Paths to Positive Affect in Older Adults: Need for Cognition as a Motivational Strength

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Abstract

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This study examines how need for cognition, or the tendency to enjoy effortful cognitive activity (Cacioppo, Petty, & Kao, 1984), relates to well-being in 355 adults experiencing the transition to retirement (age range 44-79 years, $M = 60$, $SD = 5.5$). Structural equation modeling was used to identify significant pathways between exogenous variables of conscientiousness, openness, and education to need for cognition. Mediators between need for cognition and positive affect were frequency of cognitive activity and problem-focus coping. Need for cognition and perceived control emerged as separate and distinct forms of motivation, contributing to positive affect in this model through differing patterns and to different degrees. Health contributed significantly in direct paths to both perceived control and positive affect. This well-fitting model helps to explain some of the psychological mechanisms instrumental to successful adaptation in change in adulthood. Additionally, this demonstration of the critical role of need for cognition in the prediction of positive affect provides support for Fredrickson's (1998) broaden-and-build theory, which posits a reciprocal relationship between positive emotions and broadened attention and cognition. An argument is made for consideration of need for cognition as a character strength with unique predictive value for older adults.

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PATHS TO POSITIVE AFFECT IN OLDER ADULTS: NEED FOR COGNITION AS A MOTIVATIONAL STRENGTH

The transition to retirement is a dynamic process requiring a dialectic interchange between environmental constraints and the personal strengths unique to each individual. No longer necessarily operationalized as an age-defined career cessation point, there is huge variability in the timing and circumstances of retirement. Viewed as a developmental and psychosocial transformation, this time of life presents itself as fertile territory for the study of adult adaptation to change.

Better health and decreased fertility, accompanied by rapid social, political, economic, and technological changes, have shifted developmental transition points throughout the life course away from traditional age-based markers of education, work, and retirement (Cheal, 2002; Kim & Moen, 2001; Moen & Spencer, 2006). Recent research describes the de-chronologization, de-institutionalization, and de-standardization of lives in North America and Europe (Han & Moen, 1999; Settersten, 2003), such that conventional age-graded norms, which historically served the study of human development, have become less useful in predicting behavior. More than ever, each cohort's experience at each life stage is unique from the experiences of either previous or future cohorts' (Kahana & Kahana, 2003; Kim & Moen, 2001).

Researchers have identified the main general positive predictors of successful adult adaptation as functional health, sufficient financial resources, and social support. In terms of individual differences, O'Rand (2006) writes of both personal capital (self-esteem, efficacy, sense of identity, and locus of control) and psychophysical capital (mental and physical health) as being among the staples of life course capital resources. At this time of social uncertainty, it is important that we search directly for underlying

psychological mechanisms that provide resilience and well being to adults in late mid-life transition. Positive life span psychology can contribute to the life course capital stock of well being accumulated across the lifespan with tools that mediate and moderate the effects of stress on physical and mental health during periods of uncertainty.

The purpose of this study is to examine a best-fit model of individual differences as predictors of positive affect in adults who have recently retired. At the intersection of cognition, affect, and personality is a mediating motivation that can help explain why some individuals, regardless of age, enjoy life's challenges more than others. This "life force", *need for cognition*, was conceptualized by Cacioppo and Petty (1982) as a stable individual difference in people's tendency to engage in and enjoy effortful cognitive activity. In their review of over 100 empirical studies that have investigated need for cognition, Cacioppo, Petty, Feinstein and Jarvis (1996) have called for further research linking the construct of motivated cognition to important life outcomes. This study will bring an intersecting and complementary theoretical focus to the discussion by relating need for cognition to demographic, personality, behavioral and affective variables in a sample of recently retired individuals.

People moving out of a formal institutional context like the paid workplace into an "ill-structured" zone without clear goals (Marsiske & Willis, 1998) need to draw on their personal skills for navigation. Facing potential pervasive discontinuity in their lives, retirees must rely on their own heritable traits and learned behavioral responses to re-structure patterns and re-gain an equilibrium. Caspi and Moffit (1993) propose that dispositional differences are amplified during times of uncertain change, and that the optimal time to measure personality differences between individuals is when they are

outside a defining domain and role, as in retirement. This study defines a retiree as an individual who has retired within the last three years from fulltime employment of at least 20 years duration, and who is not currently employed more than 10 hours per week.

There are a number of empirical indications that need for cognition can be a protective factor for individuals facing the novelty, ambiguity, and uncertainty which Lazarus and Folkman (1984) have identified as characteristic of transition situations. As reported in Cacioppo et al.'s (1996) meta-analysis, need for cognition has been shown to correlate positively with trait curiosity, with openness to ideas, and with objectivism, or the tendency to base one's judgments and beliefs on empirical information and rational consideration. Need for cognition also correlates with both the intrinsic motivation and challenge subscales of Amabile, Hill, Hennesey and Tighe's (1994) Work Preference Inventory. People who are high in need for cognition are more likely to look to their own (vs. others') standards for appropriate behavior, reflecting an inner directedness , and they are likely to be more introspective, or have a greater tendency to engage in inward, self-directed thought. Higher scores in need for cognition correlate with greater knowledge regarding current events, which shows an appetite for information gathering. Likewise, higher scores in need for cognition correlate with higher scores in uncertainty orientation, or the desire to maximize information gain rather than to maintain one's perceived reality. Individuals high in need for cognition are less likely to prefer predictability or to express a personal need for structure (Cacioppo et al. 1996). Each of these characteristic aspects of need for cognition reflects a creative, constructive approach that would be useful in dealing with changes in an older adult's environment.

The majority of research on need for cognition has been conducted with university undergraduates, leaving gaps in the accumulated literature on the role of need for cognition across the lifespan. A weak negative association between age and need for cognition emerged from the few studies including older participants in Cacioppo et al.'s (1996) meta-analysis. Subsequently, Nair and Ramnarayan (2000) linked need for cognition and effectiveness in solving complex problems in a study of 45 managers in a large manufacturing plant in India, reporting that exposure to task diversity strengthened the development of need for cognition for these working adults. More recently, in a study of 80 adults with a mean age of 74.14 (SD = 6.12), need for cognition was found to correlate with positive Experience of Aging scores (r = .24) measuring both perceived change and subjective emotion (Pushkar, Basevitz, Conway, Mason & Chaikelson, 2003). To provide a more detailed mapping of need for cognition in a "landscape of personality processes and individual differences" (Cacioppo et al., 1996, p.217) for older adults, this study will use structural equation modeling to position the construct of need for cognition among other individual characteristics and behaviors that lead to positive outcome during an important life transition.

Need for Cognition and Demographics

Studies have shown need for cognition to be a gender neutral construct (e.g., Cacioppo & Petty, 1982; Sadowski, 1993; Tolentino, Curry, & Leak, 1990). Likewise, family income of undergraduates did not correlate with need for cognition scores (Tolentino et al., 1990). However, both gender and income have increasingly tangible and interactive influences on individual development over time, which might result in disparate findings on these measures in older adults.

A stable positive association has been established between education level and need for cognition (Cacioppo et al., 1996), although the reciprocal nature of the association obscures potential directionality. Yet, in a study including 90 randomly selected citizens and 30 undergraduates, it was found that students and non-students did not differ in need for cognition (Verplanken, 1993). The numerous studies comparing need for cognition favorably with aspects of ability and performance within the educational or workplace experience may not be directly relevant to, or informative about, need for cognition in non-structured heterogeneous older adult populations.

However, as a foundation for the accumulation of life course capital, education may play a positive predictive role in need for cognition (or vice-versa). Vaillant (2004) has reported that education predicts positive physical and mental health outcomes 30 years later, specifically through self-care, future orientation, and perseverance. Income and intelligence did not similarly forecast health in 70-year old men. Updegraff, Gable and Taylor (2004) found that highly approach-motivated individuals are more likely to pursue, acquire, and value positive emotional experiences than less approach-motivated individuals. This provides theoretical support for a relationship between need for cognition and education in the prediction of positive affect. Need for cognition as a dispositional orientation may interact with education to facilitate and maintain gains in mental health made from an information-approach to life.

No correlation has been demonstrated between need for cognition and intelligence measured as abstract reasoning ability in undergraduates (Cacioppo, Petty & Morris, 1983). However, previously demonstrated positive relationships between need for cognition, knowledge regarding current events, logical reasoning, objectivism, and verbal ability (Cacioppo et al., 1996) lead to the possibility that age-appropriate

cognitive measures might reveal an association between fluid and/or crystallized intelligence and need for cognition in older adults.

Need for Cognition and Creativity

Need for cognition can be compared with *creative cognition*, an approach which views the capacity for creative thought as part of normative human cognitive functioning (Simonton, 1999; Ward, Smith, & Fink, 1999). By using thought processes which are simultaneously generative and exploratory, every individual is seen as located somewhere along a creativity continuum, just as they are on the need for cognition continuum. People who use creativity in everyday cognition tend to embrace complexity, just as those who are high in need for cognition do. Both creative people and high cognizers are energized by challenging tasks, reflecting high intrinsic motivation (Collins & Amabile, 1999). The creative process is described by Ward and colleagues (1999) as the original and appropriate combining of previously separate concepts in the completion of a task. Creative people share with high cognizers the agentic characteristic of enjoying effortful construction of interpretations of their world, working well with ill-defined problems by combining stored and new knowledge with both previously acquired and newly developed strategies to the solution of everyday problems. Freedom from the previously necessary extrinsic constraints of the work place may promote both creative energy and fulfillment of need for cognition in recent retirees.

Dollinger (2003) demonstrated a positive correlation among varied behavioral measures of creativity and need for cognition, with need for cognition emerging as a significant predictor of a composite creativity score. Shared variance in outcome between these two measures illustrates the similarities between them, both having an

array of cognitive and dispositional attributions characterized by a spirit of curiosity and inquiry. Both can exist in either domain-specific or domain-general areas of knowledge.

It is particularly useful to compare these two social psychology constructs as overlapping componential concepts. Creativity is described by Amabile (1983) as a constellation of personal characteristics, cognitive processes, and social environments which produces an observable outcome or response of any kind. The personality traits attributed to creativity by Sternberg & Lubart (1991) (tolerance of ambiguity, willingness to surmount obstacles and persevere, openness, willingness to take risks, and individuality) conceptually intersect with need for cognition's negative correlation with dogmatism and preference for predictability, and its positive correlations with openness to experience, and high self-appraised problem-solving effectiveness (Cacioppo et al.,1996). Since the two constructs share positive behavioral, motivational, and personality indicators, they both qualify as psychological strengths.

Several researchers have concluded that creatively meeting the personal adjustments of everyday life leads to a measurable outcome of life satisfaction or subjective well-being (Csikszentmihalyi, 1996; Goff, 1993; Guilford, 1950; Lubart & Sternberg, 1998; Marsiske & Willis, 1998; Sinnott, 1998; Ward et al., 1999). However, Cacioppo and colleagues (1996) report an indirect relationship at best between need for cognition and emotionality. The current study will show how need for cognition, like creativity, acts as a bridge between cognition and emotion through its shared relationship with personality and behavioral variables leading to positive affect.

Need for Cognition and Intelligence

The concept of creative cognition also informs our understanding of the role of need for cognition in the lives of older adults through the common influence of

cognitive resources. Sternberg and Lubart (2001) make a distinction between intelligence as "adapting to the environment" and creativity as "shaping the environment". They theorize that practical *intelligence* is most likely to be serviceable in structured situations, such as in school or the work place, where problems are often easily identified, can be solved with linear reasoning or prior knowledge, and where clear goals and solutions are accessible. Practical *creativity*, by contrast, is more likely to operate in everyday challenging situations that are ill-defined, unfamiliar, and in which known or previously successful solutions and strategies are no longer necessarily useful. Further, a conceptual link is drawn between cognitive creativity and fluid intelligence because both are important abilities in the solution of novel, unfamiliar problems (Cattell, 1971).

However, fluid abilities, which include short term memory, concentration, alertness, and processing speed, are vulnerable to age-related decline. Crystallized abilities, involving long term memory and knowledge acquired through education, remain stable or improve over time (Horn & Hofer, 1992). In his discourse on cognition and aging, Horn (1982) writes of crystallized intelligence as being an indicator of the ability to flexibly structure information, and as being useful as an operational representation of creativity. As individuals age, they continually restructure their crystallized knowledge systems for increasing cohesion, accessibility, and environmental fit. Esoteric analogies, remote associations, and experiential evaluation (Horn, 1982) are components of crystallized intelligence that increase with age, leading Sinnott (1998) to call older adulthood "the age of creativity".

An inclusive cognitive view is the hierarchical model of basic intellectual ability and everyday task performance in older adults (Marsiske & Willis, 1998). According to

this perspective, the individual uses a full range of intellectual skills, including knowledge-based crystallized abilities as well as skill-based fluid abilities, to succeed with domain-general tasks. Like Lubart and Sternberg's (1998) life-span creativity theory, the hierarchical view accommodates both convergent and divergent modes of thinking. Convergent thinking produces a single correctly-viewed solution; divergent thinking produces several alternative solutions through a synthesis of knowledge, emotion, and experience. Divergent thinking is typical of post-formal thought, a component of mature adult cognition and an adaptive tool in positive lifespan development (Sinnott, 1998). Individuals high in need for cognition would be more likely to employ divergent thinking, characterized by fluency, flexibility, & originality, in their effortful striving for cognitive solutions (Marsiske & Willis, 1998; Sternberg & Lubart, 1991).

Fluid abilities are easily assessed using tasks measuring speed and precision in non-verbal problem-solving tasks in laboratory settings, but it is more difficult to obtain ecologically valid measures of crystallized abilities. Typically researchers use vocabulary comprehension and usage to tap into crystallized knowledge. In sum, not only are there different developmental trajectories for fluid (non-verbal) and crystallized (verbal) abilities over time, and different ways of measuring them, but additionally, each type of intelligence relates differently to other variables, reflecting their distinctly different construct validities (Horn & Hofer, 1992; Horn, 1982). To fully understand the relationship between intelligence and the dispositional interest for cognitive exploration in older adults, education levels, fluid (non-verbal) abilities, and crystallized (verbal) abilities will be treated as separate independent variables in this study.

Past research has reported a significant correlation between verbal reasoning and need for cognition (Cacioppo, Petty, Kao & Rodriquez, 1986), but a non-significant relationship between abstract reasoning and need for cognition (Cacioppo, Petty & Morris, 1983) as well as a non-significant correlation between logical reasoning and need for cognition (Cacioppo et al., 1996). These studies were done with undergraduates, and did not directly tap into the innate, or "vulnerable", and learned, or "maintained", cognitive abilities of interest to theories of aging and creativity. Horn and Hofer (1992) have reported that social class and years of education correlate more highly with crystallized intelligence than with fluid intelligence. Logically, we might expect to find that the correlation between need for cognition and fluid abilities is of a differing magnitude than that between need for cognition and crystalized abilities, taking into account varying levels of education and age in our sample. While respecting the caution that need for cognition is a motivation for cognitive involvement, and not itself a cognitive ability, this study will examine not only how verbal and non-verbal abilities relate to need for cognition in an older adult sample, but also whether the two kinds of cognitive ability relate differentially to other variables in the path between need for cognition and positive affect in older adults.

Need for Cognition and Personality

Intellectual competence has been defined as an individual's capacity to acquire and consolidate knowledge throughout the lifespan (Chamorro-Premuzic & Furnham, 2006). This represents a conceptual expansion of the traditional notion of intelligence to also include personality and motivation as predictors of academic and occupational achievement. In the context of studies with retired adults, the "intelligent personality" could be used to predict the person-environment fit by mapping personality and

behavioral profiles onto a measure of life satisfaction. Other psychosocial descriptions of successful adaptation, such as Joseph & Linley's (2005) organismic valuing theory, also emphasize an interaction among personality, cognition, and coping behaviors.

Openness to experience and conscientiousness have been shown to correlate with need for cognition in undergraduates (Berzonsky & Sullivan, 1992; Sadowski & Cogburn, 1997). These two elements of the five factor personality model (John & Srivastava, 1999) can be seen as structurally integral to need for cognition in an older population. Cacioppo and colleagues (1996) suggested that while need for cognition may represent facets of both openness and conscientiousness, past research does not indicate any theoretical reason to pursue a relationship between need for cognition and extraversion, agreeableness, or neuroticism.

Openness to experience, operationalized as one of the five factors in Costa and McCrae's (1992) personality inventory, describes individuals who report curiosity, imagination, creative tendencies, wide interests, and flexible attitudes. Individuals high in openness exhibit a desire for exploration and stimulation in both the arts and sciences (Chamorro-Premuzic & Furnham, 2006; Ozer & Benet-Martinez, 2006), are independent-minded (John & Srivastava, 1999), and derive pleasure from variety and complexity in their experiences (McCrae & Costa, 1997). As with need for cognition, those high in openness are receptive to information and experience coming in from their world, and are less dogmatic than those who are low in openness. The low end of the openness continuum is characterized by conventional or authoritarian thinking just as is the low end of the need for cognition continuum. McCrae (1994) points out that the flexibility of attitude reported by open individuals reflects a fluidity and

permeability in consciousness similar to that seen in divergent thinking, common to both creativity and need for cognition. Openness has been shown to correlate positively with verbal creativity and creative accomplishments (King, Walker & Broyles, 1996), as well as with a battery of creative measures previously correlated with need for cognition (Dollinger, 2003; Dollinger, Urban & James, 2004).

High levels of trait openness have been associated with reductions in latent inhibition, a cognitive mechanism operating at a preconscious level which screens out stimuli previously experienced as irrelevant (Peterson, Smith & Carson, 2002). As a result, individuals with lowered latent inhibition can be more aware of "the range of complex possibilities laying dormant" in their everyday environments (p. 1139). These individuals are more likely to score higher on measures of originality in divergent thinking, creative achievement, and creative personality (Carson, Peterson & Higgins, 2003). Studies of the biological basis for latent inhibition in humans and animals with complex nervous systems have identified its connection with dopaminergic neurotransmission in mesolimbic systems. Dopaminergic neurotransmission is not only implicated in the mediation of incentive reward, approach and exploratory behaviour, it is also connected to planning and thinking activity in the prefrontal cortex (Lubow & Giwertz, 1995). In combination, these findings indicate multiple levels of association between openness and cognition which are consistent, though not synonymous, with Cacioppo and colleagues' (1996) conceptualization of need for cognition. For example, Carson et al. (2003) report that an IQ higher than the threshold of 120 is a necessary but insufficient condition for creative achievement. Need for cognition, on the other hand, is a motivational disposition for cognitive engagement that is independent of measures of intelligence. High and low latent

inhibition is differentiated best by a combination of openness and extraversion, whereas need for cognition is hypothesized as characterized by openness and conscientiousness, with no prior rationale for including extraversion, agreeableness or neuroticism as significant predictors of the construct.

Conscientiousness is a factor encompassing efficiency, order, dutifulness, thoroughness, self-discipline, and deliberation (Costa & McCrae, 1992). The conscientious person has been described as organized, scrupulous, dependable, planful, ambitious, and punctual (John & Srivastava, 1999) which is why conscientiousness has been associated with higher education and occupational performance (Chamorro-Premuzic & Furnham, 2006). For individuals high in need for cognition, the high conventionality in conscientiousness offsets the low conformity in openness, producing a synergy between the two personality domains unique to the construct of need for cognition. Paunonen and Ashton (2001) recommend the use of facet-level over factor-level personality measures for behavior prediction. The overlap of two orthogonally distinct factor-level traits like openness and conscientiousness in need for cognition may be an example of how more narrow trait measures can be usefully combined in specific contexts. Need for cognition can be viewed as a distinct process-based orientation which subsumes facets from both openness and conscientiousness, allowing the construct to have predictive value in environmental outcomes. An optimal balance between the motivating curiosity of openness and the regulating diligence of conscientiousness will promote activity levels that are likely to result in positive affect for older adults.

Need for Cognition and Coping Behavior

Cacioppo and colleagues (1996) describe individuals high in need for cognition as being agentic. Among studies showing support for this, Berzonsky and Sullivan (1992) analyzed the relationship between identity style (how individuals characteristically process self-relevant information, solve personal problems, and negotiate identity issues) and social cognitive dispositions. Need for cognition correlated positively with an information-style orientation in which high scores indicate a tendency to seek out and elaborate self-relevant information under problem-solving conditions. By contrast, need for cognition correlated negatively with a diffuse-avoidant style orientation, where high scores indicate a tendency to ignore problems and self-relevant information. In a factor analysis, Berzonsky and Sullivan's (1992) informational approach to identity issues loaded onto two independent but related factors: information processing and self-reflection. This distinction can be compared with Folkman and Lazarus's (1980) definitions of primary and secondary appraisals, whereby in primary appraisal a cognitive process evaluates an event with respect to its salience as a threat or a challenge, and in secondary appraisal, reflection evaluates the personal coping resources and options available in the resolution of a stressful problem. Individual differences in people's motivation to engage in effortful cognitive appraisals will influence not only their initial appraisals of incoming stimuli, but also their evaluations of available options, and their choice of focus in coping with situations. When a situation is conducive to an agentic problem-solving approach, need for cognition provides the necessary impetus to seek detailed information about relevant issues, to engage in effortful thinking about the issues, and to resist intimidation by the circumstances or tasks requiring effortful cognition.

Structurally similar to the two-step appraisal process predicating problem-solving coping (Folkman & Lazarus, 1980) is the evaluation strategy integral to Voss and Mean's (1989) model of creativity in social science problem-solving. In the initial representation phase of problem solving, a directed search leads to an interaction between prior knowledge and relevant new information. Subsequently, the solution or "re-appraisal" phase may produce ambiguous or paradoxical propositions, the resolution of which produces a creative outcome. This kind of creative process is considered by its authors to be a special case of problem solving based primarily on information processing, available to all, and particularly useful for ill-defined problems or situations with no single solution. It can be seen as a theoretical mirror of the psychological process recently retired individuals might engage in as they move from decades of structured life experiences into a new frontier which may be filled with unfamiliar constraints and challenges.

It has been shown that individuals who perceive themselves as effective problem solvers, reflecting problem-solving confidence, an approach (as opposed to avoidant) style, and a sense of personal control, score significantly higher on need for cognition than do those who perceive themselves as low problem solvers. These same self-appraised effective problem solvers also rate themselves as being more persistent, as having more positive self-concepts, more consistency in their self-perceptions, and more certainty about how they viewed themselves (Heppner, Reeder, & Larson, 1983).

Need for cognition has been conceptualized as a disposition favoring positive attitudes toward both situations and activities requiring cognitive effort and effective problem solving. In a sample of 57 undergraduates, Tolentino, Curry and Leak (1990) found only a trend toward a relationship between need for cognition and a self-directed

problem-solving strategy , however they found significant correlations between need for cognition and a composite score reflecting preferences for highly cognitive activities such as types of reading material and social activities. Other studies have shown that individuals high, as compared with low, in need for cognition are more likely to use resources and technologies that require effortful thinking and learning (e.g. library and media use, computer-aided learning, new technological tools). It is theorized that a chronic tendency to process information effortfully will result in being better informed and more knowledgeable about one's environment generally (Cacioppo & Petty, 1982; Cacioppo, Petty, & Morris, 1983; Cacioppo et al., 1996).

Aspinwall and Taylor (1997) have defined proactive coping as a temporal antecedent to coping with, or even anticipating, specific events or stressors. In accumulating knowledge, resources, and skills through varied activities, an individual can avert or minimize crisis-oriented forms of coping. Need for cognition implies a dispositional tendency to enjoy resource accumulation, the first stage of proactive coping. Also inherent to need for cognition is an approach attitude compatible with the proposition that active forms of coping yield more information about, and thus better protection from, potential stressful incidents.

Of obvious value to older adults are benefits of proactive coping such as planful behavior, a lowering of chronic stress, and a consistent association with positive emotional adjustment (Aspinwall & Taylor, 1997). Active cognitive coping and behavioral coping have been shown to correlate not only with each other, but also with positive reappraisal (Mattlin, Wethington, & Kessler, 1990). This suggests that problem-focused coping, or the cognitive and behavioral strategies used to manage a

stressful situation (Lazarus & Folkman, 1984), can be predicted by the dispositional motivation of need for cognition and will, in turn, lead to positive affect.

Need for Cognition and Activity Engagement

Activity engagement operates conjointly with agentic coping in the promotion and maintenance of positive affect. Discretionary leisure-generated activities have been shown as beneficial; for example, Iwasaki (2001) found that both problem-focused and leisure-related coping strategies reduced academic stress levels and enhanced psychological well-being in university students' lives. Positive outcomes depended on optimal matching between type of stress and style of coping; for example, leisure-related social support was more effective and useful than general social support when participants were coping with interpersonal stressors or events damaging to self-esteem. Direct or problem-focused coping strategies were associated with positive outcomes for controllable stressful events, as predicted by Lazarus and Folkman's (1984) theory, but some types of leisure coping strategies (i.e. empowerment and mood enhancement) also made a significant contribution. Overall, Iwasaki's (2001) research shows how leisure coping strategies can contribute to psychological well-being in young adults even after planning and active coping strategies have been accounted for.

In older adults, the kinds of activities that contribute most to quality of life are characterized by involvement, commitment, and skill (Kelly, 1993). Freely chosen activities that challenge knowledge, require an investment of effort and resources, and involve obligation or discipline have been called high-investment activities. These types of activities are distinct from simple diversionary amusements such as passively watching random television shows or reading light books, and are associated more with long term satisfaction than with pleasant escapism or relaxation. Older adults reporting

higher levels of life satisfaction also reported higher levels of participation in cultural, travel, and constructive home activities (Mannell, 1993), which are examples of what has been called active or "serious leisure" (Stebbins, 1998). Such activities may be as time-consuming or competence-testing as work, but are evaluated by psychological rather than economic outcomes. Commitment is a key characteristic of serious leisure. Mannell (1993) used the experience sampling method to collect data from older adults over the course of a week, and compared psychological outcomes between freely chosen uncommitted and committed activities. Components of Csikszentmihalyi's (1990) flow were measured as affect, potency, concentration, relaxation, and percentage of activities in which skills matched challenges. In freely chosen activities, those involving obligation or commitment produced greater positive affect and other measures of flow than did those activities involving freely chosen uncommitted activities. Such committed devotion of time and energy to high-investment activities would also be present in older adults with a dispositional tendency to enjoy effortful cognitive activity.

Mannell (1993) also measured intrinsic and extrinsic motivation levels in participants, expecting to find a relationship between intrinsically motivated activities, feelings of flow and freely chosen activities. However, contrary to expectations, while higher levels of flow were experienced frequently in all freely chosen activities, flow occurred to a significantly greater extent in freely chosen *extrinsically* motivated activities than in freely chosen *intrinsically* motivated activities. In other words, given freedom of choice, older individuals preferred obligation or commitment over immediate personal enjoyment. Mannell suggests this may reflect the usefulness of external motivation to overcoming psychological inertia in the face of optional effort in

leisure choices. However, it could also be a reflection of older adults' theorized developmental tendencies toward generativity and integrity (Erikson, 1997), insofar as giving to, and working with others has been described as a task of mature adulthood. Another alternative reason might be that a sense of obligation or commitment to others would accompany the increased conscientiousness that comes with age (Caspi, Roberts & Shiner, 2005).

Another possible explanation might lie in the results of a study which used need for cognition as a measurement tool to tap intrinsic motivation and persistence in free-choice effortful cognitive activities (Thompson, Chaiken, & Hazlewood, 1993). The researchers found that individuals who are low in need for cognition need extrinsic rewards to perform effortful cognitive activities, while those who are high in need for cognition, as well as high desire for control, do not need extrinsic motivation to perform effortful cognitive activities. This indicates that fitting need for cognition into the profile of choices in an older adults' lifestyle may contribute to a clearer understanding of what promotes or undermines a motivated approach to activity engagement as well as problem-solving.

Working with Rowe and Kahn's (1998) theory about the fundamental importance of continuing engagement with life to retired adults, Lennartsson and Silverstein (2001) examined whether longevity in elderly Swedish residents would be predicted by any of four activity domains: social-friendship, social-cultural, solitary-sedentary, and solitary-active. Although analysis revealed that some activities in most domains were associated with reduced mortality rates, the strongest predictor was the solitary-active domain, measured with an index including such activities as carpentry or gardening. The authors conclude that it must be a psychological dimension (such as

motivation or purposefulness) of activity that is a key mediator in the promotion of health and longevity. Being able to position need for cognition in the pathway to positive affect for older adults begins a shift of focus away from social and physical predictors of longevity and toward a motivational orientation which can be cultivated both independently and socially. It's never too late to develop curiosity, interest, and concentration.

This study will position frequency of cognitive activities (including their related social or physical components) in the pathway between need for cognition and the outcome of positive affect. Activities measured include attendance to film, theatre, concerts, museums; playing a musical instrument or singing; taking academic or information courses; reading books, magazines, newspapers, union or association newsletters; playing interactive games; doing crafts, hobbies, or creative activities such as writing, painting, composing, designing; media and internet usage; and, travelling including day trips, holidays, and recreational trips.

In structuring their time, retired individuals can create personalized patterns of activities which become a reflection of their identities. Dubin (1992) calls these patterns *central life interests*, and refers to them as vehicles for self-realization. Central life interests have the capacity to replace ego-involvements previously nourished through possible forms of power, authority, or status recognition associated with work. In retirement, the pursuit of varied central life interests leads to vitality and positive affect; this personal freedom to choose and change interests is Dubin's definition of "creative individualism". This viewpoint corresponds with Csikszentmihalyi's (1996) position that living a creative personal life through our choice of activities is within our control, and may be our most important accomplishment.

Need for Cognition and Perceived Control

The importance of the degree to which individuals perceive themselves as being in control of their life circumstances has been extensively researched in conjunction with coping in aging. Perceived control becomes more "phenomenologically salient" at times when the competence system is taxed by novel and unexpected situations or by changing individual competencies (Skinner, 1995). Among the myriad of challenges individuals face in the last third of their lifespan are potentially irreversible changes in health or income status, shifts in family and social dynamics, and in today's unstable society, rapid technological developments which can directly affect tool usage and task performance in everyday life (Furchtgott, 1999). With age, people face more options, but have fewer real choices as they can be handicapped by physical or health constraints as well as by the consequences of decisions made and actions performed earlier in life. This can leave them feeling that time is running out. The older adult may sense the fragility of the balance between expectations and reality, may feel unprotected by outdated social support systems, may be inundated by new information, or bewildered by complex changes in global political and environmental patterns (Hudson, 1999). An individual who can face these developmental challenges with a strong sense of competence and mastery is protected both biologically and psychologically (Haidt & Rodin, 1999; Lachman & Weaver, 1998).

Several extant theories of control are dichotomously structured. Lachman's (1986) work on locus of control beliefs differentiates between external sources of control such as chance, or powerful others, and an internal sense that control is contingent on one's own behavior. Locus of control, an individual difference variable that is stable over time and across situations, is a strong predictor of both current and

preventive health behaviors in middle-aged and older individuals (Haidt & Rodin, 1999; Thomas, 1997). Lachman (1986) found that beliefs about internal locus of control remain stable as people age, whereas beliefs about external sources of control were subject to an increase.

Similarly, the lifespan model of control (Heckhausen & Schulz,1995; Schulz & Heckhausen,1996) includes both primary control, or strategies directed at the external environment, and secondary control, or attempts to modify perceptions within the individual to compensate for losses of primary control. With age, there is an increase in the use of secondary control strategies, such as positive reappraisal or goal adjustment, which protect the individual (Wrosch, Heckhausen, & Lachman, 2000). Brandtstadter (1998) also describes a dual-process concept of control and coping strategies involving either the assimilation of given circumstances to one's life design, or the accommodation of one's life design to fit new constraints. He and his colleagues have presented evidence for age-related shifts in coping from assimilative to accommodative strategies in response to perceived or real changing conditions of environmental mastery (Brandtstadter & Renner, 1990; Brandtstadter & Baltes-Gotz, 1993).

The measure of perceived control used in this study included both mastery and perceived constraints subscales, providing a balanced evaluation of the participants' perceived ability to significantly alter events in their lives (Lachman, 1986). Skinner (1995) predicts that, as a general motivational construct, perceived control will have a direct and positive influence not only on valued task selection (especially those tasks requiring high cognitive processing capacity), but also on the experience of positive emotions. Skinner (1995) also, however, specifies a need for new research on the actual mechanisms, or pathways of perceived control, and its integration with other sources of

motivation to provide a better understanding of how perceived control coexists and interacts with other variables to create positive outcomes. Heckhausen and Schulz (1995) also acknowledge that motivational forces other than, and even unrelated to, either primary or secondary control may lead to identical outcomes of activity engagement and life satisfaction.

Perceived control, like need for cognition, can be a proactive agentic drive toward approach behavior and increased positive affect. As a motivation, however, the impelling need in perceived control is for competence or mastery, quite distinct from need for cognition's desire for intellectual gratification. Need for cognition has been described as an innate dispositional response to cognitive challenges (Cacioppo et al., 1996), whereas perceived control is a system of beliefs about one's personal efficacy which has been learned from experience (Haidt & Rodin, 1999). It follows that the stable trait of need for cognition would be less mutable over time than perceived control, which is subject to cognitive reappraisal and shifting competencies in differing domains. Need for cognition shows, at best, a weak negative correlation with age, according to Cacioppo et al. (1996). Qualitative and quantitative elements of perceived control, on the other hand, have been repeatedly demonstrated to change markedly as biological and social reserve capacities decline with extreme old age (Heckhausen & Schulz, 1995; Lachman, 1986; Skinner, 1996).

Highly structured contexts provide an experiential antecedent to the development of control (Skinner, 1996). In contrast, tolerance of ambiguity accompanies the openness characteristic of need for cognition, which correlates negatively with preference for predictability, with a personal need for structure, with desire for structure, and with response to lack of structure (Cacioppo et al., 1996). Need

for cognition has also been positively correlated with the autonomous exploratory behavior exhibited by individuals who display greater interest in maximizing information gain than in maintaining their perceived reality (Sorrentino, Bobocel, Gitta, Olson, & Hewitt, 1988).

Need for cognition, defined as the tendency to enjoy engagement in effortful cognitive tasks, implies emotional involvement with process, whereas perceived control, defined as the perceived ability to significantly alter events (Skinner, 1996), is a competence and contingency model. Perceived control is, by definition, an outcome-based process reliant on effective positive results; it interacts with incentive value to predict behavior, according to Skinner (1995). Need for cognition is an intrinsic motivation for cognitive processing, with individuals high in need for cognition, more so than those high in desire for control, preferring contexts with minimal extrinsic incentives. Thompson, Chaiken and Hazlewood (1993) reported correlations between the need for cognition scale and Burger and Cooper's (1979) desire for control scale in large independent samples of undergraduate students. However, they theorized that although there is a strong empirical covariance between the two motivational constructs, need for cognition may, with time, become functionally independent of personal control. This suggests potentially differing developmental trajectories for the two types of motivation, especially at older age levels.

A further distinction between the two motivational constructs has been illustrated by results of a study designed to show that individuals between the ages of 55 and 75 who participate in educational and voluntary activities would score higher on, among other things, general control beliefs (Timmer & Aartsen, 2003). It was found that a general sense of mastery, as reflected in self-esteem and control beliefs, did not

predict study and volunteer work for this population. The authors conclude that participation in educational activities by the young-old does not require mastery beliefs as much as simply a motivation to start, and an appetite for new challenges and experiences. Additionally, this was more likely to be true for those with higher levels of previous educational experience. Timmer and Aartsen (2003) did not refer to need for cognition in their article, but they effectively described it as a motivational force alternative to, and distinct from, general perceived control.

Perceived control and need for cognition appear to be two separate yet possibly related motivational constructs, each shown to influence the well-being of older adults. In terms of exogenous antecedents to the two constructs, both health and neuroticism have been repeatedly linked with perceived control, but not with need for cognition. Of particular interest to older adults, perceived control has been correlated in complex ways to the endocrine and immune systems, resulting in both direct and indirect effects on compliance and participation in health care activities (Haidt & Rodin, 1999). Gatz and Karel (1993) showed health to be a significant predictor of control beliefs, except in the oldest old. However, there is no published evidence to date of a relationship between need for cognition and health. Neuroticism has also been repeatedly linked with perceived control, to the extent that Judge, Erez, Bono, and Thoresen (2002) have proposed that neuroticism, locus of control, self-esteem and generalized self-efficacy may be components of a single higher order concept (or common core) of general neuroticism. Need for cognition, on the other hand, has shown only a modest negative correlation with anxiety in undergraduates (Cacioppo et al., 1996). Loss of perceived control, especially through health constraints, can exacerbate a sense of threat and discomfort, increasing levels of neuroticism (Skaff, 2007). There is no corollary

punitive emotional consequence to having low need for cognition; neither a tendency to experience intense emotional states nor the use of affect cues in guiding communication were shown to be significantly related to need for cognition in previous studies (Cacioppo et al., 1996). It appears unlikely that perceived control and need for cognition share either health or neuroticism as exogenous antecedents, further differentiating between them.

Hypotheses

In response to Cacioppo et al.'s (1996) call for further studies linking need for cognition to important life outcomes, the primary purpose of this study was to determine how need for cognition relates to other variables leading to a measure of life satisfaction in recently retired adults. The first hypothesis specified that the personality factors of conscientiousness and openness, as well as years of formal education, and measures of both fluid and crystallized intelligence would be significant exogenous variables contributing to need for cognition in a structural equation path model. Secondly, it was expected that need for cognition itself would contribute directly to frequency of cognitive activity and problem-focus coping, as well as to positive affect through both direct and indirect paths.

An additional goal of this study was to map the qualitative differences between need for cognition and perceived control as motivational constructs. It was expected that exogenous variables significantly related to perceived control would differ from those related to need for cognition in a well-fitting model. This led to the third hypothesis that health would positively predict perceived control, and levels of neuroticism would negatively predict perceived control.

Since both need for cognition and perceived control have been described in the literature as related to coping and activity levels in older adults, the model was planned to test whether or not these two motivational constructs would follow the same pathways to positive affect. Specifically, the fourth hypothesis was that the relationship between need for cognition and positive affect would not be mediated to the same degree by the same variables as the relationship between perceived control and positive affect.

Method

Participants

A total of 385 recently retired adults participated in this study (mean age = 60 years, *SD* = 5.49, range = 44 to 79 years). Sources of recruitment for the sample included 31% referred from a large Quebec corporation, 23% from advertisements placed in a French-language daily city newspaper, 25% from an English-language daily city newspaper and the remaining 21% from community newspapers, seniors' centers, or word of mouth. To be included in the study, participants must have retired within the last three years from fulltime employment of at least 20 years duration, and not be currently working more than 10 hours per week. Data were excluded from participants showing signs of dishonesty in communication with the research coordinator, improper use of the response scales, or any apparent difficulty in comprehending questionnaire instructions.

Although diverse, this sample was fairly well educated overall (mean years education = 15, *SD* = 2.5, range = 7 to 22) and financially secure on average, according to self-reported family income at time of assessment (*M* = 72,000$ Cdn. per year, range = 15,000$ to 220,000$, median = 63,000$, *SD* = 40,467$). Women represented 52% of the sample. With respect to marital status, 52% of participants were married, 13%

single, 21% divorced, 4% widowed, and 11 % living common-law at point of testing. In terms of language preference, 62% chose to fill out French questionnaires, and 38% chose English. French and English versions of the vocabulary test produced identical mean scores in this sample.

Procedures

The study was described via telephone to potential interested participants. They were informed that they would be helping researchers understand how people reconstruct their lives in retirement, and would be required to complete questionnaires or pencil and paper tasks. Appointments were made at the Adult Development and Aging Laboratory at Concordia University for participants to meet in groups of between 2 and 6 individuals for approximately 3 hours. Prior to a given testing session, participants completed a battery of demographic and health questions mailed to their home (see Appendix A). Once in the lab, consent forms were presented first (see Appendix B), then tasks were administered in the same order to all participants, with self-paced timing except for the two cognitive tests, Trails and Digit Symbol. With the exception of responses to the vocabulary test and the NEO-Five Factor Inventory which were collected in the first year of testing, all data reported here were collected during the second out of four planned consecutive annual waves of testing.

Measures

Participants chose to respond to either a French or English set of measures in a group facilitated in the appropriate corresponding language. All translations were made by Translation Services, Concordia University, using forward and backward translation procedures.

Cognitive Measures. 1) Scores from the Digit Symbol Substitution Test, WAIS-R (Salthouse, 1992) and the Trail Making Test from the Halstead-Reitan Battery (Reitan & Davison, 1974) were standardized and combined to produce a single *Non-verbal Cognitive Ability* factor score for each participant (eigenvalue = 1.5), accounting for 75% of the variance. In the Digit Symbol Test, perceptual processing speed is measured by the ability to correctly substitute symbols corresponding to the numbers 1 through 9 in a randomly ordered array of digits within a 90-second time limit. The score is the total number of digits accurately coded. The Trail Making Test measures the time taken by subjects to link randomly arranged letters into an alphabetic (Form A: from A to B to C, etc.) or an alphanumeric (Form B: from A to 1 to B to 2, etc.) sequence, respectively. To perform the alphanumeric alternation on Form B, subjects must inhibit the strong sequential associations within the alphabetic and numeric sets. The difference in time needed to complete the two forms provides a measure of executive function in attention switching (Arbuthnott & Frank, 2000). Together, the Digit Symbol and Trail Making tests created a reliable score for each participant's rate of processing information, with a Cronbach's alpha of .66, and a RHO coefficient of .62. Factor loadings were .57 for the Digit Symbol Test, and .88 for the Trail Making Test. As a measure of fluid, or mechanical intelligence, this nonverbal cognitive factor represents innate mental ability independent of acquired knowledge and experience, and is sensitive to indications of age-related decline (Horn & Hofer, 1992).

2) The Extended Range Vocabulary Test (Ekstrom, French, Harman & Derman, 1976) is a measure of crystallized, or pragmatic intelligence. Participants are provided with a target word and asked to select the word that most closely matches the target word in meaning from a set of five alternatives (see Appendix C). Proficiency in

language reflects retention of accumulated knowledge that is age-resistant, and provides our study with a second important intelligence measure (Ackerman, 1996; Horn, 1982).

Health. Three measures were standardized and reduced with principal-components analysis to produce an index of health (eigenvalue = 2.03), accounting for 68% of the variance: 1) a one-item measure assessing subjective health on a five-point scale (Schonfield, 1973; Schonfield & Hooper, 1973); 2) participants' answer to the question "How much do health problems stand in the way of your doing the things you want to do?" from a choice of *not at all*, *a little* or *a great deal*; and 3) an abridged version of the Seriousness of Illness Rating Scale (SIRS) (Wyler, Masuda & Holmes, 1971) which provides a self-report account of the total number of illnesses a participant has experienced over the past five years. Factor loadings were .72, .71 and .72 for each measure respectively. Cronbach's alpha was .76 and the reliability coefficient RHO was .62. Higher scores on the factor indicate better health.

Education. Level of education was measured by the number of years enrolled in formal educational institutions, and did not include extra-curricular, adult education, or job training programs.

Personality. The NEO Five Factor Inventory: Short Form (Costa & McCrae, 1989) was used to assess five global personality dimensions: neuroticism, extraversion, agreeableness, openness, and conscientiousness. Neuroticism scores reflect a continuum from well adjusted to emotional instability and assess anxiety, depression, and hostility. Extraversion scores reflect a continuum from introversion to extraversion and assess desire for greater quantity and intensity of interpersonal interaction, activity level, assertiveness, need for stimulation, and capacity for joy. Agreeableness measures altruism and positive orientation to others. Openness measures receptivity to novel

experiences and ideas. Conscientiousness measures dependability and self-discipline. Test-retest reliabilities range from .80 to .93 for six-month intervals. Correlations with other standardized measures of personality range from .45 to .82 (see Appendix D).

Need for Cognition. The Need for Cognition Scale (Cacioppo, Petty, Feinstein & Jarvis, 1996) measures preference for effortful cognitive processing of complex material. The 18-item short form includes transparent self-descriptive statements arranged on a 5-point scale from "*extremely uncharacteristic of me*" to "*extremely characteristic of me*". Participants indicate to what degree "*I prefer my life to be filled with puzzles that I must solve*" or "*Learning new ways to think doesn't excite me very much*", for example (see Appendix E). Half the items are worded positively and half negatively. Higher scores on the scale indicate a dispositional tendency toward greater need for cognition. The items in this scale combined through principal component analysis to produce an eigenvalue of 6.55, with 36% of variance explained. Inter-item reliability resulted in a Cronbach's alpha of .89 and a RHO coefficient of .90, almost identical to similar statistics previously reported (Cacioppo, Petty, & Kao, 1984; Sadowski & Gulgoz, 1992). In addition to its high internal consistency, the Need for Cognition Scale has been demonstrated to have strong test-retest reliability ($r_{69} = .88$, $p < .001$), reflecting its value as a highly stable individual difference variable. It has also been shown as gender neutral in homogeneous samples such as college students (Sadowski, 1993; Sadowski & Gulgoz, 1992).

Frequency of Cognitive Activities. Nine items from the *Everyday Activities Questionnaire* (Pushkar, Arbuckle, Conway, Chaikelson, & Maag, 1997; Rousseau, Pushkar & Reis, 2005) measure frequency of reading, game playing, travel, continuing education, media and Internet usage, as well as general cultural, musical, and creative

activities that also require the consistent and active maintenance of cognitive engagement (see Appendix F). This subscale of developmental activities has been found to predict both cognitive and social competence. Participants are asked to rate their current frequency of engaging in each activity on a 5-point scale with responses ranging from 0 (*not at all*), 1 (*less than once a month*), 2 (*monthly*), 3 (*weekly*), to 4 (*daily*), and each participant's score is the sum of the frequency ratings across all activities. The test-retest reliability coefficient for activity frequency has been reported as r (41) = .73, $p < .001$, and inter-item reliability (Cronbach's alpha) for frequency was .57 (Pushkar et al., 1997). Past research with the Everyday Activities Questionnaire has shown a high and significant correlation among frequency and number of activities, $r = .93$ and $r = .90$ for 3 and 12 month test-retest reliabilities respectively, suggesting that people who perform activities more frequently also engage in a wider range of activities (Rousseau, Pushkar & Reis, 2005).

Problem-focused Coping. Participants completed a 52-item modified version of Carver, Scheier, and Weintraub's (1989) Dispositional Coping Inventory assessing problem-focused, avoidance, support-seeking, and emotion-focused subscales. This study analyzed four items in each of three subscales included in the problem-solving cluster of adaptive strategies: active coping, planning, and suppression of competing activities. Sample items included: "I think about how I might best handle the problem" and "I concentrate my efforts on doing something about the situation I am in". To indicate what they "*generally do or feel*" in response to stressful events, participants chose from a 4-point scale ranging from "*I usually don't do this at all*" (1) to "*I usually do this a lot*"(4). The responses reflect levels of a coping style which can potentially involve such strategies as planning, taking direct action, seeking assistance, screening

out other activities, or exercising restraint where appropriate (Carver et al., 1989). The internal level of reliability for the 12 problem-focused items in this study was acceptable, with a Cronbach's alpha of .86 (see Appendix G).

Perceived Control. Personal mastery and perceived constraints were measured using a 12-item scale developed by Lachman and Weaver (1998) to operationalize an individual's generalized sense of personal control. Both competency (self-efficacy in carrying out goals) and contingency (locus of control) contribute to the construct of perceived control (Pearlin & Schooler, 1978; Skinner, 1996). Participants were asked to respond to first person attitude statements such as "*I can do just about anything I really set my mind to*" and "*There is really no way I can solve all the problems I have*" by indicating to what extent they agree or disagree on a 7-point scale ranging from "*disagree strongly*" to "*agree strongly*" (see Appendix H). Higher scores indicate greater perceived control over the environment as reflected through stronger personal control beliefs. Estimates for internal consistency were found to be high for both personal mastery (.70) and perceived constraints (.86) by Lachman and Weaver (1998).

Positive Affect. This study used the ten positively valenced descriptive terms from *The Positive and Negative Affect Schedule* (PANAS) as a measure of positive affect (*interested, excited, strong, enthusiastic, proud, alert, determined, inspired, attentive, active*). Participants were asked to indicate to what extent they had experienced each of these particular emotions during the past few weeks on a 5-point scale ranging from "*very slightly or not at all*" to "*extremely*" (see Appendix I). Watson, Clark and Tellegen (1988) reported an internal consistency reliability (coefficient alpha) of .87 for the PANAS positive affect scale with the same time instructions as this study. They also demonstrated that the PANAS has a highly stable

test-retest reliability, indicating the strong dispositional or trait-like component of affect. Positive affect is not only part of the definition of healthy aging (Hudson, 1999), but has been found equal to happiness and life satisfaction as measures of subjective well-being in correlation with personality variables (DeNeve & Cooper, 1998).

Statistical Procedure

An integrated analysis strategy was planned, in which all relationships between variables of interest could be evaluated simultaneously within a single structural equation model. Assumptions of normality were met, and it was not necessary to transform any of the variables prior to data analysis. Structural equation modeling is an appropriate statistical tool for use with a population of this size, with any number of participants over 200 being considered a large sample (Kline, 2005). Its capacity to define the roles of mediating variables, which function as both outcomes and predictors, make it ideal for positioning need for cognition in the landscape of variables leading to life satisfaction in older adults.

The goals of this cross-sectional study were: a) to produce a well-fitting model demonstrating how demographic, cognitive, and personality variables predict positive affect, mediated by need for cognition, perceived control and behavioral variables reflecting action tendencies, and b) to examine how two motivational constructs, need for cognition and perceived control, impact positive affect differentially in this older adult sample. Regression equations for the conceptual model were specified and entered into the EQS software program, version 6.1 (Bentler, 1995). Parametric estimates were made using the maximum likelihood procedure to increase the probability that the data would fit the model as closely as possible. Interrelationships among variables were analyzed with covariance matrices.

Although a recursive, or uni-directional, structural equation model by itself is not evidence of causal directionality (Hoyle & Panter, 1995), we can infer linearity or additivity of effects. In this case, the analysis would allow not only a description of exogenous variables contributing to the constructs of need for cognition and perceived control, but also a portrait of the nature of potential relationships between the two motivational constructs and mediating behavioral orientations leading to positive affect in this sample of recently retired adults.

In terms of fit indices to be reported, this study conformed to guidelines suggested by Raykov, Tomer and Nesselroade (1991). Bentler and Bonnet's normative fit index (NFI) and non-normative fit index (NNFI) are descriptive fit indices which take into account model complexity as reflected in the degrees of freedom of the proposed model. Models with NFI and NNFI in the mid-.90s or higher are seen as representing reasonably good approximations to analyzed data. Values of the comparative fit index (CFI) close to 1 are also considered indicative of a reasonably well-fitting model. The root mean-square error of approximation (RMSEA) is among the test statistics least affected by sample size, since it also takes into account model complexity, and any value less than .05 indicates a good fit between the proposed model and observed data. A chi square (χ^2) statistic with a probability larger than .05 indicates that the proposed model fits the data well, and does not significantly differ from an exact reproduction of the sample matrix of observed variable relationship indices (Raykov and Marcoulides, 2006). Thus a low, but non-significant χ^2 is needed. Tabachnick and Fidell (2001) specify that another indication of a good-fitting model is when the ratio of the chi-square to the degrees of freedom (*df*) is less than two. Hoyle (1995) stresses the advantages, in any given set of data, of having an excellent fit

combined with multiple degrees of freedom, because such models are subjected to more conditions of disconfirmability, a necessary characteristic of objectivity in testing. Among models that fit equally well, preference is given to the most parsimonious, or least complex (Hull, Tedlie & Lahr, 1995; MacCallum, 1995).

Results

Descriptive Statistics

Measure means and standard deviations are reported in Table 1. The data show a group of relatively healthy, university-educated adults volunteered to participate in this study, although there is adequate variability in the sample to meet statistical assumptions for normality. Participants reported their personal annual income from all sources as being in one of 16 categories: from 1) less than $10,000 to 16) more than $150,000, specified in $10,000 increments. This scale was then collapsed into a seven part scale, where the lowest categories one and two were merged, categories three ($20,000-$29,000), four ($30,000 - $39,000), five ($40,000-$49,000), and six ($50,000-$59,000) remained, and the higher categories 8-16 were collapsed into a single category number seven due to the limited numbers of participants represented in them. The full range of the seven point scale was represented in this sample. The numeric average income from the 16 categories was 3.9, which places the average personal income on the border between categories four and five, as described, or $39,500 per year.

The group mean for need for cognition in this study was 61 (SD = 11.7, range 26-89) from a possible range of 18 to 90 with a midpoint of 54. This group's median score was 62, and the mode was 55. Although many other studies have used the 18-item need for cognition scale, a comparison of means across studies is hampered by the lack

Table 1

Univariate unstandardized means, standard deviations and ranges

	Mean	*SD*	Range
Age	60	5.2	44 - 79
Years of education	15	2.5	7 - 22
Health problems[a]	3.54	.60	1 - 4
Total illness[a]	3.84	3.5	0 - 22
Subjective health rating[a]	6.78	1.5	3 - 9
Digit symbol task[b]	54.5	10.47	20 - 87
Trailmaking test[b]	69.36	28.9	21 - 245
Vocabulary	25.6	3.1	8 - 30
Openness	29.7	5.6	9 - 45
Conscientiousness	36.2	5.8	14 - 48
Neuroticism	15.77	7.74	0 - 42
Need for cognition	61.0	11.7	26 - 89
Problem-focused coping	9.4	1.4	5 - 12
Cognitive activity	28.0	4.2	13 - 40
Perceived control	67.68	11.0	29 - 84
Positive affect	37.61	6.4	15 - 50

[a] components of the health index
[b] components of the non-verbal cognitive ability measure

of a standardized numbered Likert scaling system. Among other studies also using the 5-point Likert scale, Bailey (1997) reported an overall mean of 42.76 (SD = 10.82) for 77 part-time MBA students (mean age 28.2 years); Berzonsky and Sullivan (1992) reported a series of need for cognition means averaging 57.53 (standard deviations not reported) for female college students with an average age of 19 years (age range 18-21); Haugtvedt and Petty (1992) reported a group of "high" need for cognition undergraduates as having a mean score of 74 (range 64-85) and "low" need for cognition undergraduates with a mean score of 55 (range 35-63); Nair and Ramnarayan (2000) reported a need for cognition mean score of 65.77, with a range between 49-84 (SD = 8.92) in a sample of 44 company managers (mean age = 45, range 26-55 years); and Petty, Schumann, Richman and Strathman (1993) reported a need for cognition median score of 60 (range 27-82) in 137 undergraduate students. Caution is needed in comparing this study's need for cognition mean score with that of other samples due to differences between studies in methodological approach and data reporting.

Correlations Among Model Variables

Table 2 provides a zero-order correlation matrix of all standardized variables of theoretical consideration. For this sample of older adults, there were no significant correlations between need for cognition and the variables of age, gender, or health. Personal income showed a weak correlation with need for cognition (r = .17, p < .05) but did not meet the probability level required for inclusion in the path model. To keep the conceptual path model as parsimonious as possible, only the most highly significant (p <.001) standardized bivariate correlates between related variables were included (see Figure 1). This necessitated dropping fluid intelligence as an exogenous variable as its correlation with need for cognition (r = .19, p > .001) was too weak to meet the criterion

Table 2

Correlations among all variables (N =385)

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	Age	—														
2	Sex	-.07	—													
3	Education	.12*	-.01	—												
4	Health	-.13*	-.07	.00	—											
5	Personal Income	-.18**	-.19***	.23***	.13*	—										
6	Openness	-.05	.17**	.17*	-.04	-.02	—									
7	Conscientiousness	-.10	.03	.08	.23***	.11*	.01	—								
8	Neuroticism	.01	.15**	-.08	-.31***	-.24***	-.03	-.40***	—							
9	Fluid Intelligence	-.48***	.15**	.18**	.18**	.21**	.12*	.19**	-.13*	—						
10	Vocabulary	-.05	.11*	.38***	-.01	.15*	.32***	.07	-.16*	.27***	—					
11	Need for Cognition	-.06	-.03	.28***	.04	.17*	.45***	.20**	-.18**	.19**	.27***	—				
12	Cognitive Activity	- .02	.06	.15*	-.02	.01	.31***	.02	-.08	.13*	.13*	.28***	—			
13	Coping	-.01	.10*	.01	.08	.05	.13*	.28***	-.15*	.08	.03	.26***	.08	—		
14	Perceived Control	-.22**	-.05	.05	.37***	.15*	.11*	.25***	-.44***	.21**	.15*	.19**	.17*	.19**	—	
15	Positive Affect	-.02	.12*	.04	.32***	.00	.20**	.32***	-.22**	.14*	.08	.27***	.23***	.41***	.46***	—

*$p < .05$, **$p < .01$, ***$p < .001$

for inclusion. Since the correlation between education and need for cognition ($r = .28$, $p < .001$) was almost equal to the correlation between vocabulary and need for cognition ($r = .27$, $p < .001$), education was chosen as the representative measure of cognitive functioning for inclusion in the model, thereby limiting the number of exogenous variables to create an optimal balance between comprehensiveness and parsimony. Education emerged as a correlate of not just need for cognition, but also of vocabulary, $r = .38$, $p < .001$; fluid intelligence, $r = .18$, $p < .01$; personal income, $r = .23$, $p < .001$; openness, $r = .17$, $p < .05$; and frequency of cognitive activity, $r = .15$, $p < .05$.

Model Development

A progressive model examination process was used. The conceptual model was tested first to establish the goodness of fit between the reproduced relationships and the original data matrix. As shown in Figure 1, exogenous variables included in the initial conceptual model as indicators of need for cognition were education, conscientiousness, and openness. Exogenous variables specified as indicators of perceived control were neuroticism and health. Intervening variables were hypothesized as need for cognition and perceived control, as well as two relevant aspects of behavioral orientation: frequency of cognitive activity, and problem-focus coping. Positive affect was used as the outcome measure of subjective well-being. All possible co-variances between exogenous variables were specified. In this sample, 30 cases of the total 385 were eliminated from the program analysis due to missing data; the EQS software will perform testing only on cases with full data supplied for each variable.

Need for cognition and perceived control were not hypothesized to be related; neither the theoretical background nor their bivariate correlation ($r = .19$, $p > .001$) were

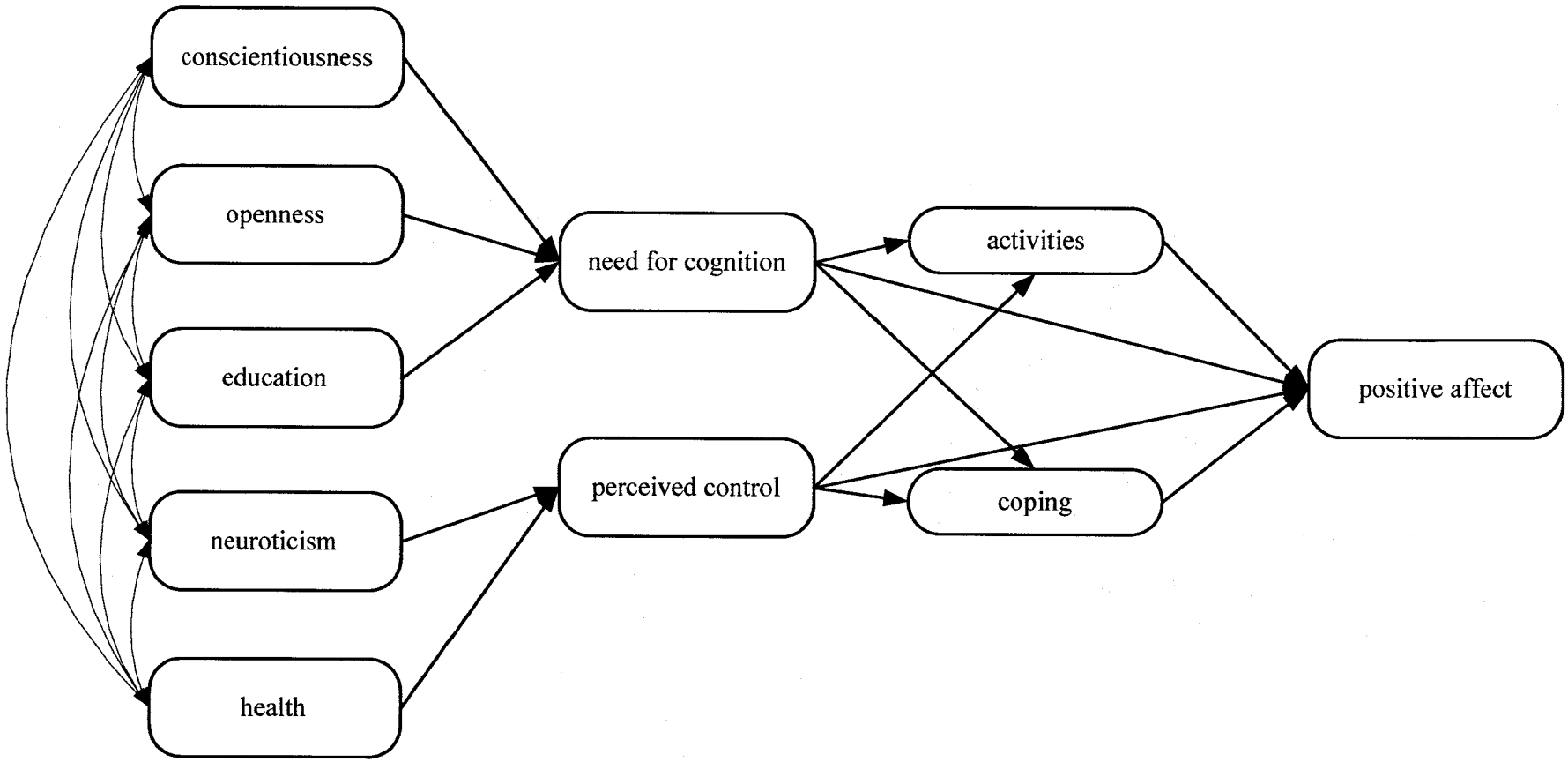

Figure 1. Conceptual model showing the position of need for cognition and perceived control as endogenous variables in a path to positive affect mediated by frequency of cognitive activity and problem-focus coping.

of sufficient strength to suggest a direct association between them. Nonetheless, to clarify their relationship, their respective error terms were specified as co-variants. EQS will not co-vary endogenous variables in a path analysis for observed, as opposed to latent variables, but covariance between the error terms of observed variables demonstrates shared variance between the constructs themselves (Bentler, 1995). There was no significant covariance between the error terms of need for cognition and perceived control.

Significant paths from education (path coefficient = .20), openness (.41), and conscientiousness (.19) to need for cognition emerged, validating the hypothesized importance of these predictor variables to need for cognition in this study. There were significant direct paths from need for cognition to cognitive activity (.25), problem-focus coping (.21), and positive affect (.10), as well as indirect paths from need for cognition through activity and coping to positive affect, confirming the centrality of this construct to the model. Neuroticism (-.36) and health (.25) were significant indicators of perceived control. All four hypothesized direct associations with positive affect produced significant path coefficients, the strongest being perceived control (.36) followed by problem-focus coping (.31). However, the specified path between perceived control and cognitive activity failed to reach significance.

The conceptual model produced a χ^2 (21, N = 355) = 73.86, $p < .001$, with a normed fit index (NFI) of .88, a non-normed fit index (NNFI) of .80, a comparative fit index (CFI) of .91, and a root mean-square error of approximation (RMSEA) of .08. Together, the variables in the model explained 32% of the variance in positive affect. All residuals were less than .10, as they should be. But overall, with low fit indices, and a high probability of significant difference between the matrices, this initial conceptual

model did not represent an adequate fit between the reproduced matrix and the observed matrix. The chi square/degrees of freedom ratio was 3.5, well above the recommended upper limit of 2. Modifications to the original hypothesized model were required.

Adjusting the model

To produce a better-fitting model, non-significant covariances between exogenous variables were removed, as recommended by the Wald test which evaluates the statistical effect of dropping free parameters from a model, thereby adding restrictions. Covariances remaining in the model were between conscientiousness and health, conscientiousness and neuroticism, openness and education, and neuroticism and health.

The Lagrange Multiplier test was used to determine which fixed or constrained parameters should become freely estimated, thus reducing restrictions on the model. It suggested the addition of a direct path between health and positive affect, as well as direct paths from conscientiousness to coping, cognitive activity, and positive affect. Paths from openness to both perceived control and cognitive activity were recommended. Additionally, an improved statistical model fit would include specification of relationships between neuroticism and need for cognition, as well as between health and cognitive activity. Since these suggested adjustments were theoretically plausible and interpretable, they were added to the model and tested for model-data fit.

The resulting adjusted model (see Figure 2) produced these test statistics: χ^2 (20, N = 355) = 17.65, p = 0.61, NFI = .97, NNFI = 1.00, CFI = 1.00, RMSEA = .00, and accounted for 36% of the variance in positive affect. The chi-square/*df* ratio for the

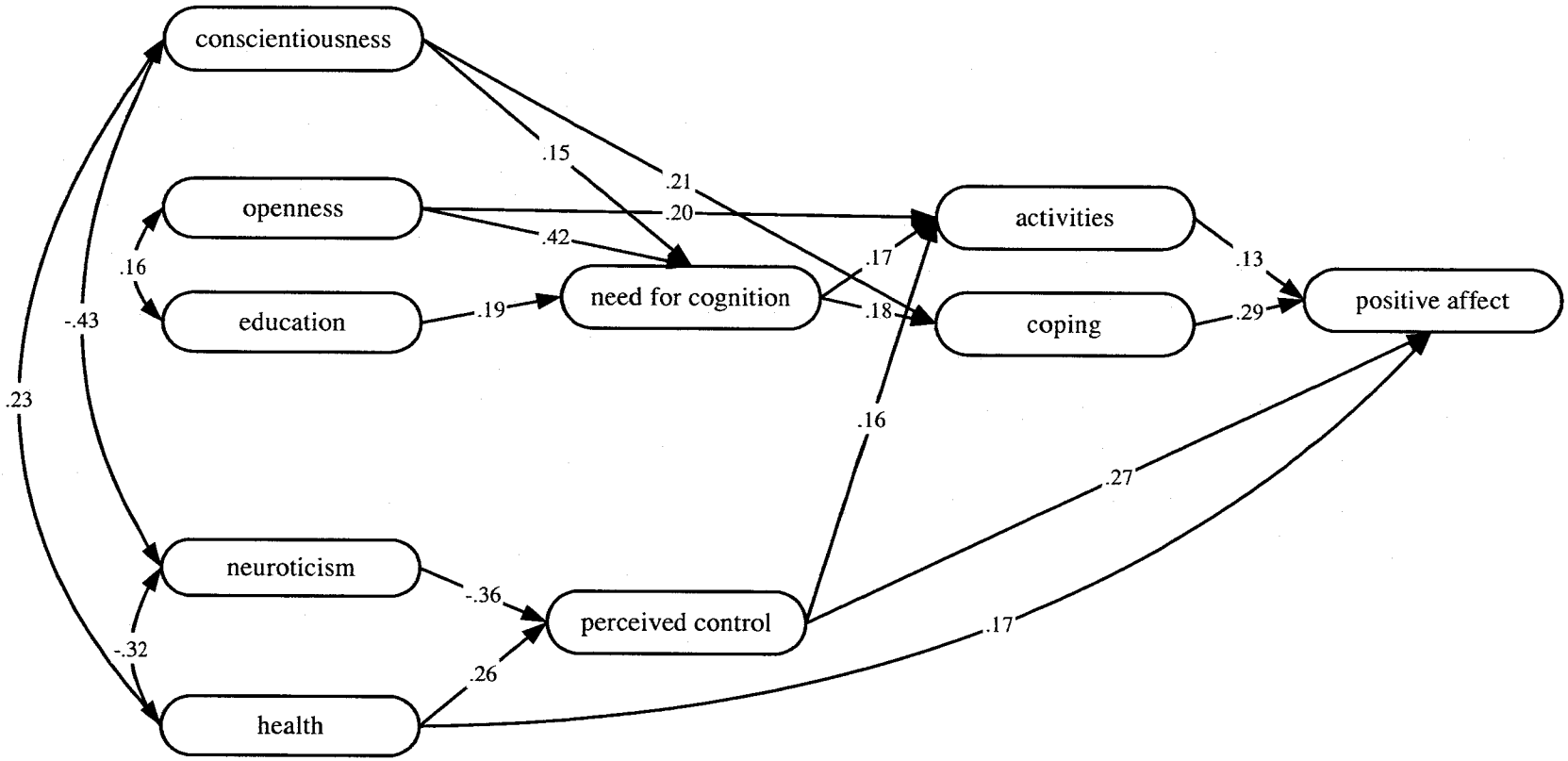

Figure 2. Adjusted model showing significant covariances and paths indicating the positions of need for cognition and perceived control as predictors of positive affect in recently retired adults.

adjusted model was an acceptable .88. A test of the significance of the difference in chi square values between the conceptual and the adjusted model resulted in a chi square value of 59.21, which exceeds the critical value of 10.83 at the .001 level of probability for 1 degree of freedom, showing that the adjusted model is significantly better than the originally proposed model. Accordingly, the adjusted model provides a best-fit description of need for cognition and perceived control in their respective relationships with variables leading to an outcome of positive affect, with partial support for the a priori relationships specified in the conceptual model.

Although the model strength was improved by the addition of paths between neuroticism and need for cognition (path coefficient = -.09), as well as health and cognitive activity (-.10), these paths do not meet the .05 probability level of significance. Likewise, direct paths between conscientiousness and cognitive activity (.06), conscientiousness and positive affect (.10), perceived control and coping (.09), and need for cognition and positive affect (.09) are non-significant in themselves, but their removal would weaken the model fit. For clarity, these non-significant paths, as well as the endogenous variable error terms (varying between .80 and .94), are not illustrated in Figure 2.

Both the conceptual and adjusted models demonstrate that the relation between need for cognition and positive affect is mediated by frequency of cognitive activity and problem-focus coping. Need for cognition remains significantly related to cognitive activity and problem-focus coping from the conceptual to the adjusted model, and both cognitive activity and problem-focus coping remain significant predictors of positive affect. Need for cognition itself also feeds directly into positive affect. If the direct association between need for cognition and positive affect is significantly reduced when

the two potential mediators are statistically controlled for, then mediation is said to exist (Baron & Kenny, 1986). To test whether or not cognitive activity and coping carry the influence of need for cognition through to positive affect, the Sobel test (Preacher & Hayes, 2004; Preacher & Leonardelli, n.d.) was performed two ways, firstly using the unstandardized coefficients and standard errors of these variables in a regression analysis, and secondly using the regression t-values. Each method yielded nearly identical results: cognitive activity produced a Sobel test statistic of 2.79 in both tests, $p < 0.01$; problem-focus coping showed a result of 4.38 using coefficients and standard errors, 4.48 using the *t*-values, $p < .001$. The Sobel two-tailed *z*-test is based on the assumption of normal distribution and hypothesizes that the mediated effect equals zero in the population; a significant score requires rejection of the null hypothesis, and indicates the presence of mediation. So, both frequency of cognitive activity and problem-focus coping qualify as mediating variables, showing how need for cognition produces positive affect through behavioral choices.

In summary, the conceptual path model hypothesized that need for cognition would be indicated by the exogenous variables of conscientiousness, openness, and education, and that perceived control would be predicted by health and neuroticism. These relationships remained unchanged between the a priori model and the adjusted model. In the adjusted model, health emerged in a direct significant path to positive affect (.18) as well as sustaining the predicted indirect path through perceived control to positive affect. The emergence of a strong direct path between perceived control and positive affect (.27) as opposed to a mediated relationship between perceived control and positive affect supported the hypothesis that perceived control would not follow the same pattern of associations between variables leading to positive affect as need for

cognition would. However, the path from perceived control to cognitive activity (.16) is almost as strong as the path from need for cognition to cognitive activity (.17).

Conscientiousness and openness branched into multiple unpredicted significant paths, collectively illustrating the ubiquitous effects of personality on individual difference variables. Conscientiousness emerged to be more strongly related to problem-focus coping (path coefficient = .21) than to need for cognition (.15). Conscientiousness also had a weak but significant path (.10) directly to positive affect (not shown in Figure 2 to simplify the presentation). There was a direct path between openness and cognitive activity (.20) in addition to the anticipated path between openness and need for cognition (.42). Openness was also an unexpected predictor of perceived control with a path coefficient of .11 ($p < .05$; also not shown on Figure 2). Clearly, these personality variables work through the model in a myriad of effective ways.

Education retained a constant relationship with need for cognition between models, with a path coefficient of .19 in both models. Also, the indirect paths from need for cognition through cognitive activity and problem-focus coping to positive affect remained stable through all adjustments.

These results show that need for cognition and perceived control contribute to positive affect in older adults through differing patterns and to differing degrees. Among the direct indicators of positive affect, problem-focus coping, a mediator for need for cognition, has the strongest direct path (.29), followed by perceived control (.27), health (.17), and cognitive activity (.13), another mediator of need for cognition.

Path modeling allowed the testing of chains of relationships between variables by adding or deleting paths guided by theoretical articulations, information from the

correlation matrix, and various statistical indices and tools generated by the data analysis itself. To determine how much of the variance in the outcome measure of positive affect was attributable to need for cognition's mediated pathway, and how much to perceived control's direct path, the paths between perceived control and cognitive activities, perceived control and positive affect, and health and positive affect were fixed to zero. Without the effects of these three variables in the model, the R^2 value decreased from .36 to .24, indicating that 24% of the variance in positive affect was attributable to the need for cognition pathways alone. With perceived control, neuroticism and health in the model, only an additional 12% of the variance in our outcome measure was explained. This indicates the comparative strength of need for cognition and its behavioural mediators in producing positive affect in older adults.

Discussion

This study is the first to link need for cognition to the subjective well-being of adults in transition to retirement by demonstrating the importance of cognitive motivation to this major life event. The hypothesized relationships between conscientiousness, openness, education, need for cognition, cognitive activity, problem-focused coping and positive affect contributed to a well-fitting model, confirming their combined theoretical strength. The measures of non-verbal or fluid intelligence used in this study, however, did not correlate highly enough with need for cognition to be included in the path model analysis, a finding which is consistent with Cacioppo and colleagues' (1996) emphasis on the stochastic independence between cognitive ability and cognitive motivation. Additional unexpected direct paths emerged from openness to cognitive activity, and from conscientiousness to problem-focus coping, which

complement the model and elucidate the supportive role of these personality variables in quality of life for older adults.

In terms of the second hypothesis, need for cognition contributed significantly to both frequency of cognitive activity and problem-focus coping, which each then contributed significantly to positive affect. The direct path between need for cognition and positive affect was reduced to non-significance by the effects of cognitive activity and problem-focus coping in the adjusted model, in accord with the functional dynamics of mediation. This illustrates *how* the motivational role of need for cognition influences behavioural choices leading to positive affect in recently retired adults, and supports the traditional description of not just "having" a personality disposition but also "doing" something with it (Cantor & Sanderson, 1999). The practical value of need for cognition in the everyday life of older adults lies in its motivation to both reasoned and committed action.

A second general goal of this study was to provide a comparative demonstration of need for cognition and perceived control as separate, unrelated paths to positive affect. Specifically, the third hypothesis was confirmed: health and neuroticism did have significant paths to perceived control, although health also emerged in an independent path directly to positive affect. The fourth hypothesis, that the relationship between need for cognition and positive affect would not be related to the same degree by the same variables as the relationship between perceived control and positive affect, also received support. Although perceived control predicted frequency of cognitive activity (but not problem-focus coping) almost as much as need for cognition did, the statistical mediation between need for cognition and positive affect through cognitive activity and problem-focus coping was not replicated for perceived control and positive affect.

Instead, perceived control had a strong direct relationship with positive affect in addition to an indirect relationship mediated by frequency of cognitive activities. Overall, the path model explained 36% of the variance in positive affect, two thirds of that driven by the particular pattern of personality and volitional behaviours operationalized as need for cognition.

Openness and Conscientiousness

In their 1996 literature review of over 100 empirical studies on individual differences in need for cognition, Cacioppo and colleagues suggested that need for cognition could be considered a component of the openness superfactor in the five-factor model of personality structure. They further speculated that the agentic qualities of conscientiousness imply its possible association with need for cognition. They posed the research question of which taxonomic framework best accommodates need for cognition, either one of the two personality superfactors, or "a distinct process-based dimensional component" (p.246) of an alternative category. The present study has modeled need for cognition as a unique constellation of individual differences in approach behaviour for people who enjoy cognitive challenge. Openness and conscientiousness both contribute strongly at multiple levels of the process from dispositional motivation to specific actions resulting in positive outcomes. Both personality traits are antecedent to need for cognition, then openness has a direct path to cognitive activity and conscientiousness has a direct path to problem-focus coping. These paths are supplementary to the mediating effects of cognitive activity and problem-focus coping between need for cognition and positive affect. This suggests that there are facets of both openness and conscientiousness which are represented

independently at different points in the process, contributing to the construct of need for cognition in distinct ways.

Paunonen and Ashton (2001) compared specific lower level trait measures to the more commonly used higher level factor measures of conscientiousness and openness in the prediction of undergraduate course grades. A need for high levels of achievement was compared with conscientiousness, and a need for understanding, or an intellectual curiosity about knowledge much like need for cognition, was compared with openness. In both cases, the narrow personality facet was a better predictor of final outcome than the broadband factor was, especially in the case of need for understanding (r =.23, p <.001) as compared with openness (r = -.04, *ns*). Also, the sum of the two narrow traits (achievement plus need for understanding) correlated significantly higher (r = .31, p <.001) with final grades than did the sum of conscientiousness and openness (r = .15, p < .001). These results provide an argument for the further examination of exactly which facets of openness and conscientiousness impact which levels in the paths from need for cognition to positive affect for older adults, each of whom balances a unique set of choices and constraints in their daily lives.

Recombining Facets

Similarly, Consedine, Magai, and King (2004) measured specific facets of the broad index of positive affect in older adults, and found that trait joy had functionally different relationships with predictors and outcomes than trait interest did. These authors found that although interest and joy are both aspects of the frequently used outcome measure of positive affect, they cannot be exchanged with each other in the prediction of specific behaviours, nor do they necessarily covary in all situations. Shared variance between any set of narrow facets, causing them to be collectively

categorized, may obscure their valuable independent contributions to a given psychological process at a particular point in the lifespan. Deconstruction of a global category can be useful in identifying how narrow personality facets or emotion traits may play differing roles in developmental stages. Costa and McCrae (1995), whose personality inventory has been used in this study, have meticulously delineated six specific facet scales within each of the five domains (neuroticism, extraversion, agreeableness, conscientiousness, and openness) in their model. They support the idea of facet analysis in conjunction with the domain approach if the facets can be reasonably re-combined to explain or predict specific attitudes and behaviours in individuals over time. In their literature, they discuss how personality domains can be overlapping, with some traits loading onto more than one factor, or how some individual facets may be more central to their factor than others. The example is provided of how the facets of "openness to aesthetics" and "openness to ideas" might be seen as more central to the openness domain than the "openness to fantasy" or "openness to values" facets. Berzonsky and Sullivan (1992) found that the openness to ideas subscale correlated most highly with need for cognition ($r = .78$, $p < .01$). In general common usage, a factor is known by its strongest loading variables. To dissect any of the well-used and well-understood personality factors and re-combine their facets into a new construct, researchers must have a clear theoretical position and replicated data. Any meaningful re-specification of facets should provide us with more information than previously existed.

Need for cognition meets these criteria. Its particular combination of facets of openness and conscientiousness, as applied through action and affect, produce a unique dispositional orientation, stable over time, and with developmental implications. In this

study, the strongest path coefficient in the model is between openness and need for cognition, supplemented by the direct paths from conscientiousness and education to need for cognition. These results are consistent with both Cacioppo et al.'s (1996) findings and the five factor model. As an example of how factors can interact to enrich the study of personality, McCrae and John (1992) describe a potential dynamic between openness and conscientiousness which aptly defines part of the need for cognition dynamic reflected in this study's model. By combining the intrinsic curiosity of openness with the self-discipline of conscientiousness, an individual can turn what would otherwise be a temporary idle interest into a sustained pursuit of active learning. This is the essence of need for cognition and its applied value in everyday life.

Future refinements in the measurement of personality would strengthen our understanding of how it contributes to major life outcomes. Past studies have tended to report levels of extraversion and neuroticism as the two most robust personality predictors or correlates of subjective well-being (Diener, Sandvik, Pavot & Fujita,1992; Tkach & Lyubomirsky, 2006: Updegraff, Gable & Taylor, 2004). Conscientiousness in older adults has been associated with health or longevity (Wilson, Mendes de Leon, Bienias, Evans & Bennett, 2004), and DeNeve and Cooper (1998) reported conscientiousness as the strongest positive correlate (among the Big Five) of life satisfaction in their meta-analysis of personality factors related to subjective well-being. They found openness, in conjunction with other cognitive variables, to be largely irrelevant to subjective well-being. Yet, as this study demonstrates, positive affect in older adults is well served by facets of both openness and conscientiousness mediated by activity and coping. Openness acquires powerful support from the specific synthesis of variables uniquely proportioned in the construct of need for cognition. Future studies

with older adults might similarly benefit from consideration of these personality variables as instrumental rather than direct predictors of adaptive behaviours in older adults.

Education

Education's significant correlations with vocabulary, fluid intelligence, personal income, openness, and frequency of cognitive activity indicate that it brings a rich mixture of variance to the path model, with qualitative implications beyond number of years of formal academic achievement. Cacioppo et al. (1996) and others have documented correlations between education and need for cognition comparable to that found in this study, and have noted the difficulty in interpreting direction of effects or untangling the ever present potential confound of intelligence from motivation in the discussion of education. However, since older adults who are high in need for cognition chronically and actively pursue information on a range of topics requiring effortful information processing, we can conclude that their intrinsic motivation to learn would have attracted them to educational opportunities which in turn would reinforce and help maintain need for cognition. The persistence aspect of need for cognition, possibly explained by conscientiousness, would have served these individuals well in the academic setting. So, need for cognition and education make a compatible trait-context fit. Education is also highly valued by our participants. When asked to write down their most severe life regret, more than 18% of the older adults in our sample reported wishing they had pursued a higher education level. This is a replication of previous findings by other North American researchers (Roese & Summerville, 2005), who explained their results by demonstrating a link between severity of regret and level of perceived opportunity to address it.

Education brings a dimension to need for cognition which is not explained by personality alone. Education is neither necessary nor sufficient for openness (McCrae & Costa, 1997), nor, in fact, are having a high IQ, being wise, logical or farsighted (McCrae & John, 1992). Distinct from the dispositional, the path from education to need for cognition in our model may also represent both cognitive capacity and motivation to learn, the practical components of the construct. Cacioppo et al. (1996) write that "individuals high in need for cognition are more likely to seek out, attend to, and think about the data that make up their world than individuals low in need for cognition" (p. 243). Thus it is likely that those with higher levels of need for cognition as a trait would have actively pursued opportunities for education, enjoyed the ensuing challenges, and benefited from the experience. Education may also have provided relevant skills that make need for cognition more effective and satisfying to participants, creating larger cognitive schemas with which to interpret information. Those with lower levels of need for cognition would have been less likely to actively approach academic programs, and more likely to regret their lack of dispositional motivation to do so later in life. Level of cognitive competence would be less relevant to this scenario than intrinsic motivation to learn.

Educational achievement assumes a certain level of cognitive competence, but its most useful contribution to lifespan development would be its nurturance of an approach attitude to knowledge acquisition. In a study of older adults, Stuart-Hamilton and McDonald (2001) found that need for cognition correlated significantly with traditional measures of fluid intelligence, indicating that both cognitive ability and attitudes toward intellectual activity work together for individuals who maintain cognitively active lives. With our participants, vocabulary correlated more highly with

education than fluid intelligence did, suggesting that crystallized intelligence, or accumulated knowledge, has a stronger relationship with cognitive motivation in older adults than abstract ability does. Finding such a clear distinction between the two types of intellectual abilities in our sample is supportive of Baltes & Baltes' (1990) proposition that knowledge-based cognitive pragmatics can compensate for the losses in cognitive mechanics, or fluid intelligence, documented in older populations. This confirms the utility of a dispositional motivation to enjoy effortful cognitive activity for older adults in particular.

Need for Cognition in Action

The path model produced by this study shows that both frequency of cognitive activity and problem-focus coping are necessary mediators between need for cognition and positive affect. The dispositional, cognitive, and motivational properties of need for cognition are transformed through behavioural choices into actions with intrinsic positive value, or which result in a positive emotional outcome. Activity engagement has been repeatedly associated with subjective well-being in older adults (Rousseau, Pushkar & Reis, 2005; Rousseau & Vallerand, 2007). Peterson, Park and Seligman (2005) found that engagement correlated more highly with both life satisfaction and meaning than pleasure did. In explaining how engagement differs from either hedonism or eudemonia, they described how the experience of flow, or the psychological state accompanying a highly engaging activity, is itself non-emotional, but is followed by positive affect. Such a distinction between engagement and pleasure is important to the process illustrated by our path model. Pleasant anticipation precedes the activity; then enjoyment follows absorption in the cognitive task. Cacioppo and colleagues (1996) were unable to find a direct correlation between need for cognition and various

measures of "emotionality", but they presented clear evidence that the higher the need for cognition, the higher the intrinsic motivation to engage in effortful cognitive activities.

Activities must be not only compatible with the individual's disposition and personal taste (Timmer & Aartsen, 2003), but also freely chosen, meaningful, and committed. Cantor and Sanderson (1999, p.230) explain how "the strength of the link between participation and well-being depends on the specific tasks on which the individuals are working". For those who are high in need for cognition, cognitively challenging tasks are preferred. For instance, Cacioppo et al's (1996) meta-analysis reported studies indicating that participants high, as opposed to low, in need for cognition were more likely to use the media for information gathering and for researching new products. A recent example of the benefits of media usage by older adults found that participants who actively acquired illness information through reading targeted material were twice as likely to engage in regular exercise (Chou & Wister, 2005). Such intentional self-development leads to a sense of personal control and well-being (Brandtstadter, 1998), both assets during times of lifestyle transition. Sheldon and Lyubomirsky (2004) present a model of happiness, 40% of which is theorized to be determined by intentional activities, or intentional and effortful cognitive, behavioural, or volitional practices. Our study has made the compatible finding that intentional activities mediate the dispositional motivation of need for cognition and positive affect.

Everyday Creativity as a Coping Tool

The second mediating variable between need for cognition and positive affect in our path model is problem-focus coping. With this variable, decision-making strategies combine with information searching to find solutions to stressful problems in everyday

life. This model shows that need for cognition, as a trait, is predictive of problem-focus coping in our sample of recently retired adults. Verplanken (1993) reported that individuals high in need for cognition showed a different pattern of organizing and structuring decision-making than individuals low in need for cognition. In combination with our findings, this may indicate that need for cognition is advantageously positioned as a tool for developmental adjustment in later adulthood.

It is in the mediating role of problem-focus coping that everyday creativity finds expression in the need for cognition process. Building on skills and knowledge developed over decades of being dispositionally receptive to information, the individual high in need for cognition is optimally positioned to find original and appropriate ways to respond to the challenges of a major life transition (cf. Simonton, 2000). Creative cognition in normal living conditions is a practical application of need for cognition, another expression of not just "having" personality and motivation but "doing" something with these traits, not just "adapting" to the environment, but actually "shaping" it for optimal outcome. Linking old ideas in a new way, reconstructing existing patterns of behaviour into more currently appropriate combinations, or synthesizing previously disparate viewpoints are all creative coping techniques consistent with problem-solving coping.

When building the need for cognition questionnaire, Cacioppo and Petty (1982) used differing test populations to generate a set of items designed to be useful in identifying inter-individual differences in diverse and broad settings. This makes their scale an ideal measurement tool for use with older adults in heterogeneous situations since its measurement of intrinsic motivation for effortful cognitive processing is context-free. The need for cognition scale is more than a diagnostic test for intrinsically-

motivated students or creative employees, it is an indicator of a motivational asset with full lifespan value. The inquisitive spirit of a great-grandmother is as usefully adaptive as the exploratory behaviour of a healthy child, as studies linking curiosity in 70-year-olds to greater survival rates have shown (Swan and Carmelli, 1996). Costa and McCrae (1995) remark in their discussion of clinical applications that it is at the specific facet level of personality that the treatment to person match is likely to be optimal. This study's path model demonstrates how Cacioppo and Petty's construct of need for cognition has unique explanatory power for a group of people in an ill-defined context.

Many of the participants in our study are just beginning a stage of older adulthood which is an extension of middle age, marked by freedom from fulltime employment, but also by many continued responsibilities. The path model demonstrates that participants with need for cognition use problem-focus coping techniques similar to the primary control strategies theorized to be more typical of use at younger ages (Wrosch et al., 2000). For individuals not yet experiencing the losses more typical of later life stages, we would expect to find that need for cognition manifests in persistent and effortful striving to control their environment. Whether individuals high, as opposed to low, in need for cognition will continue to use primarily problem-focus coping techniques as they move through further transitions over the remaining decades of their lives remains to be measured. It may be that retention of an inherent disposition to enjoy effortful cognitive activities as applied to the problems of everyday life will optimize the individual's choice of coping or control strategies for longer periods.

Aspinwall and Taylor (1997) report that cognitive coping is ineffective unless accompanied by specific actions, but it is consistently associated with positive emotional adjustment when activities are regularly present. Pushkar and colleagues

(1997) have shown that performance of activities facilitates the retention of competence in older adults. Also, a personal history of anticipatory coping will have already produced benefits for the recently retired individual high in need for cognition. Individuals who are high in need for cognition will use anticipatory thinking prior to major events, while those low in need for cognition are more likely to postpone cognitive activity until forced to (Cacioppo et al., 1996). Mutran, Reitzes and Fernandez (1997) reported that workers who were more active in their retirement planning were more positive about their retirement experience two years later. A proactive approach to an upcoming life transition predicts later satisfaction with results. This is a context-specific example of the dynamic in the need for cognition model leading to positive affect in young-old adults. Active behavioural coping may either initiate or reinforce a positive outlook. According to Brandtstadter (1998), activities have a reflexive relationship with the acting individuals themselves, and this cycle between intentional self-development and the developing self continues to be relevant and useful to older adults.

Motivation to broaden-and-build

There are several additional ways in which this model of need for cognition contributing to positive affect can be seen as self-reinforcing. Although this statistical model is recursive, or unidirectional, since it is based on correlation and covariance matrices, we can only claim associations, not causality, between variables. But to some degree, the relationships between variables may be bi-directional. In terms of activities leading to positive affect, for example, we want to do things we value, and we then value what we do. Activities and problem-focus coping strategies that result in positive affect increase the chances of future approach behaviours to environmental tasks and

challenges. Need for cognition provides the initial impetus, then a perpetual motion between actions and positive affect sustains ongoing interest and well-being. Openness, defined by McCrae and Costa (1997, p.826) as "the recurrent need to enlarge and examine experience" finds active expression in individuals high in need for cognition.

This study's need for cognition model is functionally similar to Fredrickson's (1998) broaden-and-build theory of positive emotions, which states that positive emotions can broaden an individual's momentary cognitive-action repertoire, which in turn can help to build enduring personal resources. Empirical evidence has shown that people experiencing positive emotions such as amusement or contentment exhibit broader scopes of attention and thought than do people experiencing no particular emotion (Fredrickson & Branigan, 2005). Positive emotions and broad-minded coping influence one another reciprocally (Fredrickson & Joiner, 2002), creating a mounting spiral of emotional well-being and building psychological resilience. As theoretical background to her studies, Fredrickson (2003) describes the work of Isen and colleagues which showed that positive affect was linked with creative, integrative and flexible thinking as well as openness to information. This study's model connecting need for cognition with positive affect, mediated by volitional behaviours, illustrates a level on which the reciprocal momentum between positive emotions and cognition takes motivation into account. It is also consistent with Cacioppo and colleague's (1996, p.236) report that "for individuals high in need for cognition, the more positive their mood, the more positive their thoughts, and the more positive their thoughts, the more positive their attitudes." For individuals low in need for cognition, thoughts did not mediate between mood and attitude.

Engagement with life through activities, proactive coping, and an accompanying sense of meaning is under an individual's deliberate control (Brandtstadter, 1998; Peterson et al., 2005). Personality remains fairly intractable, but intentional behaviours can be modified (Tkach & Lyubomirsky, 2006). Goff's (1993) research demonstrates that creativity in older adults (mean age 70, range 51-89), which may have been lying submerged or dormant, can be increased through interventions at the level of activity. This study proposes that an optimal time to exercise self-directed growth in older adults is at a younger mean age (i.e. 60 years) or at the point of retirement from fulltime occupation in the institutionalized workplace. By this stage of late middle-age, the individual may be freed of some of the practical constraints typical of early and middle adulthood, but not yet challenged by the health and social losses which may shift the balance from primary to secondary control strategies. Patterns of creative approach behaviour cultivated now will broaden the individual's resources for use in later stages of adult development. From the point of view of meeting researchers' preconditions for the development of raw creativity, which include diversified and challenging experiences in an ill-defined environment, and a sense of marginalization from mainstream society (Csikszentmihalyi, 1996; Simonton, 2000), the early retirement years are an optimal time to exercise need for cognition.

Need for Cognition and Perceived Control

The results of this study show that need for cognition and perceived control function differently and independently as motivational constructs. Perceived control had a strong direct path to positive affect, while need for cognition followed what McCrae and Costa (1991) have called an instrumental causal sequence, or a trait-behaviour-affect linkage. Additionally, not only was the bivariate correlation between need for

cognition and perceived control very weak, there was no significant covariance between their error terms, indicating a lack of shared variance between these two variables in the path model. Finally, they contribute differing amounts of variance to the outcome measure of positive affect; in this model, the need for cognition pathways contribute twice the effect size of perceived control and health combined.

There was an additional indirect path from perceived control to positive affect through frequency of cognitive activities. A sense of competence or personal mastery would serve as motivation for participation in cognitive activities. It has been shown that demonstrating ability by reaching achievement goals enhances intrinsic motivation for participants high in achievement orientation, whereas developing skills in the effort to achieve mastery goals enhances intrinsic motivation among participants low in achievement orientation (Cacioppo et al., 1996; Haracjiewicz & Elliot, 1993). Activities are useful whether an individual is trying to develop, attain, or demonstrate competence, thus relating perceived control to frequency of cognitive activity.

However, problem-focus coping did not mediate between perceived control and positive affect as it did with need for cognition. Problem-focus coping requires effortful cognitive attention, the distinguishing feature of need for cognition, but not a necessary component of perceived control. Implicit to need for cognition is an intrinsic reward in engagement with cognitive challenge; perceived control is less specific in its expression. Cacioppo and colleagues (1996) speculate that need for cognition may develop as a means of achieving forms of environmental mastery for those who have a high need to do so, and who have the necessary skills. Once enjoyment is embedded in the effort, it is no longer just control motivation, but has developed into need for cognition. Other means may fulfill a need for control, for example, individuals low in

need for cognition will more readily rely on other people, on advertised messages, or on simply guessing to solve problems.

In research with older adults, Arbuckle, Pushkar, Chaikelson and Andres (1999) examined how health outcomes were affected by coping and control processes. Locus of control did not significantly correlate with cognitive, behavioural, or avoidance coping in their data. Similarly, Wurm, Tesch-Romer and Tomasik (2007) found that aging-related cognitions had an independent impact on health changes when control beliefs were partialled out, illustrating an additional functional differentiation between cognitive and control motivation.

Thompson, Chaiken and Hazlewood (1993) examined the relationship between need for cognition and desire for control to see how these two constructs would interact with intrinsic and extrinsic motivation for cognitive tasks in undergraduate students. They found that need for cognition works best in conditions with minimal extrinsic incentives, independent of desire for control, but that the presence of desire for control may be causal to the undermining effects of extrinsic motivation on task performance in individuals with high need for cognition. Extrinsic rewards for information processing attenuate the predictive ability of need for cognition, probably through an overlap in motive with desire for control. And finally, in their examination of associations between productive activities and mastery beliefs in older adults, Timmer and Aartsen (2003) found that control beliefs themselves were not a precondition for participation in education or volunteering. Instead, a sense of cognitive self-efficacy and persistence, elements of need for cognition, were relevant. Such past research examples confirm the findings of this study, in that perceived control and need for cognition may share

variance under some circumstances, such as general motivation to participate in certain activities, but they are essentially two very different orientations.

Limitations and Future Research

Since this is the first study to position need for cognition as a character strength of particular use to adults facing a new frontier in aging, it acknowledges several limitations and raises many questions for future study. First, the cross-sectional design of this study prevents the separation of age from cohort effects and places limits on our ability to infer or generalize from the findings. A longitudinal study would allow predictions of change over time which are of particular interest in the study of aging. Specifically, it would be interesting to see if we could replicate the same pattern of variables as we found in this study with the same participants after they have been retired for a longer period of time.

Second, structural equation modeling is based on correlational and covariance matrices, and as such, the results cannot be described in terms of causality. Since structural equation models are sensitive only to linear relationships, interaction effects between variables cannot be discerned with this method (Klem, 2002). While path modeling has allowed a description of the variables based on their theorized relationships, it must be remembered that this is just a not-disconfirmed model, since other unexamined models might fit the data as well or better. In other words, the interpretation of this study's findings is open to challenge on both statistical and theoretical grounds. Future studies are needed to replicate the findings using alternative methods of statistical analysis. More refined and extensive methods could allow findings of directionality and interaction, thus providing a more accurate and detailed

mapping of the construct of need for cognition and its relationship to other motivational constructs.

Third, we have no way of knowing how typical our volunteer participants are of adults entering their early retirement years. Sources of recruitment limited our sample to English and French-speaking participants who live within travelling distance of our university lab, and who must be sufficiently mobile and motivated to come in for several hours of supervised tasks. Although our sample meets all assumptions for normal distribution in each demographic category, nevertheless individual participants may be self-selected for high functioning and even for high need for cognition since people with higher levels of previous education or cognitively challenging former employment are more likely to feel comfortable entering the university environment to participate. Future studies on need for cognition in older adults might consider sampling and testing in community settings. Replication of this or similar studies in other cultural populations would also be informative.

A fourth limitation is related to the implicit biases of self-report measures. Individuals cannot always be relied on to understand each questionnaire item, and their responses may not necessarily contribute to the anticipated internal validity of the measure, despite the proven extensive psychometric reliability of a given measure. Objective behavioural measures might contribute to our understanding of the dynamic workings of need for cognition in older adults. For example, the experience sampling method might be a useful measurement tool in this context.

Finally, this study explains 36%, or a modest amount, of the variance in positive affect. This is a respectable result considering the specificity of the predictor and the scope of the outcome measure of positive affect. However, there are many alternative

ways to measure subjective well-being which could be considered. In future, consideration might be given to using a hedonic balance, or ratio, of positive to negative affect, or perhaps a combination of life satisfaction and emotion measures.

Overall, a replication of this study would benefit from both conceptual and methodological refinements. Questions remain unanswered about the types of cognitive skills available to older adults at various stages, and how these would interact with need for cognition as an adaptive tool. There is work to be done examining patterns of personality facets and how they might be used as predictors of behavior across the lifespan. It would be interesting to create a high/low need for cognition split and examine the differences in activity levels from participant-generated lists rather than questionnaire categories. After controlling for income and education, would we find that the information-seeking older individual high in need for cognition is more likely to own a computer and use it frequently than a cohort member who is low in need for cognition? Placing study participants on a need for cognition continuum would allow comparative tests of the effects of age, personality, activities, coping and subjective well-being with the motivational construct. Finally, even though health did not correlate with need for cognition in this sample at this point in time, there are theoretical questions about whether or not need for cognition could predict health-related behaviours or beneficial coping styles for these participants in the future. It has been demonstrated that with increasing age, cognitive coping strategies are more adaptive than behavioural coping (Arbuckle et al., 1999). Perhaps the same protective potential in need for cognition could also be examined in populations threatened with physical handicaps or disabilities distinct from age-related declines.

Conclusion

This study extends previous research by demonstrating how need for cognition functions as a character strength with unique predictive value for adults experiencing a major life transition. Frequency of cognitive activity and problem-focus coping emerge as important mediators between need for cognition and positive affect. The motivational value of need for cognition is shown to be distinct from that of perceived control, and to account for the majority of variance in positive affect in this model. Information seeking, curiosity, and everyday creativity not only form the primary dispositional components of an engaged lifestyle, they help broaden ways of thinking and build enduring coping resources through positive affect in older adults.

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Appendix A
Demographic Information

Date _____

1. What is your sex? Male _____ Female _____
2. What is your date of birth? Year _____ Month _____

   Date _____
3. What is your age? _____
4. What is the highest level of education you have completed? (please circle that which corresponds best)

Primary School :	1	2	3	4	5	6
Secondary School :	7	8	9	10	11	12
CEGEP/College :	Diploma					
University :	Bachelor's		Master's		Doctorate	

   Other (please indicate what, how many years)

   _____
5. What was your occupation?

   _____
6. When did you retire? Year _____ Month _____

   Date _____
7. How many years were you employed?

   _____
8. Do you receive a pension from your employer? Yes _____ No _____

9. At the time of your retirement, what was your annual salary?

_____

10. What is your present annual income (include all sources, e.g. RRSP's, etc.)?

_____

11. What is your total family income from all sources?

_____

12. Compared to other people of your age that you know, how would you rate your financial situation? (please circle the corresponding number)

    a. A lot worse than most
    b. Worse than most
    c. A little worse than most
    d. About the same as most
    e. A little better than most
    f. Better than most
    g. A lot better than most

13. What languages do you speak?

    French _____

    English _____

    Other (please specify): _____

14. What languages do you read and write?

    French _____

    English _____

    Other (please specify): _____

15. What is your civil status?

Married _____

Single _____

Divorced _____

Widowed _____

Common-Law _____

16. How many times have you been married? _____

17. Do you have children? Yes_____ No _____

18. If yes, how many girls? _____ How many boys? _____

19. Who do you live with?

Alone _____

Spouse _____

Brother/Sister _____

Friend _____

Child(ren) _____

Other (please specify) : _____

20. How did you find out about this study?

_____

Appendix B

CONSENT FORM

This is to state that I, _____, agree to participate in the study on retirement being conducted by Drs Pushkar, Conway, Li and Wrosch from the Centre for Research in Human Development and the Department of Psychology at Concordia University.

I have been informed that:

1. My participation in this study entails my completing a battery of questionnaires, including questionnaires about the activities I do, my physical health, as well as about various life domains including my well-being, memory, cognition and my attitudes.

2. All information about me or any other person will remain completely confidential. Results from this study will be accessible only to the researchers involved in this study. They will be able to use the information for scientific purposes, such as for publications in scientific journals or presentations at scientific conferences, as long as I cannot be identified as a participant in this study.

3. I am free to withdraw my consent and discontinue my participation at anytime without negative consequences.

4. This interview should last approximately four hours. I will receive a monetary compensation of $50 for the four hours.

5. Because this study is a longitudinal study, I may be contacted again for an annual interview in 2006, 2007 and 2008. Each annual interview will last approximately four hours. I will receive $50 for each annual interview in which I will take part.

6. I will receive a copy of the general results as they become available if I have indicated my name and address on the previous page.

7. I understand the purpose of this study; I know that there is no deception involved.

8. The person in charge of this study is Dr. Dolores Pushkar. She can be reached at (514) 848.2424, extension 7540, e-mail: retraite@alcor.concordia.ca

I HAVE CAREFULLY STUDIED THE ABOVE AND UNDERSTAND THIS AGREEMENT. I FREELY CONSENT AND VOLUNTARILY AGREE TO PARTICIPATE IN THIS STUDY.

Name (please print) _____

Signature _____

Date _____

Witness _____

If at any time you have questions about your rights as a research participant, please contact Adela Reid, Research Ethics and Compliance Officer, Concordia University, at (514) 848-2424, extension 7481 or by email at areid@alcor.concordia.ca.

Appendix C

ID# _____

Vocabulary

Carefully read the word in capital letters at the beginning of each line. Then read the four words or phrases that follow it and draw a line under the word or phrase that matches it best.

Here are a few examples:

1. DOG	tree	highway	animal	flag
2. GUN	for writing	for swimming	for fishing	for shooting
3. FAST	quick	heavy	ready	soft
4. SAILOR	policeman	seaman	milkman	truck-driver
5. PUDDLE	large house	sharp knife	pool of water	bright light

turn the page to continue

1. CHEESE	money	hat	house	food
2. BLONDE	dark-haired	weak-minded	quick-tempered	fair-haired
3. CLOAK	noise	joy	dress	help
4. FUEL	for eating	for walking	for burning	for opening
5. CYCLONE	storm	wheel	drug	giant
6. TONSIL	machine	on the road	in the mouth	weight
7. JESTER	butcher	joker	jeweller	grumbler
8. FRACTURE	force	break	fall	cut
9. REGIME	government	vegetable	country	queen
10. JEOPARDY	beast	danger	candy	pleasure
11. ZENITH	old man	fine thread	small stone	high point
12. DISCLOSURE	doorway	statement	rule	covering
13. INDIGO	colour	island	tribe	finger
14. SEISMOGRAPH	for navigation	for finances	for earthquakes	for electricity
15. SUPERFLUOUS	fluid	extra	excellent	strong
16. ENIGMA	insect	puzzle	dream	flag
17. ASSET	altitude	young donkey	property	poor man
18. ELIMINATE	remove	make	enquire	copy
19. INTREPID	imperfect	rapid	feeble	brave
20. ACRIMONY	bitterness	vegetable	crime	poverty
21. DIFFIDENCE	kindness	shyness	difference	size
22. INHIBIT	to hope	to throw	to stop	to drink
23. CHRONOMETER	paper	compass	thermometer	clock
24. ABRIDGE	to weaken	to jump over	to shorten	to give up
25. IMMACULATE	contented	unfriendly	spotless	young
26. CERAMICS	carpentry	drapery	history	pottery
27. PLATITUDINOUS	noisy	woven	ordinary	faulty
28. PREHENSILE	grasping	pushing	dividing	smoothing
29. TURPITUDE	wickedness	good fortune	water animal	grease
30. PILOSE	dirty	hairy	round	soft

Appendix D

ID# _____

NEO – S

This questionnaire contains 60 statements. Please read each statement carefully. For each statement, circle the response that best represents your opinion. Please circle only one response for each statement. Respond to all of the statements and remember, there are no right or wrong answers.

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

1. I am not a worrier.	1	2	3	4	5
2. I like to have a lot of people around me.	1	2	3	4	5
3. I don't like to waste my time daydreaming.	1	2	3	4	5
4. I try to be courteous to everyone I meet.	1	2	3	4	5
5. I keep my belongings clean and neat.	1	2	3	4	5
6. I often feel inferior to others.	1	2	3	4	5
7. I laugh easily.	1	2	3	4	5
8. Once I find the right way to do something, I stick to it.	1	2	3	4	5
9. I often get into arguments with my family and co-workers.	1	2	3	4	5
10. I'm pretty good about pacing myself so as to get things done on time.	1	2	3	4	5
11. When I'm under a great deal of stress, sometimes I feel like I'm going to pieces.	1	2	3	4	5
12. I don't consider myself especially "light-hearted".	1	2	3	4	5
13. I am intrigued by the patterns I find in art and nature.	1	2	3	4	5
14. Some people think I'm selfish and egotistical.	1	2	3	4	5
15. I am not a very methodical person.	1	2	3	4	5
16. I rarely feel lonely or blue.	1	2	3	4	5
17. I really enjoy talking to people.	1	2	3	4	5

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

18. I believe letting students hear controversial speakers can only confuse and mislead them.	1	2	3	4	5
19. I would rather cooperate with others than compete with them.	1	2	3	4	5
20. I try to perform all the tasks assigned to me conscientiously.	1	2	3	4	5
21. I often feel tense and jittery.	1	2	3	4	5
22. I like to be where the action is.	1	2	3	4	5
23. Poetry has little or no effect on me.	1	2	3	4	5
24. I tend to be cynical and skeptical of others' intentions.	1	2	3	4	5
25. I have a clear set of goals and work toward them in an orderly fashion.	1	2	3	4	5
26. Sometimes I feel completely worthless.	1	2	3	4	5
27. I usually prefer to do things alone.	1	2	3	4	5
28. I often try new and foreign foods.	1	2	3	4	5
29. I believe that most people will take advantage of you if you let them.	1	2	3	4	5
30. I waste a lot of time before settling down to work.	1	2	3	4	5
31. I rarely feel fearful or anxious.	1	2	3	4	5
32. I often feel as if I'm bursting with energy.	1	2	3	4	5
33. I seldom notice the moods or feelings that different environments produce.	1	2	3	4	5
34. Most people I know like me.	1	2	3	4	5
35. I work hard to accomplish my goals.	1	2	3	4	5
36. I often get angry at the way people treat me.	1	2	3	4	5
37. I am a cheerful, high-spirited person.	1	2	3	4	5
38. I believe we should look to our religious authorities for decisions on moral issues.	1	2	3	4	5
39. Some people think of me as cold and calculating.	1	2	3	4	5

1	2	3	4	5
Strongly Disagree	**Disagree**	**Neutral**	**Agree**	**Strongly Agree**

40. When I make a commitment, I can always be counted on to follow through.	1	2	3	4	5
41. Too often, when things go wrong, I get discouraged and feel like giving up.	1	2	3	4	5
42. I am not a cheerful optimist.	1	2	3	4	5
43. Sometimes when I am reading poetry or looking at a work of art, I feel a chill or wave of excitement.	1	2	3	4	5
44. I'm hard-headed and tough-minded in my attitudes.	1	2	3	4	5
45. Sometimes I'm not as dependable or reliable as I should be.	1	2	3	4	5
46. I am seldom sad or depressed.	1	2	3	4	5
47. My life is fast-paced.	1	2	3	4	5
48. I have little interest in speculating on the nature of the universe or the human condition.	1	2	3	4	5
49. I generally try to be thoughtful and considerate.	1	2	3	4	5
50. I am a productive person who always gets the job done.	1	2	3	4	5
51. I often feel helpless and want someone else to solve my problems.	1	2	3	4	5
52. I am a very active person.	1	2	3	4	5
53. I have a lot of intellectual curiosity.	1	2	3	4	5
54. If I don't like people, I let them know it.	1	2	3	4	5
55. I never seem to be able to get organized.	1	2	3	4	5
56. At times I have been so ashamed I just wanted to hide.	1	2	3	4	5
57. I would rather go my own way than be a leader of others.	1	2	3	4	5
58. I often enjoy playing with theories or abstract ideas.	1	2	3	4	5
59. If necessary, I am willing to manipulate people to get what I want.	1	2	3	4	5
60. I strive for excellence in everything I do.	1	2	3	4	5

Thank you for your cooperation!

Appendix E

NC

For each of the statements below, please indicate to what extent the statement is characteristic of you using the scale below.

1 Extremely Uncharacteristic	2 Somewhat Uncharacteristic	3 Uncertain / Don't Know	4 Somewhat Characteristic	5 Extremely Characteristic

1. I would prefer complex to simple problems.	1	2	3	4	5
2. I like to have the responsibility of handling a situation that requires a lot of thinking.	1	2	3	4	5
3. Thinking is not my idea of fun.	1	2	3	4	5
4. I would rather do something that requires little thought than something that is sure to challenge my thinking abilities.	1	2	3	4	5
5. I try to anticipate and avoid situations where there is likely a chance I will have to think in depth about something.	1	2	3	4	5
6. I find satisfaction in deliberating hard and long for hours.	1	2	3	4	5
7. I only think as hard as I have to.	1	2	3	4	5
8. I prefer to think about small daily projects to long-term ones.	1	2	3	4	5
9. I like tasks that require little thought once I've learned them.	1	2	3	4	5
10. The idea of relying on thought to make my way to the top appeals to me.	1	2	3	4	5
11. I really enjoy a task that involves coming up with new solutions to problems.	1	2	3	4	5
12. Learning new ways to think doesn't excite me very much.	1	2	3	4	5
13. I prefer my life to be filled with puzzles that I must solve.	1	2	3	4	5
14. The notion of thinking abstractly is appealing to me.	1	2	3	4	5
15. I would prefer a task that is intellectual, difficult, and important to one that is somewhat important but does not require much thought.	1	2	3	4	5
16. I feel relief rather than satisfaction after completing a task that required a lot of mental effort.	1	2	3	4	5
17. It's enough for me that something gets the job done; I don't care how or why it works.	1	2	3	4	5
18. I usually end up deliberating about issues even when they do not affect me personally.	1	2	3	4	5

Appendix F

EAQ

We'd like to know more about the things that you do in everyday life, the activities that might be necessary or important to you, that you might enjoy doing and that you may be good at.

We'd like some more information about how you spend your time. There are certain activities that everyone does, for example, eating and so on, but we'd like to know more about the other things you do.

Please use the response key provided to answer questions 1 to 23.

Please note that if you do not do the activity, you may skip parts 'b', 'c', and 'd' for that question. However, please be sure to mark your responses for parts 'a' and 'e'.

12. Do you attend **CULTURAL ACTIVITIES** such as films, theatre, concerts, museums?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., getting tickets, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., understanding the film or concert, etc.)	1	2	3	4	5
e. Do you intend to attend cultural activities in the **next two years**?	1	2	3	4	5

13. Do you play a **MUSICAL INSTRUMENT OR SING?**

a. How often?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., arthritis, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., playing difficult pieces, etc.)	1	2	3	4	5
e. Do you intend to play a musical instrument or sing in the **next two years**?	1	2	3	4	5

14. What about **CONTINUING EDUCATION**? Have you taken any **ACADEMIC OR INFORMATION COURSES** over the **last two years**?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., getting to class, etc.)	1	2	3	4	5
d. How **good** do you think you are at doing this? (e.g., following and participating in class discussions, etc.)	1	2	3	4	5
e. Do you intend to take courses in the **next two years**?	1	2	3	4	5

15. Do you **READ** books, magazines, newspapers, union or association newsletters or other types of documents?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., poor eyesight, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., understanding what you read, etc.)	1	2	3	4	5
e. Do you intend to read in the **next two years**?	1	2	3	4	5

16. Do you play **GAMES** such as board games or card games?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., poor eyesight, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., understanding the rules, etc.)	1	2	3	4	5
e. Do you intend to play games in the **next two years**?	1	2	3	4	5

17. Do you do any **CRAFTS AND HOBBIES**, such as knitting, woodworking, needle work, stamp collecting, or any other activities involving a regular routine or pattern, or do you do any **CREATIVE ACTIVITIES**, such as writing, painting, composing, or designing?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., arthritis, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., completing your projects, etc.)	1	2	3	4	5
e. Do you intend to engage in crafts and hobbies or creative activities in the **next two years**?	1	2	3	4	5

18. Do you listen to the **RADIO** or watch **TV**?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., poor eyesight or hearing loss, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., understanding when listening/watching a program, etc.)	1	2	3	4	5
e. Do you intend to listen to the radio/watch TV in the **next two years?**	1	2	3	4	5

19. Do you **SURF THE INTERNET** to read or chat, or are you a member of a listserv?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., getting access to a computer, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., knowing how to do a search, etc.)	1	2	3	4	5
e. Do you intend to surf the internet in the **next two years?**	1	2	3	4	5

23. Do you do any **TRAVELLING** such as day trips, holidays, recreational trips?

a. How **often**?	1	2	3	4	5
b. How **important** to you?	1	2	3	4	5
c. Any **difficulty** now? (e.g., cannot afford financially to travel, etc.)	1	2	3	4	5
d. How **good** do you think you are generally at doing this? (e.g., planning a trip, etc.)	1	2	3	4	5
e. Do you intend to travel in the **next two years**?	1	2	3	4	5

Appendix G

DC

We are interested in how people respond when they confront difficult or stressful events in their lives. There are lots of ways to deal with stress. This questionnaire asks you to indicate what you generally do and feel, when you experience stressful events. Obviously, different events bring out somewhat different responses, but think about what you usually do when you are under a lot of stress.

Using the response choices listed just below, please circle one number for each item. Please try to respond to each item separately in your mind from each other item. Choose your answers thoughtfully, and make your answers as true FOR YOU as you can. Choose the most accurate answer for you—not what you think "most people" would say or do. Indicate what YOU usually do when YOU experience a stressful event.

1	**2**	**3**	**4**
I usually don't do this at all	**I usually do this a little bit**	**I usually do this a medium amount**	**I usually do this a lot**

1. I think about how I might best handle the problem.	1	2	3	4
2. I keep myself from getting distracted by other thoughts or activities.	1	2	3	4
3. I learn to live with it.	1	2	3	4
4. I get comfort and understanding from someone.	1	2	3	4
5. I admit to myself that I can't deal with it, and quit trying.	1	2	3	4
6. I make jokes about it.	1	2	3	4
7. I pray or meditate.	1	2	3	4
8. I refuse to believe that it has happened.	1	2	3	4
9. I concentrate my efforts on doing something about the situation I am in.	1	2	3	4
10. I turn to work or other activities to take my mind off things.	1	2	3	4
11. I look for something good in what is happening.	1	2	3	4
12. I think hard about what steps to take.	1	2	3	4

1 I usually don't do this at all	2 I usually do this a little bit	3 I usually do this a medium amount	4 I usually do this a lot

13. I focus on dealing with this problem, and if necessary let other things slide a little.	1	2	3	4
14. I get used to the idea that it happened.	1	2	3	4
15. I discuss my feelings with someone.	1	2	3	4
16. I laugh about the situation.	1	2	3	4
17. I seek God's help.	1	2	3	4
18. I act as though it hasn't even happened.	1	2	3	4
19. I take additional action to try to get rid of the problem.	1	2	3	4
20. I ask people who have had similar experiences what they did.	1	2	3	4
21. I get upset and let my emotions out.	1	2	3	4
22. I go to movies or watch TV, to think about it less.	1	2	3	4
23. I learn something from the experience.	1	2	3	4
24. I try to come up with a strategy about what to do.	1	2	3	4
25. I put aside other activities in order to concentrate on this situation.	1	2	3	4
26. I accept that this has happened and that it can't be changed.	1	2	3	4
27. I get emotional support from others.	1	2	3	4
28. I just give up trying to reach my goal.	1	2	3	4
29. I make fun of the situation.	1	2	3	4
30. I put my trust in God.	1	2	3	4
31. I pretend that it hasn't really happened.	1	2	3	4

1 I usually don't do this at all	2 I usually do this a little bit	3 I usually do this a medium amount	4 I usually do this a lot

32. **I do what has to be done, one step at a time.**	**1**	**2**	**3**	**4**
33. I talk to someone who could do something concrete about the problem.	1	2	3	4
34. I try to grow as a person as a result of the experience.	1	2	3	4
35. I make a plan of action.	1	2	3	4
36. I try hard to prevent other things from interfering with my efforts at dealing with this.	1	2	3	4
37. I accept the reality of the fact that it has happened.	1	2	3	4
38. I talk to someone about how I feel.	1	2	3	4
39. I give up the attempt to get what I want.	1	2	3	4
40. I joke around about it.	1	2	3	4
41. I try to find comfort in my religion or spiritual beliefs.	1	2	3	4
42. I say to myself "this isn't real".	1	2	3	4
43. I talk to someone to find out more about the situation.	1	2	3	4
44. I let my feelings out.	1	2	3	4
45. I daydream about things other than this.	1	2	3	4
46. I try to see it in a different light, to make it seem more positive.	1	2	3	4
47. I take action to try to make the situation better.	1	2	3	4
48. I do something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping.	1	2	3	4
49. I get help and advice from other people.	1	2	3	4
50. I express my negative feelings.	1	2	3	4
51. I give up the attempt to cope.	1	2	3	4
52. I say things to let my unpleasant feelings escape.	1	2	3	4

Appendix H

PC

On this page is a series of attitude statements. Each represents a commonly held opinion. You will probably agree with some items and disagree with others. We are interested in the extent to which you agree or disagree with such matters of opinion. Read each statement, decide if you agree or disagree and the strength of your opinion, and then circle the appropriate number.

1	2	3	4	5	6	7
Disagree Strongly	**Disagree Somewhat**	**Disagree A Little**	**Don't Know**	**Agree A little**	**Agree Somewhat**	**Agree Strongly**

1.	I have little control over the things that happen to me.	1	2	3	4	5	6	7
2.	What happens to me in the future mostly depends on me.	1	2	3	4	5	6	7
3.	There is really no way I can solve all of the problems I have.	1	2	3	4	5	6	7
4.	There is little I can do to change many of the important things in my life.	1	2	3	4	5	6	7
5.	I can do just about anything I really set my mind to.	1	2	3	4	5	6	7
6.	I often feel helpless in dealing with the problems of life.	1	2	3	4	5	6	7
7.	Sometimes I feel that I'm being pushed around in life.	1	2	3	4	5	6	7
8.	When I really want to do something, I usually find a way to succeed at it.	1	2	3	4	5	6	7
9.	Whether or not I am able to get what I want is in my own hands.	1	2	3	4	5	6	7
10.	Other people determine most of what I can and cannot do.	1	2	3	4	5	6	7
11.	What happens in my life is often beyond my control.	1	2	3	4	5	6	7
12.	There are many things that interfere with what I want to do.	1	2	3	4	5	6	7

Appendix I

PANAS

This scale consists of a number of words that describe different feelings and emotions. Read each item and then circle the appropriate answer next to that word. Indicate to what extent you have felt this way *during the past few weeks* by choosing the answer that *describes you best*. Use the following scale to record your answers.

1	2	3	4	5
Very slightly or not at all	A little	Moderately	Quite a bit	Extremely

1.	Interested	1	2	3	4	5
2.	Distressed	1	2	3	4	5
3.	Excited	1	2	3	4	5
4.	Upset	1	2	3	4	5
5.	Strong	1	2	3	4	5
6.	Guilty	1	2	3	4	5
7.	Scared	1	2	3	4	5
8.	Hostile	1	2	3	4	5
9.	Enthusiastic	1	2	3	4	5
10.	Proud	1	2	3	4	5
11.	Irritable	1	2	3	4	5
12.	Alert	1	2	3	4	5
13.	Ashamed	1	2	3	4	5
14.	Inspired	1	2	3	4	5
15.	Nervous	1	2	3	4	5
16.	Determined	1	2	3	4	5
17.	Attentive	1	2	3	4	5
18.	Jittery	1	2	3	4	5
19.	Active	1	2	3	4	5
20.	Afraid	1	2	3	4	5