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Carol D. Ryff (ed.), Robert F. Krueger (ed.)

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### CHAPTER

## 7 Determinants and Implications of Subjective Age Across Adulthood and Old Age

Yannick Stephan, Angelina R. Sutin, Antonio Terracciano

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### Abstract

Subjective age (how old or young individuals feel relative to their chronological age) is gaining popularity in gerontology and related disciplines because of its relation with biopsychosocial processes of aging. Evidence from Midlife in the United States (MIDUS) and other cohorts is reviewed on the predictors and outcomes of subjective age. An older subjective age is predicted by age discrimination, negative changes in one's social and family networks, lower well-being and perceived control, poor physical conditions and more chronic health problems. Subjective age is also predictive of a range of crucial outcomes. Indeed, feeling younger is related to better physical and mental health, cognition, more favorable personality changes, lower risk of incident hospitalization, and longevity. These findings suggest that the subjective experience of age is a biopsychosocial marker of aging with promise as a predictor of crucial age-related outcomes, beyond chronological age.

**Keywords:** [subjective age](#), [chronological age](#), [adulthood](#), [well-being](#), [cognitive aging](#), [episodic memory](#), [executive functioning](#), [longevity](#), [developmental time](#)

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## Introduction

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Chronological age is a basic dimension in much gerontological and life course research. Often, it is the key indicator used to track individuals' health and functioning. For many individuals, however, chronological age does not capture the age that they actually feel. This subjective aspect of aging turns out to predict a number of important aging-related outcomes, independent of chronological age (Kotter-Grühn, Kornadt, & Stephan, 2016). Thus, subjective age, or how old or young an individual feels relative to his or her chronological age, is a meaningful alternative marker of aging. Data from the Midlife in the United States (MIDUS) survey have been instrumental in the groundbreaking research on how subjective age shapes the aging process. In this chapter, we review evidence from MIDUS and other cohorts on the predictors and outcomes of subjective age. After defining subjective age, we present existing knowledge on the determinants and implications of subjective age across adulthood. We provide evidence that subjective age is an independent biopsychosocial marker of aging that predicts important life outcomes and trajectories of health across adulthood. Finally, we pose future directions for research on the determinants and consequences of subjective age.

## Reporting a Younger Subjective Age: A Self-Protective Strategy

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Several large national surveys assess subjective age by asking participants to report how old they feel most of the time. These studies consistently report that the majority of middle-aged and older adults feel younger than their chronological age (Choi & DiNitto, 2014; Rubin & Berntsen, 2006). For example, in the first wave of MIDUS (MIDUS 1), more than 80% of participants reported a younger subjective age than chronological age (Mock & Eibach, 2011; Stephan, Sutin, & Terracciano, 2015c), whereas around 7% of participants reported an older subjective age (Mock & Eibach, 2011). These findings suggest that feeling younger than one's actual age is a normative phenomenon in adulthood.

A younger subjective age may be one self-protective strategy that individuals use to buffer against negative aging stereotypes. That is, individuals may feel younger to distance and protect themselves from negative ideas about old age (Kornadt, Hess, Voss, & Rothermund, 2018; Weiss & Freund, 2012; Weiss & Lang, 2012). In a series of experimental studies, for example, Weiss and colleagues found that when older participants were confronted with negative age-related information, they perceived themselves as more similar to younger rather than older individuals and distanced themselves from their same-age peers (Weiss & Freund, 2012; Weiss & Lang, 2012). In addition, a recent longitudinal study reported that individuals feel younger over time in domains in which negative aging stereotypes are common and highly prevalent but not in domains with less negative or even positive images (Kornadt et al., 2018). These findings thus suggest that feeling younger than one's chronological age reflects a dissociation from one's age group and negative societal ideas about aging (Weiss & Lang, 2012). As a result, in contrast to individuals with an older subjective age, those who feel younger are relatively protected from the deleterious effects of negative aging stereotypes (Eibach, Mock, & Courtney, 2010).

# Subjective Age as Outcome: A Biopsychosocial Marker of Aging

Subjective age can be conceptualized as a biopsychosocial marker of aging (Kotter-Grühn, Neupert, & Stephan, 2015; Stephan, Sutin, & Terracciano, 2015b). In this approach, subjective age is treated as an *outcome* of several factors, which simultaneously encapsulates a range of cues about aging, from biological to social (Stephan et al., 2015b). This conceptualization suggests that subjective age provides important information about an individual's health, functioning, and quality of life. Next, we review a range of predictors of adults' subjective age, from demographic to psychological factors.

## Demographic Factors

The evidence for how demographic factors are associated with subjective age is limited. For example, chronological age was not associated with how subjective age changed between MIDUS 1 and MIDUS 2 (Ward, 2013). Individuals tend to maintain a stable discrepancy between their felt and chronological age and feel the same degree younger or older than their age over time (Ward, 2013). Consistent with these results, findings from other samples also indicate that the proportional discrepancy between felt and chronological age remains stable from middle age to old age (Rubin & Berntsen, 2006). Subjective age also does not seem to vary by gender. Although some research shows that men report an older subjective age than women (Stephan et al., 2015b), most studies, including those based on the MIDUS study, report no differences between men and women (Barrett, 2003; Rubin & Berntsen, 2006; Ward, 2013; Westerhof, Barrett, & Steverink, 2003). Participants with less education reported feeling older in both the MIDUS (Barrett, 2003) and other cohorts (Stephan et al., 2015b). Further, in the MIDUS study, low socioeconomic status, defined as low education, income, and financial well-being, was related to an older subjective age through its association with worse health (Barrett, 2003). Neither gender nor education was associated with changes in subjective age over time (Ward, 2013).

Few studies have been conducted on cultural differences in subjective age. Comparison between the MIDUS sample and a German sample revealed some cultural differences in how old individuals feel (Westerhof et al., 2003). In both countries, older adults felt younger than their chronological age. Americans, however, reported a younger subjective age than their German counterparts (Westerhof et al., 2003). This difference may reflect the youth-centeredness of American culture compared to Europe.

## Social and Environmental Factors

Subjective age is sensitive to social and environmental cues about aging. For example, individuals who perceive age discrimination—that is, unfair treatment, rejection, and exclusion because of age—also report an older subjective age (Stephan et al., 2015b). This association is independent of demographic factors, physical and mental health, and biological variables (Stephan et al., 2015b). In other words, being the target of unfair treatment because of one's age may lead to an assimilation of negative images of aging in one's self-views, resulting in an older subjective age. In addition, exposure to discriminatory experience is a significant social stressor that leads to worsening of physical and mental health and ultimately to an older subjective age. Experimental studies further showed that age-related contextual and environmental cues induced individuals to feel older (Eibach et al., 2010; Hughes, Geraci, & De Forrest, 2013). For example, the exposure to unexplained visual disfluency while reading, a generation gap in communication, or simply participating in a memory task led individuals to feel older (Eibach et al., 2010; Hughes et al., 2013). These contextual cues, such as experiencing visual difficulties or participating in a memory task, may activate negative age-related stereotypes, such as those associating visual and memory decline with aging, resulting in individuals' identification with older age.

Both experimental and correlational research suggest that subjective age is based in part on social comparison processes (Hughes & Lachman, 2018; Stephan, Chalabaev, Kotter-Grühn, & Jaconelli, 2013). Individuals may judge how well they age by comparing themselves with their same-age peers. Indeed, in a sample of adults aged between 52 and 91 years, Stephan et al. (2013) found that an experimental manipulation of information reflecting favorable social comparison with same-age peers resulted in a younger subjective age. Several studies using the MIDUS information provided additional support for this association. Hughes and Lachman (2018) showed individuals who perceived their health and cognition as better than their same-age peers had a younger subjective age over time. This favorable social comparison explains, in part, why individuals who have better functional health and cognitive performance feel younger (Hughes & Lachman, 2018). In the same vein, Barrett (2003) found that a more favorable assessment of one's health relative to that of others was a strong predictor of a younger subjective age in the MIDUS 1 study.

Beyond social comparison, the social environment also helps to shape an individual's subjective age. Across both MIDUS 1 and MIDUS 2, for example, Schafer and Shippee (2010a) found that subjective age was sensitive to changes in intimate, familial social networks. Specifically, the experience of adversity and negative events in intimate social relationships was associated with an older subjective age. Consistent with this pattern of findings, Schafer (2009) revealed that parental death, and the death of a mother in particular, during childhood is a significant early life experience related to an older subjective age in adulthood.

## Health-Related Factors

Health-related factors are a critical source of information for the assessment of one's felt age (Bergland, Nicolaisen, & Thorsen, 2014; Hubley & Russell, 2009; Schafer & Shippee, 2010a; Stephan, Demulier, & Terracciano, 2012). Subjective age reflects an individual's health, whether measured with self-report questionnaires or physiological markers assessed with laboratory tests and performance measures.

Several studies based on the MIDUS study have found support for the association between health-related factors and subjective age using different measures of health. Ward (2013) found that better self-rated health between the first and second wave was related to a younger subjective age over time. Schafer and Shippee (2010a) found that the incidence of chronic health problems between the two waves was related to subjective age over time. Finally, Hughes and Lachman (2018) found that functional health, defined as the extent to which health impacts daily activities, was related to both the level and the changes in subjective age. In particular, their results showed a relationship between better functional health and a younger subjective age both concurrently and over time. The daily diary study of Kotter-Grühn et al. (2015) further strengthened these findings by showing that physical health could explain day-to-day fluctuations of subjective age: Individuals reported older subjective age on days when they experienced more health-related problems, such as pain and other physical symptoms (Kotter-Grühn et al., 2015).

Consistent with findings from the MIDUS study, data from the Health and Retirement Study (HRS) have provided additional evidence on the biological underpinning of subjective age (Stephan et al., 2015b). In a sample of participants aged 50 years and older, individuals who felt older than their chronological age had worse lung function as measured by peak expiratory flow, worse muscular function as measured by grip strength, and higher adiposity as measured by waist circumference. Markers of cardiovascular functioning (e.g., blood pressure) and cellular aging (e.g., telomere length) were not associated with subjective age. This pattern suggests that subjective age is sensitive to the biological aging of body systems that manifest through physical signs and symptoms and have perceptible implications for everyday functioning than to biological markers without such signs (Stephan et al., 2015b).

Subjective age assessment also reflects one's mental health (Bergland et al., 2014; Stephan et al., 2015b). Individuals with an older subjective age, for example, have been found to report more depressive symptoms and negative affect (Bergland et al., 2014; Kotter-Grühn et al., 2015; Stephan et al., 2015b). At the first wave of the MIDUS study, participants who felt younger than their age had a lower risk of a major depressive episode (Keyes & Westerhof, 2012). Further, participants in the MIDUS study who felt older than their chronological age declined more in positive affect following incident chronic health conditions compared to participants who felt younger (Schafer & Shippee, 2010a). Complementary diary studies have found that daily fluctuations of subjective age are indicative of stress, such that individuals feel older when faced with more daily stressors (Bellingtier, Neupert, & Kotter-Grühn, 2017; Kotter-Grühn et al., 2015).

## Cognition

The extent to which subjective age is an indicator of one's cognitive functioning has received mixed support. Some studies reported no association between cognition and subjective age (Hughes et al., 2013; Infurna, Gerstorf, Robertson, Berg, & Zarit, 2010). The experimental study of Hughes et al. (2013) found that the performance on a memory test was not related to changes in subjective age. Furthermore, Jaconelli et al. (2017) revealed that there was no difference in subjective age between patients with dementia ( $n = 79$ ) and individuals without cognitive impairment ( $n = 96$ ) in both the United States and France. However, most of these findings have been based on small samples. Using the larger, nationally representative MIDUS sample, some cognitive measures have been shown to predict subjective age (Hughes & Lachman, 2018). In particular, better episodic memory, but not executive function, was associated with a younger subjective age but was not associated with changes in subjective age. Therefore, the extent to which assessment of one's felt age is an indicator of cognitive functioning remains unclear.

## Other Psychological Factors

In addition to mental and cognitive health, other psychological factors shape subjective age. In addition to the role of positive and negative affect described, MIDUS studies have examined the relation between perceived control and the age individuals feel (Schafer & Shippee, 2010a). MIDUS participants who reported high perceived control at baseline and who increased in control over time had a younger subjective age over the follow-up. This change in personal control explains the processes behind subjective age, that is, how declines in both one's intimate social ties and health (chronic conditions) reduce a sense of control, which then results in an older subjective age (Schafer & Shippee, 2010a).

Perceptions of one's current and future aging also contribute to changes in subjective age. In the HRS, individuals who have more positive attitudes toward their aging, referred to as satisfaction with aging, present a younger subjective age over time, whereas more negative attitudes toward aging are associated with accelerated subjective aging (Bodner, Ayalon, Avidor, & Palgi, 2016). In a German sample aged 55 years on average, Kornadt et al. (2018) reported that positive future self-views, which broadly represent positive self-views of one's future as an old person, are predictive of a younger subjective age over time.

Subjective age has also been found to reflect individuals' characteristic ways of feeling, thinking, and behaving. Based on the five-factor model (FFM) (Digman, 1990), research has found that extraversion (i.e., a propensity to experience positive emotions and to be sociable) and openness to experience (i.e., a preference for variety and intellectual curiosity) were related to a younger subjective age (Canada, Stephan, Caudroit, & Jaconelli, 2013; Hubley & Hultsch, 1994; Stephan et al., 2012). In addition, Canada et al. (2013) found that higher openness to experience was related to a youthful subjective age because it fostered a lower identification with individuals' age group.

## Subjective Age as Predictor

According to the studies reviewed in the previous section, people's health, psychological, and environmental factors predict their subjective age profiles. However, subjective age is also a robust predictor of health, behavior, and cognitive outcomes, independent of one's chronological age (Kotter-Grühn et al., 2016). This section focuses on these latter relationships and reviews evidence on the implications of subjective age.

There are two main theoretical perspectives on the implications of subjective age. The first considers subjective age as a causal factor that contributes to a range of outcomes through its influence on several pathways. This approach is supported by experimental research in which manipulation of subjective age resulted in changes in functioning (Stephan et al., 2013) and by longitudinal studies that showed that subjective age was associated with subsequent changes in functioning independent of chronological age (Spuling, Miche, Wurm, & Wahl, 2013; Stephan, Sutin, Caudroit, & Terracciano, 2016). A second perspective, including MIDUS findings, suggests that subjective age is a marker showing promise as a predictor of crucial outcomes, from well-being to mortality (Rippon & Steptoe, 2015; Stephan, Sutin, & Terracciano, 2016). More precisely, it is postulated that subjective age is related to late-life outcomes because it tracks and encapsulates individuals' biopsychosocial factors relevant to these outcomes. Therefore, individuals with a younger subjective age are psychologically and biologically younger, hold more favorable health-related profiles, and thus have better future health and psychological functioning. In contrast, an older subjective age is a marker of individuals who may be at risk of worse outcomes in a range of domains.

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### Health

Not only does health contribute to subjective age as described, but also subjective age predicts health-related outcomes. A recent meta-analysis found that the typical effect size of the association between subjective age and health was comparable to other recognized predictors (e.g., happiness) of health outcomes (Westerhof et al., 2014). Specifically, longitudinal and cross-sectional research has found that a younger subjective age was predictive of better self-rated health and fewer chronic diseases (Demakakos, Gjonca, & Nazroo, 2007; Spuling et al., 2013). Feeling older was related to having worse functional health, in part through its association with the experience of negative age-related changes, such as worsening physical health and cognition (Brothers, Miche, Wahl, & Diehl, 2017). In the same vein, a younger subjective age helps to mitigate decline in physical functioning, illustrated by slower decline in walking speed over time (Stephan, Sutin, & Terracciano, 2015a). Consistent with this finding, an experimental study further revealed that performance on a grip strength task increased when individuals were induced to feel younger (Stephan et al., 2013). Feeling younger was also associated with less systemic inflammation (Stephan, Sutin, & Terracciano, 2015d) and lower risk of obesity in the MIDUS study (Stephan, Caudroit, Jaconelli, & Terracciano, 2014). Consistent with these associations involving objective measures, individuals with a younger subjective age had lower perceived vulnerability to disease than those with an older subjective age (Wienert, Kuhlmann, Fink, Hambrecht, & Lippke, 2016). In addition, several longitudinal studies reported that subjective age also predicted subsequent changes in mental health. Indeed, an older subjective age was related to the development of depressive symptoms over time, controlling for demographic factors (Choi & DiNitto, 2014; Spuling et al., 2013; Stephan, Sutin, Caudroi, et al., 2016).

A recent study from MIDUS extended the findings on the health-related implications of subjective age by providing the first evidence of an association with the risk of future hospitalization (Stephan, Sutin, & Terracciano, 2016). Among individuals without a recent history of hospitalization, an older subjective age at baseline was associated with a 25% higher risk of incident hospitalization over the next 10 years,

independent of demographic factors. Higher disease burden and depressive symptoms associated with an older subjective age partially accounted for this association (Stephan, Sutin, Terracciano, 2016).

## Resilience to Stress

In addition to its main effect on health-related outcomes, subjective age also moderates the effect of exposure to stressful situations and events on health. In a sample of older individuals exposed to missile attacks, Shrira, Palgi, Ben-Ezra, Hoffman, and Bodner (2016) showed that those who felt older than their age were more vulnerable to the deleterious effects of Post-Traumatic Stress Disorder (PTSD) symptoms on indicators of successful aging, defined in terms of physical health, disability, and memory. A younger subjective age, in contrast, buffered the effects of PTSD symptoms on successful aging (Shrira et al., 2016). Further, exposure to rocket attacks had a greater impact on symptoms of acute stress disorder among individuals with an older subjective age, whereas this association was buffered by a younger subjective age (Hoffman, Shrira, & Grossman, 2015). Finally, individuals who perceived their death to be close at hand had more psychological distress when they felt older than their age, whereas feeling younger than their age mitigated this association (Shrira, Bodner, & Palgi, 2014).

## Mortality

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The health-related implications of subjective age culminate with mortality risk: Individuals who feel older than their chronological age are at higher risk of premature mortality, controlling for demographic factors and health status (Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009; Rippon & Steptoe, 2015; Uotinen, Rantanen, & Suutama 2005; Westerhof et al., 2014). Feeling older is related to worse health and cognition, which in turn increases the risk of mortality. And indeed, accounting for health, mobility, cognition, and health behavior attenuates this association, which suggests that these factors explain part of the link between subjective age and mortality (Rippon & Steptoe, 2015). This association has been found over a period ranging from 8 (Rippon & Steptoe, 2015) to 16 years (Kotter-Grühn et al., 2009). When examining separate causes of death, Rippon and Steptoe (2015) found that feeling older was related to cardiovascular death, but not to cancer mortality among a large sample of British participants aged 52 and over followed over 8 years. This association is consistent with findings of a relationship between an older subjective age and risk factors of cardiovascular disease, such as higher inflammation (Stephan et al., 2015d), higher vulnerability to stress (Shrira et al., 2016), and physical inactivity (Wienert, Kuhlmann, & Lippke, 2015; Weinert et al., 2016). Although less studied, changes in subjective age over time are also related to mortality, such that an older subjective age over time increases the risk of mortality (Kotter-Grühn et al., 2009).

## Cognition

Findings from the MIDUS study provide the first evidence for a link between subjective age and cognitive aging. Schafer and Shippee (2010b) found that subjective age at baseline predicted dispositions toward cognitive aging at follow-up. Specifically, individuals with a younger subjective age were more optimistic about their cognitive ability. This finding has been replicated in other samples that used different measures of perceptions of cognitive functioning and subjective memory (Hülür, Hertzog, Pearman, & Gerstorf, 2015; Pearman, Hertzog, & Gerstorf, 2014; Stephan, Caudroit, & Chalabaev, 2011).

Consistent with such evidence, Stephan et al. (2014) went a step further to show that the age individuals felt in MIDUS 1 was related to their cognitive functioning in MIDUS 2. A younger subjective age was prospectively related to better episodic memory and executive function, independent of chronological age and other risk factors for poor cognition. Feeling younger was related to better episodic memory in part

through its association with a lower risk of obesity, whereas more frequent physical activity mediated its positive association with executive function. These findings have been recently extended by studies using the HRS, which showed that a younger subjective age was associated with slower declines in memory (Stephan, Sutin, Caudroit, et al., 2016), whereas an older subjective age was associated with a higher likelihood of future cognitive impairment and dementia (Stephan, Sutin, Luchetti, & Terracciano, 2017).

## Well-Being

Consistent with the conceptualization of a younger subjective age as self-protective strategy, a range of research has found that it plays an enhancing function for indicators of well-being (Mock & Eibach, 2011; Stephan et al., 2011; Westerhof & Barrett, 2005). Based on the first wave of the MIDUS study, for example, Westerhof and Barrett (2005) found that a younger subjective age was predictive of a higher level of subjective well-being, beyond demographic and health-related factors. Furthermore, this study reported a differential pattern of associations between the MIDUS and a German sample. Specifically, a younger subjective age was associated with higher life satisfaction and positive affect in both countries, but it was related to lower negative affect only in the US sample. These findings suggest that feeling younger not only enhances well-being, but also prevents negative affect in a strongly youth-oriented culture (Westerhof & Barrett, 2005).

Mock and Eibach (2011) found that the association between subjective age and well-being depends on aging attitudes. In line with Westerhof and Barrett (2005), an older subjective age was related to lower life satisfaction and positive affect and to higher negative affect in the second wave of the MIDUS. However, the association between feeling older and lower life satisfaction and higher negative affect were stronger when aging attitudes were less favorable, whereas the links were not significant when participants held positive attitudes toward aging. This pattern of results was confirmed by experimental findings that showed that self-evaluations were more strongly affected by negative aging stereotypes when individuals were induced to feel older than when they were not exposed to such manipulation (Eibach et al., 2010). Therefore, an older subjective age is thought to increase individuals' susceptibility to negative age-related information that affects well-being (Eibach et al., 2010).

- p. 93 Some studies have tested potential mediating pathways linking subjective age to well-being. ↪ Individuals with a younger subjective age, for example, are more satisfied with their life because they possess reliable resources, such as better self-rated health and higher memory self-efficacy, that allow them to better handle the aging process (Stephan et al., 2011). Consistent with this hypothesis, a younger subjective age was associated with higher life satisfaction, in part through its relation with better self-rated health and memory self-efficacy (Stephan et al., 2011). In addition, an older subjective age was related to lower life satisfaction in part through its association with experience of age-related losses in a range of domains, from physical functioning to interpersonal relationships (Brothers et al., 2017).



## Personality Changes

In addition to mood and cognition, a MIDUS-based study showed that subjective age was associated with personality development across adulthood, independent of chronological age (Stephan et al., 2015c). Specifically, subjective age at baseline and change in subjective age from baseline to follow-up were both related to personality trait change over 10 years. Participants who felt younger than their chronological age at baseline had a smaller decline in openness and agreeableness and a greater increase in conscientiousness over time. In addition, an accelerated subjective aging between baseline and follow-up was related to a steeper decline in extraversion, openness, agreeableness, and conscientiousness and to the maintenance of neuroticism. Individuals who felt younger at both baseline and follow-up were also found to have greater personality stability (Stephan et al., 2015c). In contrast, an older subjective age and accelerated aging over time may be indicative of worsening health and cognitive and social functioning that challenge personality stability and contribute to maladaptive trajectories of personality (Stephan et al., 2015c).

## Health Behaviors

Health behavior is often suggested as a potential pathway in the association between subjective age and a range of health and cognitive outcomes. A younger subjective age, for example, is associated with more engagement in physical activity (Stephan, Sutin, Caudroit, et al., 2014, 2016; Wienert et al., 2015, 2016). Independent of chronological age and health status, Wienert et al. (2015) found that a younger subjective age was prospectively related to more physical activity 4 weeks later, defined as the frequency of fitness studio participation, active commuting, and daily life physical activity. In the MIDUS study, Stephan et al. (2014) found that a younger subjective age was associated with more frequent physical activity, computed as the mean of vigorous (e.g., running or lifting heavy objects) and moderate (e.g., slow or light swimming, brisk walking) physical activity.

Individuals with a younger subjective age have a more adaptive motivational profile for physical activity than those with an older subjective age, characterized by more positive opinions about the benefits of physical activity, higher self-efficacy for physical activity, and higher intention to be physically active (Caudroit, Stephan, Chalabaev, & Le Scanff, 2012; Wienert et al., 2016). Therefore, they are more likely to adopt a physically active lifestyle.

## Future Directions

Existing studies point to several future research directions. The link between biological aging and subjective age has been examined using cross-sectional designs. Thus, the association between biomarkers and subjective aging over time needs to be examined, to test whether changes in biological aging are reflected in, or are predicted by, changes in subjective aging. In addition, only a limited number of biomarkers have been examined, and studies examining markers of different biological systems, such as the sympathetic, parasympathetic, and hypothalamic-pituitary-adrenal systems are needed. This biological approach to the study of subjective age should also test for the neural correlates of the age individuals feel in future research.

Future research is needed to understand the range of implications of subjective age. For example, issues such as sleep, biological (dys)functioning, dementia, or the health-related economic cost of an older subjective age deserve particular attention. In addition, there is a need for more research on the explanatory pathways of these relationships. To date, research on the behavioral implications of subjective age has exclusively focused on physical activity, and little is known about the association between subjective age and other health-related behaviors. Future research is needed to test whether the age individuals feel is

related to diet, smoking, drinking, or adherence to pharmacological treatments. These associations could inform about the behavioral pathways through which an older subjective age leads to worsening health and cognitive outcomes. In addition, studies consistently report that an older subjective age is a vulnerability factor that exacerbates the risk of poor physical and mental health from stressful situations. These findings suggest that feeling older may be associated with negative outcomes in part because it amplifies reactivity to stressful situations. Future research using objective, psychophysiological measures such as those presented in the MIDUS study, may test whether individuals who feel older present higher emotional reactivity when exposed to stressful contexts. Finally, most of existing studies on the relationship between subjective age and mortality included small, selective samples. In addition, they were exclusively based on European samples. Research among larger samples from other world regions are needed to extend these patterns of relationships.

Existing evidence suggests that there are reciprocal relationships between health, well-being, and subjective age. However, more research is needed to test whether subjective age is better conceptualized as an outcome or as a predictor of health, cognition, and well-being. In addition, it is likely that there are circumstances under which one directionality is more prominent than another. For example, poor health may be less influential for subjective age in the oldest old because of the intervention of the self-regulation and adjustment process, whereas an older subjective age may be a strong predictor of mortality risk in this age group.

These research areas could ultimately inform interventions, given that subjective age assessment could be a valuable tool to identify individuals at risk for adverse outcomes in old age who may benefit from early intervention to alleviate psychological, cognitive, and health-related deficits. In addition, subjective age has the potential to be changed (Stephan et al., 2013). Interventional research is needed to examine whether interventions that induce a younger subjective age also lead to better health-related outcomes.

## Conclusion

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In this chapter, we reviewed evidence about the predictors and the implications of subjective age. Subjective age is considered a biopsychosocial marker of aging that is sensitive to a range of factors, from social to biological. Furthermore, there is robust evidence that subjective age is predictive of a range of outcomes, including the risk of incident dementia, hospitalization, and mortality. These findings were based in part on large national samples, including those from MIDUS, and used an integrative approach to place subjective experience of aging along with biomedical and psychosocial measures. This approach has proven useful for understanding the links between the subjective experience of aging and important outcomes for older adults. To move forward, more research is needed to understand the processes underlying the development of a younger subjective age and the range of implications of this perception.

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