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Predictors of Chronological-Subjective Age Discrepancies in Younger and Older Adults

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Abstract

Past research indicates that as individuals age, they begin to perceive themselves as subjectively younger than their chronological ages (Linn & Hunter, 1979; Montepare & Lachman, 1989; Staats, 1996). The present study examined four classes of predictors of chronological-subjective age discrepancies in both older and younger adults, ages 21 to 95: (1) *psychological*, four sources of self-efficacy, self-esteem, and life satisfaction; (2) *ageist stereotypes*; (3) *health factors*, the number of health conditions, exercise (perceived & objective measures) and perceived health, and; (4) *demographic characteristics*, gender, chronological age, retirement status and marital status. Discrepancies between chronological and subjective age were investigated using a modified version of the Cognitive Age Scale items of *feel-age* and *look-age*. Contrary to prediction the psychological variables were not the strongest predictors of chronological-subjective age discrepancies. Perceived health and perceived activity predicted *feel-age* discrepancies, whereas perceived activity and self-efficacy (mastery experiences), predicted *look-age* discrepancies. Supplementary analyses indicated that all age groups reported feeling younger than their chronological ages and that there were psychological benefits associated with feeling subjectively younger.

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**Predictors of Chronological-Subjective Age Discrepancies
in Younger and Older Adults**

Chronological age does not always correspond with how young or old an individual feels. *Subjective age* is the term used to describe the age that individuals perceive themselves to be, relative to their chronological years. However, many additional variables may also be more important when interpreting an individual's subjective age. In fact, subjective age is often considered to be multidimensional and more meaningful than the total number of years lived (Barak, 1987). Hubley and Hultsch (1994) refer to subjective age as an "age" that may include the limits set by an individual's social, psychological and physical experiences in life. Subjective age may better predict psychological and physical functioning when compared to chronological age, although this has not yet been established.

It is essential to make a distinction between subjective age and "functional age," because the latter primarily examines biological or functional markers of aging (e.g., grip strength, cholesterol levels, or blood pressure). The goal in functional age research is to determine an individual's "true" biological age, based on a number of these indices. In contrast, one of the goals in subjective age

research is to discover variables that predict discrepancies with chronological age, rather than pinpointing a formula that predicts the rate of biological aging. In addition, research on functional age often incorporates measures of psychological performance (Heron & Chown, 1967; Dirken, 1972) and personality (Finkel, Whitfield, & McGue, 1995), which makes it similar to subjective age. The present study focused on psychological and biological predictors of the discrepancies between chronological and subjective age.

Importance of Subjective Age

Subjective age has an impact on the everyday lives of older adults. An important life decision and future life trajectory may be influenced by an individual's perception of age. Staats (1996) conceptualized subjective age as an attitude that leads to intentions to act and subsequent behaviors. To investigate the impact of these proposed attitudes on everyday life, Staats examined subjective age reports in relation to work-related issues. She found that older adults had a more *youthful bias* in terms of their work-related capabilities. They felt that they could perform their job well regardless of their chronological age. Older adults also showed an *older bias* in regards to their peak time for work-related accomplishments. They felt their peak job performance occurred later on

in life. Based on these two findings, Staats concluded that older adults use a “self-age optimization bias,” wherein optimistic self-views help maximize one’s position on the life trajectory. Using employment as an example, this bias would enable an individual to remain in the work force for a longer period of time. Employers may therefore be imposing a disservice on individuals by setting a specific chronological age for retirement (e.g., 65 years). An individual may still perform well and feel as capable as they were at 35 years old. In contrast, older adults who feel subjectively older than their chronological age may withdraw from the workforce at an earlier age.

It is possible that the self-optimizing bias applies to other areas of life as well, such as health and mortality. Indeed, seniors who perceive themselves to be in good health, despite any medical problems, have been found to reduce their risk of mortality (Idler & Kasl, 1991). Individuals may bring their actual health status into line with their self-perceptions of good health, thus reducing the risk of mortality. Subjective feelings of youth may have a similar effect. Feeling subjectively older than one’s chronological age may lead to a reduction in other activities as well, such as social outings or recreation. Thus, one can see the significance these subjective reports may have in everyday life and why this is an important area of research.

Not all researchers agree on the utility of subjective age as an indicator of functioning associated with aging. Staats et al. (1993) posited that perceiving the self as younger than one's chronological age may not be healthy because this bias may represent a denial of actual aging. For example, the denial of health problems that require limitations in one's lifestyle may aggravate health concerns. Small discrepancies between chronological and subjective age may thus have positive implications. Uotinen (1998) suggested that having an equivalent chronological-subjective age may actually be an indication of personal acceptance and healthy adjustment to aging.

Measurement

Chronological-subjective age discrepancies have not been measured in a consistent manner across studies, and this inconsistency may be responsible for contradictory results. Barak and Stern (1986) reviewed the literature and identified five commonly used methods of measuring subjective age: cognitive age, stereotype age, identity age, comparison age, and feel/age. One method of measurement, referred to as *cognitive age* originates from the research of Kastenbaum, Derbin, Sabatini and Artt (1972). Barak and Schiffman (1981) developed the Cognitive Age Scale, based on the concepts of Kastenbaum et al.,

which allows the respondent to rank the self in reference to other age groups. This scale uses the dimensions of "feel-age," "look-age," "do-age" and "interest-age." For example, "I *feel* as though I am ____," and "I *do* most things as though I were in my ____". Respondents indicate the age group to which they feel they belong from a list of age categories ranging from 20 to 80 years of age (i.e., 20's, 30's, 40's, etc.). The items are then added together and divided by four to create a composite score. Barak and Schiffman found only a moderate degree of correspondence between the four dimensions and chronological age, indicating that each item captures a distinct aspect not found in chronological age alone. In addition, the correspondence with chronological age across the four dimensions showed definite variations (i.e., for individuals in their 50's there was 44% agreement with look-age and only 32% with interest-age). One advantage of the Cognitive Age approach is simplicity, both for researchers to score and for the respondents to answer. One suggested improvement for this method is to allow respondents to give a numerical open-ended response. Important information may be lost when responses are limited to a set of categories (Tabachnick & Fidell, 1996). The present study incorporated a modified version of the Cognitive Age Scale items feel- and look-age. However, the findings were not interpreted to reflect the concept of cognitive age. Instead, the findings represented the

discrepancies between chronological and subjective ages, and were interpreted as either youthful or older depending on the direction of the discrepancy.

A second method, referred to as *stereotype age*, was developed to deal with the potential drawback of social desirability with single-item response measures. However, Hubley and Hultsch (1994) recently found that a single item measure, similar to stereotype age, was not correlated with socially desirable responses in older adults. Thus, older adults were not reluctant to give a truthful response. The stereotype age method uses semantic differential item lists and respondents rate how old they “feel” on each item. For example, Burke and Tully (1977) used fifteen bipolar items such as “insecure-secure,” “ineffective-effective,” “inactive-active” and “sick-healthy.” The respondents rated how closely the items described an *old or middle-aged person* and *myself*. Discriminant function analysis was used to determine which items best discriminated between the two age categories. These items were then applied to the ratings of *myself* to create a personal subjective age score. The semantic-differential approach allows the researcher to tap into an individual’s subjective age indirectly, thus dealing with the possible problem of social desirability. However, this measure is difficult to administer and has little empirical support in terms of reliability and validity (George, Mutran & Pennybacker, 1980). In

addition, information may be lost because the terms “middle-aged” and “old” may have different meanings for individuals.

A third method for measuring subjective age is referred to as *identity age*. To measure identity age, one question is given wherein respondents rank themselves in comparison to *other age* groups. One example of a question to determine identity age is “Do you consider yourself young, middle-aged, or old?” (Logan, Ward & Spitzes, 1992). Thus, a respondent is forced to choose between very general age categories and a tremendous amount of information is lost. All three age concepts may have differing meanings between individuals. For instance, one individual may consider the chronological age of 50 to be old, while another may consider the age of 98 to be old. Without a precise numerical age measurement, as determined by the respondent (e.g., I feel 73 years of age.), there is nothing to compare the subjective reports with. Since subjective age is relative to chronological age, regardless of how it is measured, the scores calculated would be practically meaningless.

Another general method of measuring of subjective age is *comparison age*. Again, one question is presented and respondents rate themselves in comparison to *their own* chronological ages from a limited set of responses (e.g., “I feel older, the same or younger than my real age”; Baum & Boxley, 1983).

Feel:age is the fifth method indicated by Barak and Stern (1986). This method is similar to cognitive age but requires that respondents give a numerical response to *one* question regarding how old they feel. Unlike the Cognitive Age Scale, the question is determined by the researcher and therefore varies across studies. For example, Underhill and Caldwell (1984) posed the question, "What age do you feel on the inside?", leaving the response open to the participants. In contrast to measures where a forced category response is required, *feel/age* elicits a numerical response. Thus, the potential loss of information from using pre-chosen categories is minimized. Applying this method (open-ended response) to the Cognitive Age Scale, *may* prove to be the most accurate measure for calculating chronological-subjective age discrepancies.

A method that Barak and Stern (1986) did not mention in their review of the subjective age measures was the *subjective time experience*. This method has only been used once, by Cooper, Thomas, Stevens and Suscovich (1981). Subjective time experience is calculated by a projective device referred to as the "experimental clock." This clock does not have hands, but contains standard 12 hour intervals on the face. Respondents are asked to draw the hands on the face of the clock to estimate, (a) the amount of time they feel they have lived and (b) the time left in their life span. Scores are then calculated using a formula that

uses actuarial life span figures, the respondents' chronological ages, and their projective estimates (indicated by the hands). However, the reliability and validity of this measure have not yet been demonstrated, and problems with the interpretation of projective measures undoubtedly apply.

Finally, two methods that have been recently developed (Barak & Rahtz, 1999) can be added to the list of subjective age measures. "*Perceived youth*" reflects the *proportion* of the discrepancy between chronological and cognitive ages. The perceived youth measure has the advantage of facilitating researchers to contrast the proportion of the life-span characterized by the discrepancies between various age groups. The proportion of these discrepancies are important to study, since fifteen years are a smaller portion of life for an eighty-year-old than a thirty-year-old. Perceived youth is computed by dividing the combined total of the four Cognitive Age Scale items by chronological age, and further multiplying by one hundred. The scoring for this new method is very straightforward and simple. A higher, positive score would imply greater levels of self-perceived youth, whereas a negative score would represent the self-perception of being old. In addition, Barak and Rahtz developed the *feeling-old* scale, based on the item "I feel old." The respondents reply based on a six-point Likert scale which ranges from one (disagree) to six (agree). It is posited by

Barak and Rahtz that this scale captures the magnitude of youth, with each point reflecting equal increments in feeling old or youthful. This new scale is an improvement over categorical response formats used in previous research. The earlier categories used have been much too general (e.g., younger, middle-aged & older) for elucidating a precise estimate of perceived youth. The feeling-old scale not only gives a more precise youth estimate, but also answers the question, *how much younger?* Finally, this scale is very simple to administer and easily scored by the researcher.

One important measurement concern for the aforementioned methods is restriction in range: few respondents define themselves as "old" (George et al., 1980). Thus, researchers can only examine one side of chronological-subjective age discrepancies. The small number of individuals who report feeling subjectively older are excluded by researchers from most analyses. In summary, there are many different ways of measuring subjective age and chronological-subjective age discrepancies. Therefore, it is not surprising that the findings are sometimes inconclusive or contradictory (see Table 1). The present investigation will focus on discrepancies between chronological and subjective age.

Discrepancies Between Chronological and Subjective Age

Numerous researchers have found that most older adults perceive themselves as approximately 10 to 15 years younger than their chronological ages (Barak & Gould, 1985; Barak & Stern, 1986; Cooper et al., 1981; Goldsmith & Heiens, 1992; Linn & Hunter, 1979; Logan et al., 1992; Markides & Boldt, 1983; Montepare & Lachman, 1989; Staats, 1996; Underhill & Caldwell, 1984; Uotinen, 1998). There is a consensus in the literature that older adults tend to feel subjectively younger than their chronological years. However, there are four areas in subjective age research where there have been inconsistent findings and disagreement among researchers. These areas of inconsistency include: (1) the patterns of discrepancies across various age groups, (2) the potential benefits of feeling subjectively younger than one's chronological age, (3) gender differences in age discrepancies and, what is most important, (4) the predictors of chronological-subjective age discrepancies. Again, it is possible that contradictory findings emerged because of inconsistent measures of subjective age.

Patterns in Chronological-Subjective Age Discrepancies Across the Life-span. One question in subjective age research concerns the discrepancies

between chronological-subjective ages across the life-span (e.g., for young, middle-aged, and older adults), (Barnes-Farrell & Piotrowski, 1989; Cooper et al., 1981; Goldsmith & Heiens, 1992; Henderson et al., 1995; Montepare & Lachman, 1989; Underhill & Caldwell, 1984; Uotinen, 1998). Indeed, differing patterns in the discrepancies between chronological-subjective age have been found at various ages, although the findings vary across the aforementioned studies. The only consistent finding is that most older adults tend to report youthful subjective ages.

Montepare and Lachman (1989), Barnes-Farrell and Piotrowski (1989), Underhill and Caldwell (1984) and Goldsmith and Heiens (1992) found that younger adults and teenagers typically view themselves as subjectively *older* than their chronological ages. One possible explanation for this finding may be that young adulthood is a period of transition between childhood and adulthood wherein most teens have a desire to feel more grown up. Two important tasks of adolescence are to individuate from family and become more independent, both of which demand greater responsibility and maturity. Many teens may feel they are ready for more autonomy (e.g., staying out later) and, as a result, they may “feel” older as a means of displaying readiness for this independence. In addition, Montepare and Lachman (1989) found that the younger adults in their

sample with *older* subjective ages also had the least personal fear toward aging. Therefore, in a desire to feel more grown up, younger adults may fear the “young” label more than the “old” label.

Chronological-subjective age discrepancies among middle-aged individuals, however, have not shown consistent patterns. Montepare and Lachman (1989) believe that middle-age should be a time of less discrepancy between chronological and subjective age due to the relative stability of this time of life. Subjective age reports should therefore be more closely related to an individual’s chronological age during this time. In contrast, Goldsmith and Heiens (1992) hypothesize that middle-age is a time of crisis and that individuals should display greater discrepancies between their chronological and subjective ages. These researchers postulate that individuals may report feeling subjectively either older or younger than their chronological ages depending on the life crisis they are experiencing.

In order to elucidate the nature of the discrepancies surrounding middle-aged adults, Goldsmith and Heiens (1992) tested 607 individuals from various age groups (21 to 80 years of age). Using Barak and Schiffman’s (1981) Cognitive Age Scale, two important findings emerged from the comparisons between the age groups. First, in congruence with previous studies, Goldsmith and Heiens

found that agreement between chronological age and subjective age declines throughout the adult decades. Second, the authors found that individuals who were 30–40 years of age exhibited the greatest variability on the subjective age dimensions. Hence, middle-aged individuals were equally likely to report feeling subjectively either younger or older than their chronological ages. This finding supports their contention that a mid-life crisis may result in feeling either younger or older, perhaps depending on the nature of the crisis. However the variation may not relate to crisis at all, and further research is required that consistently uses the same method of measuring subjective age. In addition, an examination of factors that contribute to subjective age discrepancies across the various age groups is one area that has not been thoroughly examined. Researchers have examined chronological-subjective age discrepancies across the life-span, but they have not examined predictors of these discrepancies. Therefore, the present investigation will examine the predictors of chronological-subjective age discrepancies across various age groups.

Psychological Well-being. It is possible that the youthful subjective ages demonstrated by older adults represents a denial of, or overcompensation for, chronological aging. Many researchers however, have provided evidence indicating that a youthful subjective age is psychologically beneficial. For

example, research by Linn and Hunter (1979) found that youthful subjective ages in older adults were related to better overall psychological functioning. The researchers surveyed 150 seniors (65 years and older) from the community, using a battery of questionnaires to examine their seven psychological variables of interest: self-esteem, life satisfaction, knowledge, anxiety, depression, somatization, and locus of control. Linn and Hunter used a *comparative age* measure for assessing subjective age. The measure consisted of the question: "Compared with others your age, do you think you feel older, younger or about the same?" The results indicated that 64% of older adults perceived themselves as subjectively younger than others of the same chronological ages even after social class, disability and impairment were covaried. Using multivariate analyses, the results indicated that internal locus of control was the variable that best discriminated feeling young versus feeling old. Furthermore, those individuals whose subjective ages were younger than their chronological ages had greater self-esteem, life satisfaction, and WAIS knowledge. Linn and Hunter found better psychological functioning (higher self-esteem, greater life satisfaction, more knowledge, internality, less anxiety, less depression, and less somatization) for both black/white and male/female respondents who reported lower subjective ages.

Subsequent research, using a comparative age measure has confirmed the earlier finding that a lower subjective age is associated with better psychological functioning. Baum and Boxley (1983) studied 308 older adults to examine the effects of feeling younger on various social-psychological dimensions. Using a variety of measures, they examined psychological health, social participation, purpose in life, locus of control and affiliation. The researchers found that purpose in life was the variable that most highly correlated with having a younger subjective age, followed by affiliation, locus of control, psychological health and social participation. The results suggested that older adults who feel subjectively younger place greater importance on maintaining meaningful existence in later years. Baum and Boxley concluded that a sense of purpose reflected better emotional, physical and social well-being.

Additional researchers have also confirmed that older adults with a younger subjective age also have better psychological well-being. Logan et al. (1992) indicated that seniors who reported feeling subjectively *older* also scored lower on happiness and life satisfaction and higher on distress. Montepare and Lachman (1989) further indicated that a younger subjective age was not related to fears about aging or denial in older adults. However, these researchers did find one contradiction concerning the psychological benefits of having a youthful

subjective age. They found that life satisfaction was the *lowest* in older women with youthful subjective ages. Future research is therefore necessary to determine whether there are beneficial aspects, despite whether individuals report feeling younger or older than their chronological ages. However, the causality direction of the discrepancies has not yet been established; a youthful subjective age may influence well-being, or well-being may influence subjective age.

Gender Differences. One area in subjective age research that is frequently investigated is that of gender. However, a number of researchers have failed to find consistent gender differences in subjective age. Goldsmith and Heiens (1992) utilized the Cognitive Age Scale and did not find gender differences on any of the four dimensions (look, feel, do, and interests) for individuals 21 to 92 years of age. Furthermore, Barak (1998) also used the Cognitive Age Scale did not find that subjective age differed between gender. In fact, Barak posited that results based on single gender samples can be generalized to both genders due to the lack of substantiated differences obtained by many researchers. Additional researchers who have not found gender differences in subjective age include Barak and Rahtz (1999), Barnes-Farrell & Piotroski (1989), Hubley and Hultsch (1994), Logan et al. (1992), Underhill and Caldwell (1984) and Uotinen (1998).

However, a number of researchers have reported that there are certain

gender differences in subjective age. Such contradictions may derive from the lack of a consistently used method of measuring subjective age. Also, when these differences are established, results are also inconsistent in regards to which gender reports feeling subjectively younger or older. For example, Linn and Hunter, using the previously mentioned comparative age measure, established that females viewed themselves as subjectively younger than their chronological ages, as compared to men. These authors further indicated that psychological functioning did not differ with the subjective age perceptions of both genders. Therefore, women reported feeling subjectively younger than men but did not differ in terms of psychological well-being. In addition, Henderson et al. (1995) used the Cognitive Age Scale and also reported that the women in their sample had younger subjective ages. However, gender differences obtained by Cooper et al. (1981), using the experimental clock to measure subjective age, were slightly different. These authors concluded that *men* (ages 17 to 85) had younger subjective ages as compared to the women in their sample. Additional researchers to report gender differences in subjective age include Markides and Boldt (1983) Montepare and Lachman (1989), Staats (1996), Streib and Schneider (1971), Uotinen (1998) and Ward (1977). Further research is necessary to elucidate the nature of any potential gender differences in subjective age with a

consistently used measure. The present investigation will investigate these differences using a modified version of the Cognitive Age Scale, to measure chronological-subjective age discrepancies.

Potential Influences on Chronological-Subjective Age Discrepancies

As previously indicated the predominant area of disagreement among researchers concerns the variables that systematically predict subjective age, regardless of how it is measured. A variety of factors have been found to correlate with subjective age and chronological-subjective age discrepancies, such as locus of control, perceived health, purpose in life, chronological age, education, retirement, life satisfaction, and extraversion (Baum & Boxely, 1983; Hubley & Hulstch, 1994; Linn & Hunter, 1971; Underhill & Caldwell, 1984). The lack of a consistently used measure may account for many of these contradictions between studies. In addition, many researchers have examined these predictors in isolation. For example, Henderson et al.(1995), as well as Underhill and Caldwell (1984), investigated only demographic characteristics. Furthermore, many potentially important variables, such as exercise or self-efficacy, have not received adequate attention in previous studies. Therefore, the

present study incorporated several types of variables (including psychological, ageist stereotypes, health/exercise and demographics) to determine which among them best accounted for differences observed between chronological and subjective ages. A variety of variables are necessary for elucidating the nature of chronological-subjective age discrepancies and to clarify many of the contradictions in past research. The following sections will discuss the aforementioned factors chosen for the present investigation; the goal was to replicate some of the previous findings and to provide new information regarding chronological-subjective age discrepancies.

Psychological Influences

Self-efficacy. Self-efficacy refers to the conviction that one can successfully execute and control behaviors required to produce an outcome (Bandura, 1977). Self-efficacy has not yet received adequate attention in the literature regarding chronological-subjective age discrepancies. Some conclusions can nevertheless be extracted from previous research. For example, Seeman, Rodin and Albert (1993) found that higher instrumental self-efficacy is associated with better performance on tests of memory and abstraction for older men. Seeman, McAvay, Albert, Merrill and Rodin (1996) also found that higher

instrumental self-efficacy helped to maintain an increased performance on the abstraction tests at a three-year follow-up. These results taken together indicate that higher self-efficacy may contribute to feeling productive and capable, which are often associated with younger characteristics. Higher personal self-efficacy has also been associated with lower levels of maladjustment, in terms of depression and physiological complaints (Holan, Holan & Beck, 1984). Thus, self-efficacy may also guard against mental and physical ailments which are also associated with age. Therefore, it is presently hypothesized that higher personal self-efficacy can lead to feeling productive, which in turn may contribute to feeling younger than one's chronological age.

Self-esteem. Another factor that requires further examination is self-esteem and its influence on age discrepancies. Self-esteem refers to the positive and negative evaluations that individuals make regarding themselves (Giarrusso & Bengston, 1996). Individuals often see themselves through the eyes of others, and self-esteem reflects the perceptions they feel others hold about them (Chene, 1991). If society views elderly people in a negative fashion, then elderly individuals may perceive themselves in a similarly negative way.

Hunter, Linn and Harris (1982) found that high self-esteem in older adults is linked to greater perceptions of productivity, personal control, and task

performance. These researchers also found that older adults with low self-esteem reported poorer health, more pain, and had a more externally-oriented locus of control. Therefore, in a similar fashion to self-efficacy, it is hypothesized that higher esteem may be associated with more youthful chronological-subjective age discrepancies. In fact, Hunter et al. found that individuals who felt older than their chronological ages had the lowest self-esteem and psychological functioning.

Life Satisfaction. Past research has indicated that greater satisfaction with life is related to a more youthful subjective age (Barak & Stern, 1986; Linn & Hunter, 1979). However, life satisfaction may be highly influenced by various demographic characteristics (e.g., income) or psychological factors (e.g., coping style or personality). In addition, it may also be influenced by gender, as indicated by Montepare and Lachman (1989) who found differences in youthful subjective age discrepancies and life satisfaction between men and women. Other factors may also influence life satisfaction, such as health issues, physical activity level, or social support. The influence of life satisfaction also requires further investigation in order to determine how it contributes to chronological-subjective age discrepancies. It is presently postulated that individuals with greater life satisfaction are more likely to have youthful chronological-subjective

age discrepancies.

Influence of Ageist Stereotypes

Negative ageist beliefs are prominent in our society. Stereotypes that often plague older adults include assumptions that seniors are weak, passive, slow, unproductive, sexless and incompetent (Palmore, 1990). These stereotypes are often based on the assumption that seniors are a homogeneous group. However, individuals actually become increasingly diverse as they age and most will age successfully (Marshall, 1987) despite these negative assumptions. In addition, seniors today live longer, healthier, and more active lives. However, negative labeling and stigmatization of the elderly may lead to self-fulfilling behaviors and beliefs (Rodin & Langer, 1980). Internalizing negative beliefs can be detrimental to older adults' self-concepts and potentially to their subjective estimate of age. Rodin and Langer postulated that the perception of being old may be attributed to behaviors that older adults believe are due to aging rather than to their actual circumstances. For example, forgetfulness may be attributed to age rather than to merely having a busy day.

One reason older adults may perceive themselves as subjectively younger is that they are reacting against pervasive ageist stereotypes. In order to

disassociate themselves from the negative connotations identified with aging, older adults may be unwilling to relinquish the middle-aged label (Markides & Boldt, 1983). The fact that they are aging chronologically may be too difficult for some individuals to accept and, therefore, they report feeling subjectively younger.

In summary, most older adults report a younger subjective age (regardless of how it is measured). Stereotypes are hypothesized to influence chronological-subjective discrepancies of older individuals in two potential ways. Older adults may internalize ageist beliefs and report feeling older, or dissociate from these beliefs and report feeling younger.

Physical Health

Another important domain is physical health, which also has both objective and subjective components.

Physical Health Status. Physical health is posited to influence chronological-subjective age discrepancies. To examine this hypothesis, Markides and Bolt (1983) tested 323 older adults in a four-year longitudinal study. Prior to an interview procedure with the older respondents, researchers determined the severity of health conditions, number of days spent at home in

bed, and the number of nights spent in the hospital during the past year. They divided subjects into two groups, based on an identity age question where individuals reported feeling subjectively “youthful” (those who said they felt young or middle-aged) or “old” (those who said they felt old or very-old). The researchers found that those individuals who changed from a youthful to an old subjective status had significantly poorer health than they did during the initial interview. Thus, declines in health may influence subjective age reports by causing an individual to feel older. Health declines, unfortunately, are often attributed to aging regardless of their etiology (e.g., poor nutrition). Furthermore, older adults who changed from being subjectively older to youthful had improved health status relative to the initial interview, though this improvement was not statistically significant. The results of this study indicate that poor health status may result in feeling subjectively older. However a replication of these findings is necessary, with perhaps a more specific measure of subjective age. By grouping individuals into old or youthful categories, potentially relevant information may have been lost. Future studies may benefit from using a measure that allows for a more precise age measurement.

Perceived Health. Many researchers believe that perceived health can better explain chronological-subjective age discrepancies than can actual health.

Perceived health describes how healthy individuals believe themselves to be, as well as how they adjust to physical changes associated with aging. Perceived health has been shown to have an inverse relationship with subjective age (Barak & Stern, 1986; Idler, 1993). That is, the younger individuals feel, the greater their corresponding health is perceived to be.

Staats and colleagues (1993) found that older adults perceived themselves as subjectively younger than their chronological age, regardless of actual health status. The researchers tested 250 older adults in a prospective study over a four-month period. Participants were assessed five times for the number of doctor visits, self-reported health, health as compared to that of a friend, what their health permits them to do, and quality of life for both the present time and future predictions. Staats et al., found that chronologically older groups perceived themselves to be in good health and reported the most youthfulness regardless of actual health status. The future quality of life estimates were also optimistically biased by older individuals. One possible explanation for these findings is that older adults may tend to compare themselves to others who are worse off in terms of health. Therefore, older adults may see themselves as relatively younger and healthier than others their own age, which contributes to a lower subjective age report. It is hypothesized that perceived health will be more influential on

chronological-subjective age discrepancies than the objective measures of health.

Exercise. To date, the influence of exercise on chronological-subjective age discrepancies has not been adequately examined. Barak and Gould (1985) investigated a number of demographic and leisure related variables in relation to subjective age discrepancies, including the number of hours an individual exercises per day. This variable was shown to be moderately positively correlated with the Cognitive Age Scale, however, their study was limited in a number of ways. The respondents were asked to write down the number of hours a day they exercised, but were not required to specify what type of physical activity they engaged in. Furthermore, the participants were not given an explanation of what the term *exercise* would encompass. For example, many older adults may engage in activities which are not typically considered to be exercise, yet they are still physically active individuals (i.e., shopping, gardening, or stretching). Finally, the subjective age discrepancies were from a sample that consisted of only women.

Barak (1998) further examined the role of exercise constructs on subjective age. Respondents (ages 40 to 69) were asked to indicate in the past month how often they (a) use a health club, (b) dance, (c) run/jog, and (d) swim. The results indicated that both dance and run/jog frequencies were related to

feeling subjectively younger than one's chronological age. However, due to the limited number of exercise categories to choose from, these results must be interpreted cautiously. In order to make any substantial claims about the effects of exercise on subjective age, further research, using a better measure of physical activity is necessary.

A few hypotheses can therefore be generated regarding exercise and chronological-subjective age discrepancies based upon literature concerning the benefits of physical exercise. Physical activity in older adults has been associated with a variety of increased cognitive functions. Perri and Templer (1984; 1985) found that seniors who participated in a 14 week exercise program had significant increases in confidence and mastery over their environment. Rodin and Langer (1980) have suggested that feelings of personal control can help guard against internalizing ageist beliefs, and is associated with being younger. Thus, exercise could lead to mastery (control) which guards against ageist beliefs, and contributes to feeling subjectively younger. Exercise has also been shown to improve self-efficacy, self-esteem, health, quality of life, and life satisfaction in older adults (Spirduso & Gilliam-MacRae, 1990). In addition, these variables have been shown to directly influence subjective age reports. The World Health Organization recently compiled a list of potential benefits of exercise for older

adults (Chodzko-Zajko ed. 1997). These benefits include improved balance (fewer falls), relaxation, greater skill acquisition, sense of empowerment, enhanced social participation, enhanced intergenerational activity, and enhanced productivity. All of these benefits could lead to feelings of subjective youth. Therefore, individuals who routinely exercise are postulated to have a youthful subjective age compared to their chronological age.

Demographic Variables

Demographic factors, such as income or age, are often used to predict chronological-subjective age discrepancies. Demographic factors alone, however, cannot explain why there are discrepancies between chronological-subjective age. Henderson et al. (1995) examined gender, marital status, education, income, and race in relation to subjective age in two samples; 185 adults (ages 21 to 80 years) and 607 adults (ages 21 to 92). Using Barak and Schiffman's (1981) Cognitive Age Scale, they examined these demographic variables in relation to the four dimensions of subjective age (do, feel, interests and look-age). Henderson et al. found that chronological age was significantly related to all four dimensions for both men and women. However, the remaining demographic variables, after controlling for the effects of chronological age, were

not systematically related to any aspect of subjective age. This finding indicates that in previous studies, (where chronological age is not controlled) the demographic correlates examined may actually reflect differences in chronological age more so than in subjective age.

Other researchers have indicated that retirement, income, social class and education (George et al., 1980) each contribute to subjective age discrepancies. It may be hypothesized that some individuals who are retired might report feeling subjectively older. Retirement may influence subjective age via the age-related stereotypes that individuals attribute to it (i.e., loss of productivity) or to the sudden reduction in income. In addition, individuals with higher socioeconomic status may give younger subjective age reports, possibly due to their better quality of life.

In summary, demographic variables are not systematically related to any dimension of subjective age. These findings suggest that other variables, such as psychological or social factors may be more influential in subjective age reports. More emphasis is needed on factors such as self-esteem, life satisfaction, and the influence of stereotypes. In fact, Henderson et al. (1995) recommended that future studies focus more on psychological variables, while carefully controlling for the effects of chronological age. It is presently hypothesized that

chronological age will be most influential on chronological-subjective age discrepancies, as compared to the remaining demographic variables.

The Present Study

The present study examined a number of variables from four different domains to better understand the discrepancies between chronological and subjective ages. The first type of variable was *psychological*, which included, self-esteem, self-efficacy, and life satisfaction. The second type of variable included *health factors*, such as, the number of medical conditions, exercise (objective and subjective measures), and perceived health. The third type of variable consisted of *stereotypical beliefs about aging*. The fourth type of variable included *demographic characteristics*, such as chronological age, retirement status, marital status and gender. Based on the recommendations of Henderson et al. (1995), the influences of these classes of variables were examined after controlling for the effects of chronological age.

The *feel-age* and *look-age* items, as modified from Barak and Schiffman's (1981) Cognitive Age Scale, were examined in relation to the four classes of variables. Past research has suggested that these two items are distinct

and represent different aspects of subjective age (Kastenbaum et al., 1972). In fact, Barak and Schiffman (1981) advise that the items from the Cognitive Age Scale are best examined separately to explore for multiple influences. Therefore, the present examination explored the discrepancies between chronological and subjective age in relation to the two dimensions of feel- and look-age. Unlike past research endeavors, the present study used an open-ended measure which elicited a numerical response for the feel- and look-age dimensions.

The purpose of the present study was to determine which of the four types of variables (psychological, stereotypes, health, and demographics) would best predict chronological-subjective age discrepancies. It was hypothesized that the psychological variables would be the best predictors of feel-age discrepancies, after chronological age was statistically controlled. For look-age discrepancies, the amount of exercise an individual engaged in was postulated to be most influential.

The second objective of the study was to determine which predictors would influence chronological-subjective age discrepancies at various ages, using a cross-sectional approach. For the older age groups, it was hypothesized that psychological variables and health factors would be the most important predictors. In comparison, younger adults' chronological-subjective age

discrepancies would be predicted by more of the demographic variables.

There were also five supplementary (mostly exploratory) analyses. The first was to determine the *patterns* of chronological-subjective age discrepancies across the adult decades. Based on past research, it was hypothesized that younger adults will have older chronological-subjective age discrepancies and older adults would have younger discrepancies. It was also hypothesized that middle-aged adults will show the greatest variability in chronological-subjective age discrepancies (Goldsmith & Heiens, 1992). The second investigation was to determine if youthful chronological-subjective age discrepancies were beneficial or if these represented poor adjustment to aging. Third, gender analyses were conducted to determine if males and females differ in chronological-subjective age discrepancies. The fourth supplementary area of investigation concerned the modified Cognitive Age items of feel-age and look-age. These items were examined separately to further validate previous findings which suggest that these measures have multiple influences. The final supplementary inquiry was to use Barak and Rahtz's (1999) proportional *perceived youth* measure, to compare with the chronological-subjective age discrepancies. The perceived youth measure was used to determine if the results differed from those obtained using the simple chronological-subjective age discrepancies.

Method

Participants and Procedure

The participants for the present study were recruited from various community groups for both seniors and younger adults in Thunder Bay, Ontario, Canada. The groups were visited by the researchers in order to discuss the purpose and procedure of the study. Groups were also contacted by telephone or sent a letter explaining the purpose of the study and asking for their participation. In addition, participants from an existing volunteer list, who have been involved in previous studies were contacted. The sample consisted of only community dwelling individuals.

One thousand questionnaires were distributed to both younger and older adults from the community. Of these questionnaires, 441 were completed and returned; resulting in a return rate of 42.8% for the study. The minimum age required to participate in the study was 20, therefore four subjects who did not meet this condition were excluded from the analyses. The final sample consisted of 437 adults aged 20 to 95, ($M=53.48$, $SD=17.91$) of which 71.4% were female and 28.6% were male. The average number of total years of education was $M=14.03$ ($SD=3.11$) and the mean total number of years retired was $M=11.32$

($SD=10.15$). Additionally, 11.3% of the individuals in the sample were single, 58.9% were married, 19.1% were widowed and 9.0% were divorced or separated. The most common (present and within the last five years) medical conditions reported by the participants were arthritis (31.6%), various broken bones (24.7%), and heart conditions (16.4%).

In order to make comparisons across various age groups, the sample was divided into five groups based on chronological age. The age groups chosen closely corresponded to groups in a previous studies investigating the role theory of aging (Gove, Ortega & Style, 1989) and life satisfaction (Medley, 1980). The groups were also notably similar to those used in other subjective age studies which have taken a cross-sectional approach (Barak, Stern & Gould, 1988; Uotinen, 1998). Group 1 included individuals ages 20 to 34 ($M=29.16$, $SD=3.59$); Group 2 included individuals ages 35 to 44 ($M=39.6$, $SD=3.01$); Group 3 included individuals ages 45 to 54 ($M=49.04$, $SD=2.65$); Group 4 included individuals ages 55 to 69 ($M=62.73$, $SD=4.00$); and Group 5 included individuals ages 70 to 95 ($M=77.27$, $SD=5.55$). Characteristics across age groups are provided in Table 2.

Participants had the option of completing the questionnaire at the community group; which would take approximately 30 minutes. As well,

participants could take the questionnaire home and either mail it back or have a research assistant pick it up. The questionnaire also contained a cover letter detailing the instructions, purpose of the study, and confidentiality issues (see Appendices A & B).

Measures

Chronological-Subjective Age Discrepancies. Chronological-subjective age discrepancies were measured using a modified version of Barak and Schiffman's (1981) Cognitive Age scale. As previously mentioned, the Cognitive Age scale consists of four subjective age measurements: feel, look, do, and interests-age. The four dimensions added together and divided by four create a total cognitive age score. However, the present study used only the *feel-* and *look-age* measures, and the scores were not added together (nor did the scores create a "cognitive age" score). Barak and Schiffman agree that the composite measure may mask some potentially important differences between the items. Subjects responded to two statements ("Most of the time, I *feel* as though I am about age ____ years." and "Most of the time, I *look* as though I am about age ____ years."), by providing open-ended numerical age estimates. Chronological-subjective age discrepancies were then measured by calculating the difference

between the subjective estimate and the respondent's actual chronological age. Although Barak and Schiffman's original Cognitive Age Scale provided respondents with a set of age groups to choose from, (i.e., 20's, 30's, 40's, etc.), the present study did not employ this method. An open-ended format was provided which elicited a numerical response, in order to minimize potential information which may be lost from using categories. The Cognitive Age Scale has been shown to have adequate internal consistency, test-retest, Guttman Lambda and Spearman-Brown split-half reliabilities, .88, .86, and .85, respectively (Barak & Schiffman, 1981).

In addition, Barak and Rahtz's newly developed *perceived youth* computations were employed on the difference scores, wherein the look- and feel-age discrepancies were divided by chronological age and multiplied by one hundred. This computation was performed in order to calculate the magnitude, or proportion, of the life-span represented by the discrepancies.

Self-esteem. Self-esteem was measured using Rosenberg's (1979) Self-esteem Scale. This scale consisted of five statements which assessed feelings of general self-worth and acceptance (e.g., "I take a positive attitude toward myself."). Subjects indicated their agreement with the statements on an eleven point Likert scale ranging from -5 (disagree) to +5 (agree). A higher summed

score indicated greater personal self-esteem. The Self-esteem Scale has been shown to be unidimensional, internally consistent, as well as having high test-retest reliability (Blascovich & Tomaka, 1991). Cronbach's alpha calculated for this scale was .83.

Satisfaction with Life. The Satisfaction with Life Scale (Diener, Emmons, Larsen & Griffin, 1985) was used to assess the cognitive or judgmental component of global life satisfaction. This measure consisted of five statements, such as "I am satisfied with my life." Respondents indicated their degree of agreement with the statements on an eleven point Likert scale ranging from -5 (disagree) to +5 (agree). A higher summed score on this measure indicated greater life satisfaction. The Satisfaction with Life Scale has demonstrated unidimensionality in studies using factor analysis (Lewis, Shelvin, Bunting, & Joseph, 1995; Shelvin & Bunting, 1994). The measure has been shown to have favorable psychometric properties such as high internal consistency and temporal reliability and it is suited for use with different age groups (Diener et al., 1985). Cronbach's alpha for this scale was .87.

Self-efficacy. Self-efficacy was measured using an exercise self-efficacy measure (Deeg, Kardaun, Fozard, 1996). Four statements were used that relate to the four sources of self-efficacy proposed by Bandura (1986). The four sources

are, mastery experiences, modeling, social persuasion, and physiological state (sample item: "Other people seem to think that I am unable to exercise regularly."). Responses to the statements were measured on an eleven point Likert scale, ranging from -5 (disagree) to +5 (agree), and were not added together to create a composite score. A higher score on each on the items indicated greater endorsement of that particular source of self-efficacy. Bandura (1991) posited that self-efficacy beliefs vary across domains, and that a global measure has little relevance to the domain being studied. Therefore, the present investigation used an exercise measure of self-efficacy to coincide with the activity items.

Physical Health Status. Physical health status was assessed using a checklist to determine (a) the total number of medical conditions and (b) the type of medical conditions. The checklist consisted of ten common medical conditions which may affect the elderly population, for example, hip fractures, heart condition, diabetes and arthritis. In addition, there was an open-ended question which allowed the participant to include a condition that may not have appeared in the checklist. The total number of medical conditions were then added together to create a summed score for each respondent. An additional item was included to assess possible assistance required with daily living as a measure

of physical health. This item was rated on an eleven point Likert scale ranging from -5 (never) to +5 (often).

Perceived Health. Perceived health was measured using a self-rated health item posed by Idler (1993). This item is a global assessment of health which asks “How would you rate your health at the present time?” Respondents indicated their health assessment on an eleven point Likert scale ranging from -5 (very poor) to +5 (very good). In addition, two other questions were included by the researchers. The first question assessed the respondent’s health as it compared to other individuals of the same age (“How would you describe your health compared to people your age?”). This item was rated on an eleven point Likert scale, ranging from -5 (much worse) to +5 (much better). The second question assessed health according to what a physician may have indicated (“According to the doctors I have seen, my health is now ____.”). The same eleven point Likert scale was used for this assessment, however, using the -5 (very poor) to +5 (very good) criteria. A higher summed score indicated greater perceived health. It has been suggested that self-assessments of health are important for determining quality of life, functioning and mortality (Staats et al., 1996). Cronbach’s alpha calculated for this scale was .90.

Physical Exercise/Activity. Exercise habits were assessed using a

modified version of Davis' (1990) Lifestyle Questionnaire. Respondents were asked whether or not they exercised on a regular basis. If an individual replied "yes," he or she further indicated: (a) the type of exercise, (b) the number of days of exercise per week, (c) the number of minutes per exercise session, and (d) the number of weeks in past 12 months spent exercising. For an individual who replied "no" to exercising regularly, he or she was provided with a checklist of possible reasons for not engaging in physical activity (sample items: ill health, costs too much, lack of time). A physical index was then created by giving each type of exercise a metabolic equivalent (MET) based on published tables by Ainsworth's et al. (1993). These MET's were multiplied by the number of days and the number of minutes, and further summed to create a single score, or personal exercise index (PEI). A higher PEI indicated a greater amount of physical exercise on the part of the respondent.

In addition, a second measure of physical activity was included based on the number of hours per day that respondents spent on five types of activities: basal (i.e., sleeping); sedentary (i.e., reading); slight (i.e., walking); moderate (i.e., golf); and heavy (i.e., swimming laps). Each activity was given an intensity factor (Abbot, Rodriguez, Burchfiel & Curb, 1994). The intensity factor was multiplied by the number of hours engaged in each activity and summated

(computations were based on 24 hour equivalents). A higher score therefore indicated greater amounts of physical activity.

Perceived Exercise/Activity. A measure of how physically active individuals perceived themselves to be was also included. It was speculated that an age-related bias may occur with the objective measures. The scores on the objective measures are higher for individuals who can participate in more strenuous activities for a longer period of time, which may bias this measure in favor of the younger adults. Therefore, three statements were included to assess whether the respondents felt physically active, regardless of actual activity levels. One example of an item is, "I am a physically active person." The items were measured on an eleven point Likert scale, ranging from -5 (disagree) to +5 (agree). A higher summed score indicated greater perceptions of being physically active. The Cronbach's alpha calculated for this scale was .87.

Stereotypes. The degree to which individuals endorse ageist stereotypes was assessed by providing three statements, used in previous aging research. The first statement given to the participants was "Physical aging is a programmed, internal process." The second statement was "Physical aging is a process that can be altered by one's lifestyle." The final statement was "Physical aging is a general process that affects many aspects of one's physical being." The

respondents indicated their degree of agreement with each statement on an eleven point Likert scale ranging from -5 (disagree) to +5 (agree). A higher score on each item indicated a greater endorsement of that age-related stereotype.

Demographic Variables. Demographic characteristics were assessed using five general questions determined by the researchers. Questions were given regarding chronological age, gender, marital status, retirement status, and years of education.

Results

The findings from a series of hierarchical regressions are presented in the following sections. For the supplementary analyses, findings from Analyses of Variance, t-tests, and Pearson correlations are included. The results for both feel-age and look-age discrepancies are reported.

Data Screening

Prior to conducting the analyses, all of the measures were screened for univariate outliers and potential skewness. Outliers were identified by dividing the skewness values with the standard error of skewness, to obtain a standardized

score. A score greater than ± 3.29 was considered to be an outlier. On both the feel-age and look-age discrepancies, two outliers were found. However, the values did not exceed ± 5 and were not excluded from the analyses, as these were not seen as a threat to the normality of the data. Tabachnick and Fidell (1996) indicated that when sample sizes are large, values over ± 3.29 are expected and are not a threat. Prior to screening the data, one of the participant's scores on both feel-age and look-age discrepancies was detected as an outlier and adjusted. The participant indicated that he or she felt 500 chronological years old on both of the chronological-subjective age discrepancy items. The researchers changed the response to 120 years old since this is the average *maximum* lifespan of a human being and this respondent obviously felt as old as possible.

Predictors of Chronological-Subjective Age Discrepancies (Entire Sample)

The Pearson correlations between the variables are reported in Table 3. The variables that significantly correlated with the two chronological-subjective age discrepancies at $p \leq .01$ included: chronological age, self-efficacy (mastery experiences), self-efficacy (physiological state), self-esteem, *perceived* activity, *perceived* health, life satisfaction and the number of years retired. The correlations ranged from $\pm .13$ to $\pm .31$. These seven variables were therefore

retained and utilized in all subsequent analyses.

Two hierarchical regressions were conducted to determine the best predictors of the feel-age and look-age discrepancies. Again, the variables included in the regressions analyses were chronological age, self-esteem, self-efficacy (mastery experiences), self-efficacy (physiological state), perceived activity, life satisfaction, years of retirement, and perceived health.

Tests for possible interactions between chronological age and each of these variables were conducted by computing product terms. This procedure consisted of multiplying each variable by chronological age (e.g., age by self-esteem). Next, chronological age and self-esteem were entered as separate variables into the first block of a hierarchical regression equation, followed by the previously computed product term (Cohen & Cohen, 1983). There were no interactions for either of the dependent measures; therefore, the researchers were able to proceed with entering chronological age first in all subsequent hierarchical regressions. This technique aided the researchers in clarifying which variables beyond that of chronological age predicted the discrepancies. Cases with missing data were excluded from the analyses using listwise elimination. Thus, all cases with a minimum of one missing variable were eliminated from the analyses.

Predictors of Feel-age Discrepancies. The results of the hierarchical regression indicated that chronological age was a significant predictor of feel-age discrepancies when entered into the equation first, [$R^2 = .30$, $F(1, 375) = 36.6$, $p < .001$]. What is more important, the set of remaining variables also were significant predictors of feel-age discrepancies, even after chronological age was statistically controlled for [$R^2_{\text{chg}} = .15$, $F(7, 368) = 10.27$, $p < .001$]. An examination of the semipartial correlations revealed that perceived exercise [$sr = .10$, $t(368) = 2.3$, $p = .03$] and perceived health [$sr = .10$, $t(368) = 2.3$, $p = .02$] both independently contributed to the discrepancy between chronological age and feel-age (see Table 4).

Predictors of Look-age Discrepancies. The hierarchical regression for the look-age discrepancies also indicated that chronological age was a significant predictor [$R^2 = .07$, $F(1, 370) = 26.8$, $p < .001$]. Again, the variables entered after chronological age were also found to be significant predictors [$R^2_{\text{chg}} = .08$, $F(7, 363) = 5.0$, $p < .001$]. Perceived exercise [$sr = .13$, $t(363) = 1$, $p = .01$] and self-efficacy (*mastery experiences*) [$sr = -.10$, $t(363) = -2.14$, $p = .03$] demonstrated a unique contribution to the discrepancies between chronological age and look-age (see Table 4).

Cross-sectional Predictors of Chronological-Subjective Age Discrepancies

A cross-sectional examination of the predictors of feel-age and look-age discrepancies was obtained by calculating a series of hierarchical regressions across the five age groups. The results of these regressions are presented in Table 5 and Table 6. The following is a summary of the findings on both the feel-age and look-age discrepancies. Overall, the main divergence between these two difference scores is that chronological age *did not* significantly predict look-age discrepancies for any of the age groups. However, with feel-age discrepancies the influence of chronological age was surprisingly only apparent with the younger groups. In addition, look-age discrepancies were influenced by perceived activity, whereas the feel-age discrepancies were not. As aforementioned, all of the regressions were entered as follows: block one consisted of chronological age, and block two consisted of self-efficacy (mastery experiences), self-efficacy (physiological state), self-esteem, perceived activity, perceived health and life satisfaction and number of years retired. Note that *years of retirement* for analyses with age groups 1 (20 to 34 years of age) and 2 (35 to 44 years of age), were excluded as these individuals were still employed and therefore could not provide data for this question.

Predictors of Feel-age Discrepancies. For the individuals 20 to 34 years of

age, chronological age was a significant predictor, with the unique contribution of self-esteem. Among the individuals 35 to 44 years of age, chronological age was again a significant predictor. However, no unique contributions were found as the variables were only significant as a whole. For the individuals 45 to 54 years of age, chronological age was not a significant predictor of feel-age discrepancies. Regardless, the variables entered subsequently into the regression equation were significant, with the unique contribution of perceived health. For the group of individuals 55 to 69 years of age, neither age nor the remaining variables significantly added to the prediction of feel-age discrepancies. Finally, for the group of individuals 70 to 9 years of age, chronological age was also not a significant predictor (see Table 5). However, the variables which were found to be the most important for these individuals were self-efficacy (mastery experiences) and life satisfaction. Therefore, the patterns displayed here indicated that for feel-age discrepancies, chronological age becomes less important as individuals become older.

Predictors of Look-age Discrepancies. For the individuals 20 to 34 years of age, neither chronological age, or the remaining variables were significant predictors of the look-age discrepancies. For the next group of individuals, ages 35 to 44, chronological age was again not a significant predictor. However,

perceived activity contributed uniquely with the look-age discrepancies (see Table 6). Likewise, for the group of individuals 45 to 54 years of age, chronological age was not a significant predictor. The remaining variables in the equation did significantly predict look-age discrepancies, but only as a whole. For those individuals 55 to 69 years of age, chronological age again, was not a predictor. However, perceived activity and life satisfaction did offer unique contributions. Finally, for the last group of individuals 70 to 99 years of age, chronological age did not predict look-age discrepancies, nor did the remaining variables.

Supplementary Analyses

The following sections include the findings from simple one-way Analyses of Variance, *t*-tests, a series of hierarchical regressions and Pearson correlations. Recall that the chronological-subjective age discrepancies are difference scores that were calculated by subtracting subjective age from chronological age. Therefore, a higher (positive) mean score indicates a greater discrepancy towards feeling youthful.

Chronological-Subjective Age Discrepancies Across Age Groups. Mean-level analyses were conducted (ANOVAs), to test the differences across the five

age groups on their subjective age discrepancies. Older adults reported feeling younger on the chronological-subjective age discrepancies (feel & look), in comparison to the younger age groups. The mean feel-age and look-age discrepancies across age groups are presented in Table 7. Results indicated that, for the *feel-age* discrepancies, there were significant differences between the five age groups [$F(4, 404) = 8.78, p < .01$]. Newman Keuls post hoc analyses ($p < .05$) indicated that the younger age groups, 20 to 34 ($M = 2.78$) and 35 to 44 ($M = 6.1$) had significantly lower scores than group of 45 to 54 ($M = 8.60$) years old. However, those 45 to 54 years of age had significantly lower scores than those 55 to 69 ($M = 11.53$) and 70 to 95 ($M = 11.04$) years of age.

In addition, results indicated significant differences between the five age groups on the *look-age* discrepancies [$F(4, 397) = 4.89, p = .001$]. The Newman Keuls post hoc analyses revealed a pattern of significant differences between the groups that was identical to the feel-age discrepancies. Those individuals ages 20 to 34 ($M = 3.2$), 35 to 44 ($M = 4.42$), were significantly different than those 45 to 54 ($M = 6.08$). Again, those 45 to 54 years of age were significantly different than those who were 55 to 69 ($M = 7.34$) and 70 to 95 ($M = 7.58$).

Psychological Benefits of Youthful Chronological-Subjective Age

Discrepancies. The sample was divided into three groups based on whether they

reported feeling, younger, equivalent to, or older than their chronological ages. However, due to the limited number of participants in the *older* and *equivalent* age groups, these were collapsed into one category. Despite collapsing the groups together, the number of respondents in the younger and older (collapsed group) was still substantially uneven. The number of respondents in each category (younger, equivalent and older) are presented in Table 8. In addition, the percentage of respondents in each category across age groups is presented in Table 9, although sample size did not permit age groups comparisons.

Simple *t*-tests were conducted on both feel- and look-age discrepancies. The variables included in the analyses were those shown to be significant in the previous hierarchical regressions (self-efficacy *mastery*, self-esteem, perceived exercise, perceived health, and life satisfaction).

Results from the *t*-tests indicated that the subjectively younger and older groups significantly differed on all of the measures (see Table 10). The group who had a youthful chronological-subjective age discrepancy scored higher on self-esteem, perceived activity, perceived health and life satisfaction. This group did however score lower on the self-efficacy measure, which indicated less endorsement of *mastery experiences*. Mean responses on the main variables of interest are sorted by group in Table 10

Results of the t -tests for look-age discrepancies also revealed that the groups scored significantly different on the measures. Again, the group with youthful discrepancies scored higher on self-esteem, perceived activity, perceived health, life satisfaction, and lower on self-efficacy (mastery). Mean differences are presented in Table 10.

Gender Differences. Potential differences gender differences on the feel-age and look-age discrepancies were also analyzed. On feel-age discrepancies, no significant differences were found between males ($M = 8.1$) and females ($M = 8.2$), [$F(1, 407) = .003$]. The look-age discrepancies also showed no significant differences between males ($M = 6.03$) and females ($M = 5.70$), [$F(1, 400) = .15$]. Therefore both males and females scored similarly on both of the chronological-subjective age discrepancies.

Feel-age and Look-age Discrepancy Measures. Pearson correlations were used to investigate potential differences on the feel- and look-age discrepancy measures. The pattern of correlations indicated that the two dependent variables (feel-age and look-age discrepancies) were significantly related ($r = .61$, $p < .001$). Despite this strong positive association between the two dependent measures, the predictors were found to influence each discrepancy differently. This finding suggests that the two measures should be investigated separately, and not added

together to create a total score.

The variables that correlated positively with the feel-age discrepancies at $p \leq .01$ included, self-esteem ($r = .20$), perceived activity ($r = .31$), life satisfaction ($r = .20$), perceived health ($r = .31$), years of retirement ($r = .13$) chronological age ($r = .27$) and daily assistance ($r = .07$). In addition, significant negative correlations were found for two of the self-efficacy measures, *mastery experiences* ($r = -.13$) and *physiological state* ($r = -.14$). Negative correlations on these variables indicate less endorsement to that particular source of self-efficacy. For the look-age discrepancies, the variables that were positively correlated included, chronological age ($r = .26$), perceived health ($r = .20$), perceived activity ($r = .24$) and self-esteem ($r = .14$).

Perceived Youth Measure. The aforementioned analyses were also run using the *perceived youth* measure (Barak & Rahtz, 1999) to compare with the chronological-subjective age discrepancy findings. Recall that perceived youth calculates the proportion of the life-span represented by the simple chronological-subjective age discrepancies.

The Pearson correlations between the two chronological-subjective age discrepancy measures (feel- and look-age) and the proportional feel- and look-age measures were, $r = .94$ and $r = .92$ respectively (significant at $p < .001$). The

remaining variables that significantly correlated with proportional feel- and look-age (at $p \leq .01$) included: self-efficacy (physiological state), self-efficacy (mastery experiences), self-esteem, perceived activity, daily assistance, perceived health, life satisfaction, number of medical conditions, and stereotypes (aging is a programmed, internal process). These results differed slightly from those obtained from the chronological-subjective age discrepancy measures; the proportional measures also correlated with the number of medical conditions, stereotypes and help with daily assistance. However, the most notable difference between the two measures (discrepancies versus proportional) is that chronological age did not correlate with either proportional feel- or look-age, $r = .08$, ns and $r = -.02$, ns, respectively. The chronological-subjective age discrepancies for feel-age ($r = .26$, $p < .001$) and look-age ($r = .22$, $p < .001$) were found to correlate with chronological age.

A hierarchical regression was run for entire sample using the proportional feel-age measure. The findings indicated that chronological age was a significant predictor. However, self-efficacy (mastery experiences), self-esteem, perceived activity, and perceived health contributed uniquely to the proportional feel-age measure. These findings differ slightly from the simple feel-age discrepancies, which did not have the unique contribution of self-efficacy (mastery) and self-

esteem. The proportional look-age measure indicated that self-efficacy (physiological state), self-esteem, and perceived activity uniquely contributed. Again, these differ slightly from the simple discrepancy measures, which did not include either self-efficacy (physiological) or self-esteem.

A series of hierarchical regressions were also run for both proportional feel-age and look-age across the five age groups. The following is a summary of the significant predictors of the proportional feel-age measure: 20 to 34 years of age (chronological age and self-esteem), 35 to 44 years of age (all predictors), 45 to 54 years of age (perceived health), 55 to 69 years of age (no significant predictors) and, 70 to 95 years of age (self-efficacy mastery and life satisfaction).

The following is a summary of the significant predictors for the proportional look-age measure: 20 to 34 years of age (no significant predictors), 35 to 44 years of age (perceived activity), 45 to 54 years of age (predictors were all significant), 55 to 69 years of age (perceived activity and life satisfaction) and, 70 to 95 years of age (no significant predictors). These findings are identical to those found using the simple discrepancy scores.

In addition to the main investigations, supplementary analyses were explored using the proportional measures as well. First, the magnitudes of these discrepancies across age groups were tested. Mean-level analyses were

conducted (ANOVAs) to test the differences across the five age groups on perceived youth (proportional) scores. No significant differences were found between the age groups on the magnitude of these discrepancies, for either proportional feel-age or look-age, [$F(4, 409) = 2.07, ns$] and [$F(4, 402) = .30, ns$], respectively. This finding is quite interesting, as the simple chronological-subjective age discrepancies across age groups were found to differ significantly. Mean scores for the magnitude of these differences in proportion across age groups are presented in Table 11.

The benefits of having a younger versus an older proportional age discrepancy were also examined. The proportionally younger feel-age group had significantly higher scores on perceived health, life satisfaction and less endorsement of self-efficacy (mastery experiences). The proportionally younger look-age group had higher scores on self-esteem, perceived health, and less endorsement of self-efficacy (mastery experiences). Again, these differed slightly from the simple discrepancies, which further indicated higher scores on perceived activity. In addition, just as the mean-level analyses (ANOVA) for the simple discrepancy measures indicated, gender differences using the proportional measure were also nonsignificant.

Discussion

The purpose of the present study was to investigate which types of variables would predict discrepancies between chronological-subjective ages in younger and older adults. Included were: *psychological variables* (self-esteem, self-efficacy, and life satisfaction), *health factors* (number of medical conditions, perceived and objective measures of activity, and perceived health), *stereotypes about aging*, and *demographic characteristics* (chronological age, retirement status, marital status, and gender). Based on the recommendations of Henderson et al. (1995) and Staats et al. (1993), chronological age was held constant in each regression analysis, to assess the importance of the remaining variables.

Predictors of Chronological-Subjective Age Discrepancies (Entire Sample)

Predictors of Feel-age Discrepancies. Although significant in the Pearson correlations, the psychological variables (self-esteem, self-efficacy & life satisfaction) did not predict discrepancies on feel-age in the hierarchical regression. This contradicts earlier findings (using a variety of measures), which have found psychological variables to be influential on subjective age (Baum and Boxely, 1983; Linn & Hunter, 1979; Montepare & Lachman, 1989). Contrary to

expectations, important predictors of the discrepancy between chronological age and feel-age were perceived activity and perceived health. Thus, when individuals subjectively estimate the age they *feel*, this assessment is based primarily on health-related perceptions. These findings support Staats et al. (1993) who, after carefully controlling for chronological age, also established that perceived health was influential on subjective age. Although chronological age additionally predicted feel-age discrepancies, the focus of this investigation was to elucidate which variables would be influential beyond the number of years lived. One speculation why chronological age may influence discrepancies is because individuals can use it as a reference point for making comparisons. For instance, an older adult may be 85 chronological years of age, however may feel 70 subjective years of age. This individual will have preconceptions about how a typical 85 year old should feel (or look); yet personal experience or beliefs may lead to an association with a different age. Without chronological age to use as a reference point, it would be quite difficult to make this subjective comparison. In a similar fashion to chronological age, it is speculated that perceived health and activity influence feel-age discrepancies because these variables can also be used as a cognitive reference point. Both health and activity may induce salient preconceptions for making comparisons with other age groups.

Predictors of Look-age Discrepancies. The hypotheses for the *look-age* discrepancies were somewhat different, as it was speculated that activity level would be an important predictor. Although mainly exploratory, activity was assumed to influence chronological-look-age discrepancies because it has an impact on physical appearance. In direct contrast to this hypothesis, look-age discrepancies were predicted by *perceived* activity as well as self-efficacy (mastery experiences). The relationship with self-efficacy indicated that respondents felt competent (to exercise) at their current age, as compared to when they were younger. Therefore, any limitations (i.e., health) which may reduce levels of activity did not alter the self-perceptions of being capable and active individuals. Bandura (1991) postulated that mastery experiences are the most effective way to instill a strong sense of personal efficacy and control. However, these results suggest that for chronological-subjective age discrepancies, past successes and failures (in exercise) are less likely to influence the age individuals will perceive themselves to *look*.

Again, an interesting observation from the findings of both feel- and look-age scores was that perceived activity was influential whereas actual activity levels were not. Measures of activity have not been properly investigated in past subjective age studies (Barak & Gould, 1985), which makes these findings

notably unique. One tentative explanation for why perceived activity may be important is because of the impact it has on overall well-being. Marinelli and Plummer (1991) recently indicated that seniors who engaged in *any* level of physical activity (low impact to vigorous) reported positive outcomes in four domains of health. These domains included physical health, emotional (i.e., life satisfaction and coping), social (i.e., sense of belonging), and intellectual (i.e., decision making). Seniors experienced these benefits regardless of the level of activity. Therefore, perceiving the self as an active individual may impact on these four areas of health, as well as the discrepancy between chronological-subjective age.

Cross-sectional Predictors of Chronological-Subjective Age Discrepancies

A cross-sectional approach was used for the second objective of the present study, which was to identify *predictors* of chronological-subjective age discrepancies across various age groups. This objective demarcates the investigation from past research also using cross-sectional methods, in two respects. First, past research has focused on the *patterns* of age discrepancies, thus ignoring the potential influences behind these patterns (Barnes-Farrell & Piotrowski, 1989; Cooper et al., 1981; Goldsmith & Heiens, 1983; Staats, 1996;

Underhill & Caldwell, 1984; and Uotinen, 1998). Second, when predictors have been examined, the scope of these have been quite restricted. For example, previous studies investigating this line of research have examined life satisfaction and fear of aging (Montepare & Lachman, 1989) and demographic characteristics (Henderson et al., 1995); whereas the present study examined four types of variables. Due to the exploratory nature of this investigation, no specific hypotheses were generated for each age group. Instead, more general assumptions were made, asserting that stereotypes and perceived health would be more important predictors for older adults, and demographic variables would be influential for younger adults.

Predictors of Feel-age Discrepancies. The following is summary of significant predictors across five age groups for the *feel-age* discrepancies: 20 to 34 years of age (chronological age and self-esteem), 35 to 44 years of age (chronological age and all predictors as a whole), 45 to 54 years of age (perceived health), 55 to 69 years of age (no significant predictors) and, 70 to 95 years of age (life satisfaction, self-efficacy *mastery experiences*). The most interesting finding for the *feel-age* discrepancies was that chronological age was a significant predictor, but only for respondents between 20 and 44 years of age. A speculation for this finding is that younger adults have not yet experienced

possible age-related health problems, which may influence age estimates. Thus, the only significant milestone available for age comparisons is chronological age. The assumption that demographic variables would be important for younger adults was therefore confirmed. Contrary to speculation, stereotypes about aging were not shown to be significant predictors for the oldest age group (70 to 95 years of age), nor was perceived health; their feel-age discrepancies were determined by life satisfaction and self-efficacy (mastery experiences).

It is also interesting that for individuals 55 to 69 years of age, none of the predictors were significant. This finding is not congruent with previous studies as the majority of researchers have focused on this age group and reported numerous influences. Therefore, in line with Henderson et al. (1995), it may be possible that past findings are the result of improperly controlling for the effects of chronological age. Furthermore, variables such as personality traits have not been thoroughly examined, and may be important for chronological-subjective age discrepancies.

Predictors of Look-age Discrepancies. The following is a summary of significant predictors across the age groups for look-age discrepancies: 20 to 34 years of age (no significant predictors), 35 to 44 years of age (perceived activity), 45 to 54 years of age (predictors were all significant), 55 to 69 years of age

(perceived activity and life satisfaction) and, 70 to 95 years of age (no significant predictors). Interestingly, chronological age was not a significant predictor for any of the age groups, contrary to expectation. For the group of individuals 20 to 34 and 70 to 95 years of age, no significant predictors were indicated. This finding may suggest that individuals are not concerned about chronological age when determining the age they *look* or, again, that important variables have been overlooked (i.e., personality factors).

However, what is more intriguing, is that predictors of chronological and *look-age* discrepancies for respondents 55 to 69 years of age were perceived activity and life satisfaction. This is contrary to the findings for *feel-age* discrepancies, as none of the predictors were significant. Although further investigation is required, these results demonstrate the uniqueness and complexity of these two dimensions of chronological-subjective age discrepancies.

Supplementary Findings

Patterns in Chronological-Subjective Age Discrepancies Across Age Groups. In concordance with previous studies, the majority of respondents reported feeling subjectively younger than their chronological ages, for both *feel-age* (74%) and *look-age* (78%) discrepancy measures. However, despite

hypotheses made by the researchers, younger adults in this sample also perceived themselves as subjectively younger than their chronological age. Therefore, no support was found for Montepare and Lachman (1989), who also utilized the Cognitive Age Scale and found that younger adults perceived themselves to be subjectively older. Middle-aged respondents in the present study also perceived themselves as subjectively younger. Thus, no evidence was provided for the hypothesis that the middle years are a time of inconsistency and age-identity crisis (Goldsmith & Heiens, 1992).

The reason that the present study did not replicate past findings may be due to the modifications made to the Cognitive Age Scale items. For instance, previous studies have combined the four items to create a composite score, and used categorical responses. This investigation examined the items separately, and elicited a numerical, open-ended response from the participants. It may be assumed that the *discrepancies* between chronological and subjective ages reported here are a more accurate reflection of how one feels or looks; this is because an individual does not have to choose from age categories. However, replications using the newly modified format are necessary, before this can be substantiated.

Another speculation as to why a youthful bias was found for all of the

respondents involves the portrayal of old age today. For example, retirement advertisements nowadays will frequently display seniors traveling and enjoying a variety of activities, as opposed to showing the stereotypical frail older adult. Younger and middle-aged adults may recognize that they have an active and fulfilling life to anticipate and therefore feel much younger. Thus, old age may now be viewed more positively than in the past; it may no longer be associated with only frail or institutionalized individuals.

In terms of *look-age* discrepancies, the youthful bias may stem from the societal emphasis on maintaining a youthful appearance. Indeed, with all of the money spent on “age-defying” products each year, people may not only perceive themselves as looking younger, but they may actually look younger too.

Psychological Benefits of Youthful Chronological-Subjective Age Discrepancies. Congruent with previous research, although using different measures, (Baum & Boxely, 1988; Linn & Hunter, 1979; Logan et al., 1992; Montepare & Lachman, 1989), youthful chronological-subjective age discrepancies were associated with higher scores on the measures of psychological well-being. Therefore, support for the “denial of aging” hypothesis was not indicated. The fact that ageist beliefs were not endorsed at all indicates that the respondents do not hold stereotypical beliefs about aging. Individuals

who were subjectively younger (feel- and look-age discrepancies) had higher self-esteem and life satisfaction, as well as greater perceived health and activity levels. These individuals also endorsed self-efficacy (mastery experiences), and believed they were as capable (at exercise) compared to when they were younger.

The results of this investigation offered some support to a proposed model of subjective age posited by Baum (1983). He postulated that subjective age is a reflection of overall subjective well-being, (physical and psychological) which is indicated by life-span markers (or age) that a person feels they are. Baum reasoned that younger self-perceptions are associated with greater subjective well-being, whereas older perceptions indicate that it is lacking. His model of subjective age suggests that individuals seek to be efficacious and competent through all of life's stages. When efficacy is enhanced throughout various stages, subjective well-being is also enhanced and thus, later in life seniors do not feel the "weight of their years." Baum believes that strengthened well-being allows people to remain active and in control of their lives. He further conceptualizes inefficacy and efficacy on a continuum, wherein people may or may not move along it at various points in their life. Regardless of where an individual may lie on this continuum, the subjective experience of age would be impacted.

Baum's model seems to incorporate perceived activity as well, as this

variable also involves the aspect of control and efficacy. It may be possible that when individuals perceive themselves as capable at being active, regardless of age, illness, past experiences or any factors which may limit physical activities, they can associate with younger age identities. Therefore, activity (any amount or kind) leads one to perceive the self as active, which in turn influences efficacy and well-being (i.e., life satisfaction), and impacts the discrepancy between chronological-subjective age.

Past research by Rodin and Langer (1980) has suggested that when older adults have increased feelings of control, it also leads to an increase in both motivation and self-benefit behaviors. In fact, these authors believe that individuals will evaluate themselves as "old" once they attribute aging to environment and circumstances beyond their control. Thus, by taking an active role in their lives, individuals may feel younger than they actually are. It is speculated that taking an initiative to maintain a healthy lifestyle is the key to not only feeling in control, but for determining one's subjective age as more youthful than chronological age.

Gender Differences. The absence of gender differences on the two chronological-subjective age discrepancy measures further replicates the findings of Barak (1998) and Barak and Rahtz (1999). However, there was also a notable

limitation in this investigation, thus the results should be interpreted cautiously. The failure to replicate previous gender differences (Henderson et al., 1995) may be due to the unequal numbers of males and females. Although the age ranges were similar in both studies (20 to 80), Henderson et al. had a more proportioned ratio of males and females (study 1 consisted of 53% women and 44% men, study 2 consisted of 48% men and 52% women). In this study, the gender ratio was not quite equal, with 71% females and 29% males.

Feel-age and Look-age Discrepancy Measures. The feel- and look-age discrepancy measures were examined separately in the present study. Although these two measures did correlate quite strongly ($r = .61$), the variables which influenced each were distinctive enough to warrant separate investigations. The feel-age discrepancies, for instance, were influenced by more types of variables than the look-age discrepancies. Variables that were shown to influence the feel-age discrepancies (beginning with the strongest correlations) included, perceived health, perceived activity, chronological age, self-esteem, life satisfaction, self-efficacy (physiological state), self-efficacy (master experiences), and years of retirement. On the contrary, look-age discrepancies were influenced by: chronological age, perceived activity, perceived health, and self-esteem. These findings indicated that these two discrepancy measures do possess distinct

features and would be best examined individually. The present investigation thus replicated previous findings by Barak and Schiffman (1981) who also found differences among the two items. Due to these notable differences, it is recommended that the two measures are not combined together, as in previous studies, as this would surely result in a loss of important information. However, based on the findings of this study alone, the discrepancy measures (feel- and look-age) cannot be assumed to be multidimensional, as other researchers (e.g., Staats et al., 1993) have suggested. A factor analysis must be performed to support such claims of multi-dimensionality; which to date has not been implemented.

The only gender difference found between the two discrepancy measures was for the total number of years in retirement. This variable was influential on both feel- and look-age discrepancies for the male respondents, however, this was not found for the females. Thus, a moderate degree of support for the hypothesis that males would be affected more so by retirement than females was demonstrated. It may be hypothesized that as a result of sex role stereotypes, retirement may be more influential to the self-concepts of males than to females.

Perceived Youth Measure. The analyses in the present study were also run using Barak and Rahtz's (1999) *perceived youth* measure (chronological age

divided by the discrepancies, multiplied by 100), to compare with the findings of the simple discrepancies. Perceived youth calculates the proportion of the life-span that is represented by the discrepancies. The findings from the Pearson correlations indicated that the perceived youth measures (feel- and look-age) were remarkably similar to the simple chronological-subjective age discrepancies. Due to these high correlations, it was not surprising that many of the findings were consistent to those found using the simple discrepancies. However, one exceptional difference was that chronological age did not significantly correlate with the perceived youth measure of feel-age ($r = .08$, $p = .10$) or look-age ($r = -.02$, $p = .77$). This differs from the findings using simple discrepancies, as chronological age was significantly correlated with both feel-age ($r = .26$, $p < .001$) and look-age ($r = .22$, $p < .001$) discrepancies. One reason for this finding may be that simple chronological-subjective age discrepancies are too highly correlated with chronological age to be an accurate estimate of "youth" or "old age". Proportionalized discrepancy scores apparently provide good control for chronological age, as Barak and Rahtz (1999) claim. However, if a researcher controls for the effects of chronological age in regression analyses, this problem can be eliminated.

The main finding from the hierarchical regressions on the entire sample

was that self-esteem contributed uniquely to both proportional feel-and look-ages. Self-esteem was not a unique predictor when using the simple discrepancies. However, when the predictors were examined across the five age groups, the findings from the simple discrepancies were precisely replicated. This replication was found for both feel- and look-age discrepancies.

The supplementary analyses that were run using the perceived youth measure demonstrated the most interesting findings. First, the differences across the five age groups in regards to the magnitude of the discrepancies were found to be nonsignificant. This finding illustrates that, although there were differences in chronological-subjective age discrepancies, these discrepancies represent the same proportion of the life-span for each age group. Therefore, a chronological-subjective age discrepancy of fifteen years for an eighty-year-old person is relatively similar to a discrepancy of five years for someone twenty-five years of age. The perceived youth method of exploring the magnitude of the age discrepancies is quite unique because it provides information beyond that obtained by simple discrepancies. In fact, Barak and Rahtz (1999) posit that this method is exceptionally valuable for contrasting the relative size of discrepancies of perceived youth between members of different age cohorts. Furthermore, previous findings that indicate chronological-subjective age discrepancies

increase as chronological age increases may be slightly misleading. For instance, in the present study, although the discrepancies increased with chronological age, the proportion of the life-span these represented stayed essentially the same. Previous researchers employing chronological-subjective age discrepancy measures have also reported an increase in these discrepancies with advancing age. However, the magnitudes of these differences have not been thoroughly investigated. Therefore, perceived youth is a very useful measurement tool in subjective age research. Future research is necessary to establish psychometric properties of the perceived youth measure, as well as to replicate the findings of the present investigation.

The psychological benefits of being proportionally younger (feel-and look-age), as compared to older were also investigated. The findings differed slightly from the simple chronological-subjective age discrepancies. Perceived activity did not differ between the groups when using the proportional measure. Finally, gender differences using the perceived youth measure were not significant, which also replicates the findings from the simple discrepancies. This finding indicates that gender differences do not exist in terms of the proportion of chronological-subjective age discrepancies, as Barak (1998) and Barak and Rahtz (1999) posited. As previously mentioned, replications with a

consistent subjective age measure, and an equal ratio of males and females are required for further validation.

Summary, Limitations, and Considerations for Future Research

In summary, the results of the present study further clarified which variables predict chronological-subjective age discrepancies. The findings indicated that *feel-age* discrepancies were influenced by perceived activity and health, and *look-age* discrepancies by perceived activity and efficacy. When a cross-sectional approach was employed, different predictors emerged for various age groups, and between the modified Cognitive Age items. Furthermore, older and younger adults in this sample perceived themselves as subjectively younger, and this was also demonstrated for both genders. One of the questions posed by the researchers was whether this youthful chronological-subjective age discrepancy would be beneficial or represent a denial of aging. The findings presented here may suggest that feeling young is beneficial, as indicated by higher scores on the measures of well-being for these individuals. Finally, the findings provided support for using the modified Cognitive Age items separately, as these exhibited important differences.

This investigation offered a number of methodological advantages over

past studies that have also utilized the Cognitive Age Scale. First, the discrepancies between chronological age and feel-age/look-age were examined separately, as not to mask substantial differences. Second, the response format for the two difference scores was open-ended and elicited a numerical answer, as not to restrict answers to pre-determined categories. Third, the Cognitive Age Scale (although modified here) has not yet been used to examine these four kinds of variables (psychological, health, stereotypes, and demographics) at once. It has been used to study exclusive types of variables, for instance, consumer-related traits (Barak & Gould, 1985), demographics (Henderson et al., 1995) and cultural differences (Chua, Cote, & Leong, 1990). Finally, chronological age was tested for potential interactions with the remaining variables, prior to holding it constant in hierarchical regression equations. However, some caution is also necessary when interpreting these results, as this investigation was also limited in a number of ways.

The extent to which the results of the present study can generalize is the first limitation. The sample consisted of community-dwelling seniors and younger adults, thus the results of this study may not apply to other individuals. It may be speculated that institutionalized seniors would report feeling older (or equivalent) to their chronological age. Seniors who live in institutionalized

settings may not feel as efficacious as those living in the community, which contributes to subjective feelings of youth. Although, Terpstra, Terpstra, Plawecki and Streeter (1989) suggest that institutionalized seniors may not differ greatly in chronological-subjective age discrepancies from community-living seniors. They found that community seniors felt 11.3 years younger than their chronological ages, whereas nursing home residents felt 13.1 years younger. This finding must be interpreted cautiously, as it was not mentioned if the homes had activity programs which could increase self-efficacy.

Furthermore, the return rate for the questionnaire was satisfactory (42.8%), and may suggest a bias in the results. For instance, those individuals who felt subjectively *older* may have been less willing to respond.

In addition, cultural differences may also account for some of the differences observed between chronological-subjective ages. Culture was not examined in this investigation. Recent findings from Uotinen (1998) suggest that individuals from North America, when compared to a Finnish sample, show less acceptance of age and report feeling younger. In addition, Chua et al. (1990) found that in a sample of older adults from Singapore, those who spoke English also reported feeling subjectively younger. Therefore, future studies would benefit from taking a closer examination of cultural differences. Uotinen

suggests that using an open-ended, numerical response format (as in this study) is more appropriate for this line of research, as this method is less culture-linked than categorical responses.

A second limitation of the present study was the reliance on single-item measures for the two chronological-subjective age (feel-age and look-age) discrepancies. Single item subjective age measures have been criticized (George et al., 1980), for being strongly influenced by social desirability, although recent evidence has suggested otherwise (Hubley & Hultsch, 1994). In addition, Gardner, Cummings, Dunham and Pierce (1998) posit that for certain research questions (i.e., self-reports), single item measures may not only be appropriate, but superior. Many researchers however, choose to disregard single item measures because establishing reliability and validity is difficult. However, Gardner et al. suggests that one "good" item may be psychometrically advantageous to many "bad" (i.e., poor reliability) items. Furthermore, these researchers propose that multiple item scales are problematic because these are more time-consuming, create monotonous responding, and fatigue the participant. A single item may give the respondents an opportunity to carefully answer the research question, thus eliciting an accurate expression of their beliefs or attitudes.

Another limitation was the use of cross-sectional methods to examine discrepancies in chronological-subjective ages across the life-span. One of the most long-standing criticisms of cross-sectional research is that differences which are observed may represent chronological age or cohort changes (Baltes, 1968). Furthermore, in cross-sectional research, there is only one observation made per age cohort, which conceals important developmental changes. Therefore, crucial events that lead up to subjectively feeling younger or older are not explicated. Future studies would benefit from designs using longitudinal methods, which would display these developmental patterns. Another method that can be used is growth curve analysis, which would examine the events leading up to the chronological-subjective age discrepancies. There are important implications of determining the development up to feeling subjectively older or younger. As Idler and Kasl (1991) have indicated, seniors who perceive themselves in good health, also alter their risk of mortality. Although strictly speculative, perceptions of youth may have a similar effect to perceptions of health. Therefore, by feeling subjectively younger, an older individual may bring their chronological age in line with their subjective age estimate. In fact, based on the psychological benefits of feeling younger, Baum (1983) suggests that gerontologists create age-identity intervention strategies. He hypothesizes that by inducing *youthful*

feelings in those subjectively older and less active, psychological well-being will be enhanced. However, methods which allow researchers to analyze the risk factors leading up to feeling older than one's age, as well as the time of onset for this change are required. Finally, qualitative methods may also elucidate many important questions when investigating subjective age. Researchers often include variables they believe are important into their study without directly asking the participants in question for their input. In fact, Gardner et al. (1998) posit that researchers frequently create items based on their own understanding of the construct under investigation, which may or may not be accurate representations.

A fourth limitation of this investigation was that too few seniors reported feeling subjectively *older* than their chronological ages to contribute to the understanding of this side of the subjective age phenomenon. Therefore, caution must be taken when interpreting the subjectively young versus old group comparisons in this study. To make comparisons statistically feasible, the researchers had to combine the groups of individuals *older* and *equivalent* to their chronological ages together. Conceptually, these categories may be quite different, but combining them together was necessary to make group comparisons. Future studies would benefit from comparable numbers of individuals in each of the three groups (younger, older, and equivalent to

chronological age) in order to fully understand the impact on psychological well-being. The present investigation also had an unbalanced ratio of males and females. Therefore caution must also be taken when interpreting the results of the gender analyses.

A final limitation of the present study was the use of only the feel- and look-age items of the modified version of the Cognitive Age Scale. However, due to the different influences on each of these items, this may not be a limitation under certain circumstances. The items chosen from the scale may reflect the research question of interest, therefore if an inquiry was focused on physical appearances, the *look-age* item could be utilized. If the researcher was only interested in physical appearance, the inclusion of the remaining items would not be necessary. Furthermore, chronological-subjective age discrepancies may be thought of as domain specific (feel, look, do & interests). Therefore by adding the four items together, a researcher may be merging different components of subjective age in a less than meaningful way. In the present investigation however, the researchers were interested in predicting which variables would influence chronological-subjective age discrepancies. Therefore, the study would have benefitted from examining all four items as separate dependent measures. In addition, the advantage of using Barak and Rahtz's perceived youth measure

was established. This method provides a greater understanding of the chronological-subjective age discrepancies when comparing various age groups. Therefore future studies would benefit from incorporating this easily computed proportional measure of age discrepancies.

Finally, because some of the feel- and look-age discrepancies were not influenced by any of the variables for certain age groups (i.e., 55 to 69 for feel-age), the inclusion of potentially new predictors is necessary. For instance, future studies could focus on personality traits, and how these influence chronological-subjective age discrepancies. Hubley and Hultsch (1994) recently examined personality using the NEO-PI, but they included only three of the five possible traits (neuroticism, extraversion, and openness). These preliminary findings suggested that extraversion was related to the age an individual *feels*. However, future research would benefit from incorporating a complete measure of the five factor model of personality (i.e., Goldberg, 1992).

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Table 1: Measurement of Subjective Age and Findings from Previous Research

Authors	Subjects	Method	Measure	Main Finding
Burke & Tully (1979)	58 classrooms (6 th , 7 th , 8 th grades)	Questionnaire	Stereotype Age ₁ (33 bipolar items)	Development of a 15 item scale
Linn & Hunter (1979)	150 community seniors (65 years of age and over)	Questionnaire	Comparison Age ² (single item)	Internal locus of control associated with youthful subjective age
Cooper et al. (1981)	294 community adults (17 to 85 years of age)	Questionnaire	Experimental Clock ³ (projective device)	Males felt subjectively younger
Baum & Boxley (1983)	91 institutionalized seniors 217 community seniors	Interview	Comparison Age (single item)	Purpose in life most important for youthful reports
Markides & Boldt (1983)	510 adults (50 and older)	Interviews over 4 year period	Identity Age ⁴ (single item)	Individuals who felt older were also in poorer physical health
Barak & Schiffman (1981)	324 community adults (55 years of age and older)	Interview & Questionnaire	Cognitive Age ⁵ (4 items together/separately, category response)	Cognitive Age is reliable, and had good internal consistency
Underhill & Caldwell (1984)	1,900 adults (18 years of age and older)	Telephone interviews	Feel-Age ⁶ (single item)	Retired individuals more likely to feel their chronological age
Barak & Gould (1985)	430 females (30 to 69) years of age)	Questionnaire	Cognitive Age (4 items combined, with open-ended response)	Age of youngest child, age of oldest grandchild, homebody, masculinity, and eating at restaurants predicted Cognitive Age scores
Montepare & Lachman (1989)	188 community adults (14 to 83 years of age)	Questionnaires	Cognitive Age (4 items combined, category response)	Fear of aging not linked with older subjective ages in seniors
Goldsmith & Heines (1992)	607 community adults (21 to 92 years of age)	Questionnaire	Cognitive Age (4 items combined, category response)	Younger adults felt older, and middle-age adults showed the most variability in subjective age

Table 1 continued : Measurement of Subjective Age and Findings from Previous Research

Authors	Subjects	Method	Measure	Main Finding
Logan et al., (1992)	1,200 community adults (40 to 80)	Interviews	Identity Age	Age and health predicted subjective age
Staats et al., (1993)	250 community adults (50 and older)	Mini-longitudinal	Identity Age (3 items)	Older adults report more youthfulness, regardless of health status
Hubley & Hultsch (1994)	Study 1: 241 community adults (53 to 75 years of age) Study 2: 355 community adults (55 to 85 years of age)	Questionnaire	Identity Age (2 items, open-ended)	Personality traits (neuroticism, openness, extraversion)
Henderson et al., (1995)	Study 1: 185 adults (21 to 80) Study 2: 607 adults (21 to 92)	Questionnaire	Cognitive Age (4 items combined, category response)	No predictors were systematically significant
Staats (1996)	Data from 2 cohorts: 222 older adults, 112 younger adults	Questionnaire	Identity Age (2 items, category response)	Older adults view time of greatest accomplishment later in life
Uotinen (1998)	1,355 adults (21 to 64)	Questionnaire	Feel Age (single item) Identity Age (single item)	Finnish subjects' subjective ages corresponded closer their chronological ages
Chua (1990)	301 adults (55 and older)	Questionnaire	Cognitive Age (4 items, category response)	English speaking more likely to feel younger
Barak & Rahitz (1999)	668 adults (60 and older)	Questionnaire	Perceived Youth ⁷ Feeling-old ⁸	Perceived youth and feeling-old measures are suited for use with older populations

1. Stereotype Age: bipolar items (adjective lists)
2. Comparison Age: one item, respondent's subjective age in comparison to their own chronological age
3. Experimental Clock: projective age
4. Identity Age: one item, respondent's subjective age in relation to *other* age categories
5. Cognitive Age: four item scale, consisting of do/interests/feel/look-age
6. Feel-age: one item, numerical response to how young/old the respondent subjectively feels
7. Perceived Youth: chronological age divided by the discrepancies on the combined Cognitive Age items (category response) multiplied by one hundred
8. Feeling-old Measure: six point Likert response (1) agree (6) disagree to the statement "I feel old."

Table 2

Demographic Characteristics

	<u>M</u> Age (<u>SD</u>)	% Male	% Female	<u>M</u> number of years retired (<u>SD</u>)	<u>M</u> number of total years education (<u>SD</u>)
Group 1: 20-34	29.16	19.2	80.8	0	15.16
n= 74	(3.59)			(0)	(1.71)
Group 2: 35-44	39.4	21.8	78.2	0	14.74
n= 88	(3.01)			(0)	(2.39)
Group 3: 45-54	49.04	24.1	75.9	3.73	15.07
n= 83	(2.65)			(4.16)	(2.61)
Group 4: 55-69	62.73	37.2	62.8	6.77	14.05
n= 78	(4.00)			(5.38)	(3.96)
Group 5: 70-95	77.27	37.5	62.5	16.84	11.8
n= 112	(5.55)			(10.14)	(2.94)

N= 437

Table 3: Pearson Correlations

	feel-age	look-age	ageism m 1 _a	ageism 2 _b	ageism 3 _c	self-efficacy (mastery)	self-efficacy (modeling)	self-efficacy (social)	self-efficacy (physiological)	self-esteem	life satisfaction	perceived health	perceived activity	activity (24 hr)	activity (PFI)
feel-age															
look-age	.61**														
ageism 1	-.04														
ageism 2	-.10	-.004													
ageism 3	-.10	.06	-.06												
self-efficacy (mastery)	-.04	-.50	.24**	.48**											
self-efficacy (modeling)	-.13**		.19**												
self-efficacy (social)	-.14**		.07												
self-efficacy (physiological)	-.01		.07												
self-esteem	.20**		.19**												
life satisfaction	.18**		.02												
perceived health	.31**		.17**												
perceived activity	.31**		.16**												
activity (24 hr)	.03		.11*												
activity (PFI)	.10		.07												
gender			-.05												
marital status			-.11*												
medical conditions			.30**												
daily assistance			.25**												
education			.10*												
chronological age			.45**												

Physical aging is a programmed, internal process

b. Physical aging is a process that can be altered by one's lifestyle

c. Physical aging is a general process that affects many aspects of one's physical being

Table 3 continued: Pearson Correlations

	gender	retirement status	marital status	medical conditions	daily assistance	education	chronological age
frail-age	.003	.13**	-.08	-.06	.07**	.05	.27**
frail-age	-.02	.10	-.06	-.01	.03	-.02	.22**
ageism 1	-.03	.14**	-.01	.08	-.02	-.12*	-.18*
ageism 2	-.07	.13**	.17**	-.06	.08	-.17**	.13**
ageism 3	.01	-.03	.03	.01	.03	.10	-.02
self-efficacy (memory)	-.12*	.25**	-.11*	.27**	-.19**	-.25**	.28**
self-efficacy (handling)	-.05	.26**	-.17**	.25**	-.15**	-.16**	.42**
self-efficacy (social)	-.02	.28**	-.10	.25**	-.27**	-.16**	.31**
self-efficacy (physical/total)	-.11*	.15**	-.08	.22**	-.22**	-.20**	.21**
self-esteem	.02	-.04	.07	-.08	.21**	.09	-.03
life satisfaction	-.01	.06	.10*	-.13**	.15**	-.03	.08
perceived health	.04	.02	.03	-.26**	.30**	.08	.04
perceived activity	-.05	.12*	-.10	.01	.06	.02	.15**
activity (24 hr)	-.13**	-.10*	.11*	.17**	-.12*	-.01	-.17**
activity (PEI)	.03	-.03	-.03	-.06	.13*	.17**	-.10*
gender		-.12*	-.35**	-.11*	.03	.09	-.17**
retirement status			-.31**	.36**	-.33**	-.30**	.68**
marital status				-.29**	.33**	.18**	-.44**
medical conditions					-.33**	-.20**	.43**
daily assistance						-.20**	-.30**
education							-.37**
chronological age							

*p<.05; **p<.01; N=437

Table 4

Predictors of Chronological-Subjective Age Discrepancies: *Feel-age* and *Look-age*

Variables	Feel-age Discrepancies			Look-age Discrepancies		
	R ²	R ² _{change}	Semi-Partial Correlation	R ²	R ² _{change}	Semi-Partial Correlation
Block One	.09**			.07**		
chronological age			.30**			.26**
Block Two		.14**		.08**		
self-efficacy (<i>mastery experiences</i>)			-.09			-.10*
self-efficacy (<i>physiological state</i>)			-.06			-.04
self-esteem			.08			.08
perceived activity			.10*			.13**
perceived health			.10*			.07
life satisfaction			-.01			-.08
years retired			-.05			-.06

* = p < .05; ** = p ≤ .01

Table 5

Predictors of Feel-age Discrepancies Across Age Groups: Controlling for Chronological Age

Group	F _{change} (df)	R ²	R ² _{chg}	Variable(s) and Semi-Partial Correlations
<u>Group 1: (20-34)</u>				
block 1: chronological age	6.67 (1,68)	.09**		chronological age (.20**)
block 2: all predictors	2.93 (6,62)		.20**	self-esteem (.27*)
<u>Group 2: (35-44)</u>				
block 1: chronological age	4.37 (1,83)	.05*		chronological age (.22*)
block 2: all predictors	3.11 (6,77)		.19**	
<u>Group 3: (45-54)</u>				
block 1: chronological age	1.83 (1,78)	ns		
block 2: all predictors	4.93 (7,71)		.32**	perceived health (.22*)
<u>Group 4: (55-69)</u>				
block 1: chronological age	.09 (1,64)	ns		
block 2: all predictors	1.58 (7,57)		ns	
<u>Group 5: (70-95)</u>				
block 1: chronological age	.15 (1,74)	ns		
block 2: all predictors	2.89 (7,67)		.23**	self-efficacy <i>mastery</i> (-.21*) life satisfaction (.22*)

* = $p \leq .05$; ** = $p \leq .01$

Table 6

Predictors of Look-age Discrepancies Across Age Groups: Controlling for**Chronological Age**

Group	F _{change} (df)	R ²	R ² _{chg}	Variable(s) and Semi-Partial Correlations
<u>Group 1: (20-34)</u>				
block 1: chronological age	1.99 (1,68)	ns		
block 2: all predictors	2.18 (6,62)		ns	
<u>Group 2: (35-44)</u>				
block 1: chronological age	1.26 (1,81)	ns		
block 2: all predictors	2.34 (6,75)		.16*	perceived activity (.20*)
<u>Group 3: (45-54)</u>				
block 1: chronological age	1.07 (1,77)	ns		
block 2: all predictors	2.32 (7,70)		.19*	
<u>Group 4: (55-69)</u>				
block 1: chronological age	.8 (1,62)	ns		
block 2: all predictors	3.0 (7, 55)		.27**	perceived activity (.30**) life satisfaction (-.36**)
<u>Group 5: (70-95)</u>				
block 1: chronological age	.35 (1,74)	ns		
block 2: all predictors	2.0 (7.67)		ns	

* = $p \leq .05$; ** = $p \leq .01$

Table 7

Mean Scores for Chronological-Subjective Age Discrepancies Across Age Groups¹

Group	Feel-Age Discrepancies		Look-Age Discrepancies	
	Mean Score	Range	Mean Score	Range
Group 1: 20-34 years of age	2.78 (n=72)	-26 to 15	3.22 (n=72)	-8 to 14
Group 2: 35-44 years of age	6.07 (n=86)	-62 to 36	4.42 (n=84)	-62 to 33
Group 3: 45-54 years of age	8.60 (n=81)	-45 to 28	6.08 (n=80)	-35 to 16
Group 4: 55-69 years of age	11.52 (n=72)	-6 to 48	7.34 (n=70)	-4 to 27
Group 5: 70-95 years of age	11.04 (n=98)	-16 to 52	7.59 (n=96)	-27 to 42
Entire Sample	8.14 (n=409)	-62 to 52	5.8 (n=402)	-62 to 42

1. The discrepancies were calculated wherein negative numbers indicated feeling older in comparison to chronological age and positive numbers indicated feeling younger. A higher score (negative or positive) indicated a greater discrepancy between chronological-subjective age.

Table 8

Number of Participants Feeling Subjectively Younger, Equivalent to, or Older than their Chronological Ages

Groups	N for Feel-age	N for Look-age
Subjectively younger	n= 302 (78.3%)	n= 314 (78.1%)
Equivalent to Chronological age	n= 70 (17.1%)	n= 57 (14.1%)
Subjectively Older	n= 37 (9.1%)	n= 31 (7.7%)
Older and Equivalent Groups Combined	n= 128 (31.3%)	n= 88 (21.9%)
Total N	409	402

Table 9

Percentages Across Age Groups: Feeling Subjectively Younger, Equivalent to, or Older than Chronological Age

	Group 1: (20-34)	Group 2: (35-44)	Group 3: (45-54)	Group 4: (55-69)	Group 5: (70-99)
Feel-age:					
Younger	60 %	74 %	79 %	78 %	74 %
Equal	26 %	12 %	12 %	19 %	17 %
Older	14 %	14 %	9 %	3 %	6 %
Look-age:					
Younger	68 %	82 %	81 %	81 %	80 %
Equal	19 %	10 %	13 %	16 %	15 %
Older	13 %	8 %	6 %	3 %	6 %

Table 10

T-test Values and Mean Scores for the Subjectively Young and Older Groups

Variables	Feel-age Discrepancies			Look-age Discrepancies		
	t	Young M	Old M	t	Young M	Old M
Self-efficacy (<i>mastery experiences</i>)	-2.87 p=.01	.41	1.64	-2.32 p=.02	.64	1.40
Self-esteem	-3.87 p<.001	3.48	2.88	3.25 p=.001	3.44	2.89
Perceived activity	6.04 p<.001	1.62	.08	3.69 p<.001	1.42	.29
Perceived health	5.62 p<.001	2.66	1.37	3.90 p<.001	2.53	1.55
Life satisfaction	4.48 p<.001	2.03	.89	2.30 p=.02	1.88	1.25

Table 11

Mean Scores on the Proportion of Chronological-Subjective Age DiscrepanciesAcross Age Groups

Group	Feel-Age Discrepancies (proportion of life-span)		Look-Age Discrepancies (proportion of life-span)	
	Mean Score	Standard Deviation	Mean Score	Standard Deviation
Group 1: 20-34 years of age (n=72)	8.77	20.30	10.83 (n=72)	13.85
Group 2: 35-44 years of age (n=86)	14.88	30.87	10.98 (n=84)	23.67
Group 3: 45-54 years of age (n=81)	17.41	24.41	12.32 (n=80)	14.39
Group 4: 55-69 years of age (n=72)	18.39	16.44	11.67 (n=70)	9.18
Group 5: 70-95 years of age (n=98)	14.43	15.48	9.88 (n=96)	12.29
Entire Sample (n=409)	14.81	22.39	11.08 (n=402)	15.55

1. Recall that the magnitude is calculated by dividing the discrepancies by chronological age and multiplying by one hundred.

Appendix A: Cover Letter for Questionnaire

I am a student at Lakehead University and I am looking for people to help me with a study I am conducting. The purpose of the study is to understand personal beliefs and health. The study involves filling out a questionnaire and should require about 20 minutes of your time. There are no direct benefits to you for participating, and there are no risks. Your responses will remain completely anonymous and confidential. There are no right or wrong answers, or good or bad answers. Your participation in the study is completely voluntary and you may withdraw at any time. The data from all participants will be pooled and analyzed as a group, as the responses of any single individual are meaningful only in relation to the responses of others. The completed questionnaires will also be safely stored for seven years at Lakehead University. You may obtain a copy of the final results of the study by writing or calling me at the address below.

If you would like to participate, just complete the questionnaire and mail it back to me in the enclosed stamped and self-addressed envelope. To guarantee anonymity, please do not put your name on the questionnaire.

Thank you very much for your help.

Sincerely,

**Sue Maki
Department of Psychology
Lakehead University
Thunder Bay, On.,
P7B 5E1**

Appendix B: Measures

QUESTIONNAIRE

There are no right or wrong, or good or bad, answers to any of the questions below. Please just give the most accurate, truthful response for you. If you find any of the questions too personal, you do not have to respond, although it would be most helpful to us if you answered every question. To ensure anonymity, please do not sign your name on this questionnaire. In answering the questions your first impressions are probably correct. For each question you are asked to make a rating on a scale of numbers. Answer each question by circling the appropriate number. Please do not circle the words. The following statements have to do with how you have been feeling over the past year compared to preceding years.

Do you exercise on regular basis? yes no

Type of Exercise	# of Days per Week	# of Minutes per Occasion	# of Weeks in the Last 12 months
1. _____	_____	_____	_____
2. _____	_____	_____	_____
3. _____	_____	_____	_____
4. _____	_____	_____	_____
5. _____	_____	_____	_____
6. _____	_____	_____	_____

If you do not exercise on a regular basis, what are the reasons?

- | | | |
|---|---|--|
| <input type="checkbox"/> I don't want to | <input type="checkbox"/> Lack of time | <input type="checkbox"/> No facilities nearby |
| <input type="checkbox"/> Costs too much | <input type="checkbox"/> Lack of energy | <input type="checkbox"/> No leaders available |
| <input type="checkbox"/> Ill health | <input type="checkbox"/> Injury or handicap | <input type="checkbox"/> I lack the necessary skills |
| <input type="checkbox"/> Requires too much self-discipline | <input type="checkbox"/> I'm too old | |
| <input type="checkbox"/> Other reasons (please specify) _____ | | |

Now please think about your average day and indicate how much time you spend in each of the following categories of physical activity (the total should add up to 24 hours):

- _____ sleeping or lying down
- _____ sedentary activity (e.g., sitting, standing, reading, listening to music, watching TV)
- _____ slight activity (e.g., light walking, window shopping)
- _____ moderate activity (e.g., sweeping or mopping, raking or mowing the lawn, gardening, carpentry, baseball, golf, slow jogging, brisk walking or dancing)
- _____ heavy activity (e.g., shoveling, digging, chopping wood, carrying heavy loads, swimming laps, racquet sports, running, hockey)

I am a physically active person.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I am more physically active than most other people my age.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I get enough exercise to stay healthy and fit.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I was more competent at exercising when I was younger.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I know many other people my age who are unable to exercise regularly.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

Other people seem to think that I am unable to exercise regularly.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

My body feels lousy when I exercise.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

Physical aging is a programmed, internal process.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

Physical aging is a process that can be altered by one's lifestyle.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

Physical aging is a general process that affects many aspects of one's physical being.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

In general, how would you rate your health at the present time?

Very poor -5 -4 -3 -2 -1 0 1 2 3 4 5 Very Good

How would you describe your health compared to people your age?

Much Worse -5 -4 -3 -2 -1 0 1 2 3 4 5 Much Better

According to the doctors I've seen, my health is now:

Very poor -5 -4 -3 -2 -1 0 1 2 3 4 5 Very Good

Do you require assistance with some of the activities of daily living (e.g., transportation, personal care, cooking)?

Never -5 -4 -3 -2 -1 0 1 2 3 4 5 Often

Do you now have, or have you ever had, any of the following? Check the appropriate items:

- | | | |
|---|--|--|
| <input type="checkbox"/> a heart condition | <input type="checkbox"/> stroke | <input type="checkbox"/> cancer |
| <input type="checkbox"/> diabetes | <input type="checkbox"/> liver disease | <input type="checkbox"/> hip fracture |
| <input type="checkbox"/> broken bones | <input type="checkbox"/> arthritis | <input type="checkbox"/> Parkinson's disease |
| <input type="checkbox"/> amputation of a limb | | |

In most ways my life is close to my ideal.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

The conditions of my life are excellent.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I am satisfied with my life.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

So far I've gotten the important things I want in life.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

If I could live my life over, I would change almost nothing.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

On the whole, I am satisfied with myself.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I feel that I have a number of good qualities.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I am able to do things as well as most other people my age.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I feel that I'm a person of worth, at least on an equal plane with others.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

I take a positive attitude toward myself.

Disagree -5 -4 -3 -2 -1 0 1 2 3 4 5 Agree

Most of the time, I feel as though I am about age ____ years.

Most of the time, I look as though I am about age ____ years.

What is your gender? (circle the answer) Male Female

What is your marital status? (circle the answer):

single married widowed divorced or separated

How old are you? _____ years

What was the highest level of education that you completed? _____

What is (or was) your job? _____

If you are retired, how long have you been retired? _____ years

Thank You Very Much For Your Help