesized model, $\Delta \chi^2(1) = 6.26, p = .01$. 

The second alternative model examined whether the impact of severity of depressive symptoms at Year 2 on cognitive functioning at Year 4 would be mediated by number of cognitive activities at Year 3. The tested model was identical to the model in Figure 2 except that the direct paths from severity of depressive symptoms at Years 2 and 3 to cognitive functioning at Year 4 were constrained to zero. The model provided a good fit to the data ($\chi^2(19) = 20.73$, $p = .35$, CFI = 1, RMSEA = .02) but constraining the path from need for cognition at Year 2 to cognitive functioning at Year 4 significantly worsened model fit relative to the hypothesized model, $\Delta \chi^2(1) = 6.26, p = .01$. 

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activities at Year 3 was nonsignificant (β < .01, z < .01), ruling out this alternative model.

The third alternative model tested whether the relations between cognitive status and its predictors were bidirectional over time. Previous research indicates that cognitive functioning may have consequences for depressive symptoms over time (e.g., Jajodia & Borders, 2011; Perrino, Mason, Brown, Spokane, & Szapocznik, 2008). As such, we reanalyzed the model in Figure 2 after including a direct path from cognitive functioning at Year 3 to severity of depressive symptoms at Year 4. We also added two direct paths from cognitive functioning at Year 3 to need for cognition at Year 4 and cognitive activities at Year 4. The model provided a good fit (SBχ²(15) = 14.63, p = .48, CFI = 1, RMSEA < .01), yet the three additional paths were nonsignificant, absolute βs < .04 and zs < 1. Constraining the three additional paths to zero in the model did not worsen model fit, Δχ²(3) = 1.20, p = .75. In sum, there was no evidence of a bidirectional relation over time between cognitive functioning and any of its predictors.

The fourth alternative model examined whether severity of depressive symptoms, need for cognition, and number of cognitive activities to cognitive status to cognitive status at Years 2 and 3 were constrained to zero. This model did not provide a good fit to the data (SBχ²(24) = 40.05, p = .02, CFI = .99, RMSEA = .05). Indeed, constraining the longitudinal paths from depressive symptoms, need for cognition, and number of cognitive activities to cognitive status significantly worsened model fit relative to the hypothesized model, Δχ²(6) = 24.76, p = .001.

In sum, the four alternative models were rejected in favor of the theoretical model. The present research provides evidence that interindividual differences in need for cognition are associated with cognitive change and that severity of depressive symptoms and engagement in a variety of cognitive activities are directly associated with cognitive status.

**Discussion**

In this study, we investigated how a combination of positive and negative factors accounts for individual differences in cognitive status in the first years following retirement. Need for cognition, the variety of cognitive

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**Figure 2.** Path model for cognitive functioning over time. Rectangles represent residualized scores of observed variables after controlling for age, education, years since retirement, and former occupation. Path coefficients are standardized beta weights. Cross-sectional associations between variables in Years 3 and 4, respectively, were estimated in the model, but were nonsignificant and not included in the figure. Dashed lines represent nonsignificant paths. *p < .05. **p < .01.
activities engaged in, depressive symptomatology, and overall cognitive status were measured across a 4-year period and combined into a structural equation model to assess longitudinal influences on cognitive status. To better isolate the effects of these predictors, we controlled for education, age, prior occupation, and the number of years since retirement. Our results indicate that the motivational trait of need for cognition was associated with positive change in cognitive status 2 years later. This key finding demonstrates that dispositional resources such as the need for cognition are relevant when evaluating risk factors for cognitive decline. We also found that the variety of cognitive activities in which retirees engage was positively linked with cognitive status 1 year later. The severity of depressive symptomatology was negatively associated with cognitive status 1 year later. Taken as a whole, these results demonstrate the importance of considering how combinations of positive and negative factors can relate to individuals’ range of cognitive functioning (Hertzog, Kramer, Wilson, & Lindenberger, 2008).

Need for Cognition
The most important outcome of our study is the association found between need for cognition and change in cognitive status. Need for cognition at Year 2 was positively related to change in cognitive status from Years 3 to 4, even after controlling for education, age, and occupational complexity. Individuals with higher need for cognition are more likely to select more demanding activities and need for cognition may work together, but at least in some cases, they appear to operate differently. High need for cognition might lead individuals to pursue a greater number of intellectually challenging activities in their retirement, as reflected in variety of cognitive activities pursued in the early years of retirement is directly associated with better cognitive status 1 year later.

We note that the relationship observed between activity and level of cognitive functioning differs from the relationship found between need for cognition and change in cognitive functioning. Although both factors showed positive influences on cognition and were contemporaneously related, they appear to operate differently. High need for cognition might lead individuals to pursue a greater number of intellectually challenging activities in their retirement, as reflected in variety of cognitive activities. However, independent of one’s choice of leisure activities, high need for cognition might additionally drive individuals to seek out more demanding levels of cognitive complexity within any given activity. As discussed later, we propose that variety of activities and need for cognition may work together, but at different time points.

Depressive Symptomatology
The severity of depressive symptomatology at Year 2 was negatively associated with cognitive status at Year 3. Notably, we also analyzed the data excluding any older adults whose depression scores were in the clinical range, but found no change in the overall pattern of results (see Supplementary Data). This negative association is consistent with previous longitudinal studies of older adults (e.g., Dotson et al., 2008) but is novel for the age range of young older adults represented in our community sample and for its focus on the period of years following retirement. Our results also contribute to the growing body of evidence (e.g., Dotson et al., 2008) showing that even subclinical...
depression can have harmful effects on cognition in older adults.

**Combined Influences of Positive and Negative Factors on Cognitive Status**

Given that the years immediately following retirement are a period of transition during which individuals seek to establish new routines (Ekerdt, 2010), it may be that the pathway between Year 2 cognitive activity and Year 3 cognitive status is a result of the cognitive challenge of attempting a variety of novel activities. Once a routine is established, it may be that variety is maintained but not novelty. Accordingly, the path from number of cognitive activities at Year 3 to cognitive functioning at Year 4 was not significant, suggesting that variety alone was not sufficiently challenging to effect cognitive change. At this stage, the level of engagement or intensity with which individuals pursue their activities may become more important, as represented by the pathway from Year 2 need for cognition to Year 4 cognitive change. As discussed earlier, need for cognition might motivate individuals to seek further intellectual challenge within their chosen set of activities. This interpretation is speculative but testable. A future study should include a more detailed assessment of cognitive activity that includes indices of the variety and novelty of activities engaged in, as well as the level of engagement for each activity using ratings of challenge, effort, and duration as suggested previously.

**Strengths and Limitations**

The specific time parameters of this study present both strengths and limitations. In particular, we chose to recruit individuals who had recently retired prior to Year 1 in order to capture the period of adjustment and eventual stability associated with the retirement transition. As such, we did not collect preretirement measures, and the majority of our participants fell into the young–old category, which ensured that the majority of our sample was in good health and free of serious mobility limitations. We fully anticipate that the pattern of relationships found may change over time, as individuals move deeper into retirement and as new challenges to physical health and social resources arise. Furthermore, our analysis examined interindividual differences in cognitive functioning. It did not address intraindividual change, which may follow different longitudinal patterns. Finally, we acknowledge that the absence of measures across all time points may limit our interpretation of the data. Specifically, the absence of a measure of cognitive status at Year 2 prevents us from exploring the prediction of change in cognitive status from Years 2 to 3. Including Year 2 cognitive status in our model might change the association between need for cognition at Year 2 and cognitive status at Year 3. A more focused study including the relevant measures across all time points would help to clarify these issues.

**Conclusions**

The present findings suggest that need for cognition is a protective influence on cognitive change following retirement. This result contributes to a small but growing body of research linking internal traits to cognitive function. Additionally, our study demonstrates the positive association of pursuing a variety of cognitive activities and the negative association of subclinical depressive symptomatology with cognitive status. Our findings have potential implications for retirement planning that could have long-term public health consequences for preventing or delaying the onset of mild cognitive impairment and dementia. Future studies of clinical samples could include a need for cognition measure to determine if the pattern of results we found also holds for clinical populations. Interventions to increase cognitive activity levels of retirees and older adults could be made more effective by taking into account individual levels of need for cognition and by designing modules to increase motivation and engagement.

**SUPPLEMENTARY MATERIAL**

Supplementary material can be found at: http://psychsocgerontology.oxfordjournals.org/

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Correspondence should be addressed to Lawrence H. Baer, Centre for Research in Human Development and Department of Psychology, Concordia University, 7141 Sherbrooke Street West Montréal, Québec, Canada H3B 1R6. E-mail: LHBaer@gmail.com.

Correspondence should be addressed to Lawrence H. Baer, Centre for Research in Human Development and Department of Psychology, Concordia University, 7141 Sherbrooke Street West Montréal, Québec, Canada H3B 1R6. E-mail: LHBaer@gmail.com.


