An Empirical Examination of Subjective Age in Older Adults

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Abstract

It has been observed that subjective age (SA) often trails chronological age, especially in older adults. In a previously published paper, the authors argue that differences in individual’s SA is a function of their level of activity on biological, mental, and social dimensions. This paper empirically tests this proposition using a newly created subjective aging index (SAI). The SAI is related to SA above the effect of age with differences existing across age groups and sex. The findings contribute to the literature on successful aging strategies with important implications for healthcare practitioners, marketers and individuals heading towards older adult years.

*Keywords:* aging, aging experience, subjective aging, baby boomers, rejuvenation, reparation, wellness, partial least squares
Introduction

Agogo, Milne, & Schewe (2014) proposed a model for understanding the aging experience by integrating multiple perspectives from the existing literature on aging. The integrated perspective explains feelings of subjective age in older adults as a function of biological, mental and social factors unique to each individual (shown in Figure 1). In keeping with that, this paper takes the perspective that one’s cognitive assessment of one’s age is key and subject to control by the individual. This concept is referred to as subjective age (Barak & Schiffman, 1981). Several studies have noted that older people today tend to perceive themselves as younger in age and outlook than they really are (Schiffman & Sherman, 1991). Additionally, those who believe they are younger generally feel, act and even appear younger (Choi, DiNitto, & Kim, 2014; Stephan, Chalabaev, Kotter-Grühn, & Jaconelli, 2013). Furthermore, lower subjective age results in better health and hence lower healthcare costs (Barrett, 2003; Boehmer, 2007; Linn & Hunter, 1979; Markides & Boldt, 1983; Stephan, Caudroit, & Chalabaev, 2011; Stephan et al., 2013; Westerhof & Barrett, 2005). Finally, longitudinal research has shown that lower subjective age leads to adding an additional 7.5 years to one’s life (Kotter-Grühn, Kleinspehn-Ammerlahn, Gerstorf, & Smith, 2009; Levy, Slade, Kunkel, & Kasl, 2002).

Figure 1
Subjective Age and Chronological Age Model
Our current study is designed to carry out an empirical investigation of these determinants of subjective age in older adults. Specifically, we investigate if subjective age can be predicted by self-reported measures of biological, social, and mental characteristics in an individual after controlling for chronological age. Also, differences in how these characteristics impact subjective age across age groups of older adults and sexes are examined. Answering these research questions will improve the understanding of how people come to feel younger or older than their chronological age, and has implications on quality of life of individuals in their later years.

**Measures of Age**

The principal dimensions of age include chronological, mental, social, and biological age. Chronological age is represented as the number of years a person has lived. Mental age is measured as intelligence or cognition and there are many widely used scales for measuring mental age in children and adults. Social age is usually defined in terms of social roles and habits (Birren & Renner, 1977). Finally, biological age is used to capture how much of biological changes have occurred in an individual over time and it is measured using biomarkers (Jackson, Weale, & Weale, 2003), frailty (Jones, Song, & Rockwood, 2004) and physical parameters (Borkan & Norris, 1980).

In the field of marketing, attempts have been made to develop self-reported measures of age that can promote understanding of the role of an individual’s perception and outlook on their behavior. Subjective age, which is the most common self-reported measure of age, has been measured in two ways: (1) as an individual’s self-perception in terms of reference age groups, i.e., ‘middle-aged”, “elderly”, or “old”, which is referred to as identity age, or (2) as units of age, which is also referred to as personal age (Kastenbaum, Derbin, Sabatini, & Artt, 1972) or cognitive age (Barak, 1987). Related concepts are ideal age and desired age, self-reported aspirational measures
of age also collected as a count of years (Barak, Stern, & Gould, 1988; Sirgy, 1982). This paper utilizes the conceptualization of subjective age made up of four dimensions: look-age (how old the individual believes they look), feel-age (how old the individual feels), interest-age (the interests of the individual) and do-age (the individual’s actions and behavior) (Barak & Schiffman, 1981). In the past, this composite measure has been reduced to a single variable by averaging the four dimensions into a single measure (Barak & Schiffman, 1981; Kastenbaum et al., 1972; Stephens, 1991).

Based on Agogo, Milne and Schewe (2014), the proposed determinants of subjective age fall into biological, mental and social dimensions, and older individuals balance their level of activity within and across these areas as they grow older in order to keep feeling subjectively young. The rest of this paper outlines the method by which we explore the hypothesized relationship, report the results of analyses performed and finally a discussion of the findings and the implications for further theoretical development by the academy and for professional practice.

Method

In this paper, the relationship between biological, mental and social activity and subjective age is explored empirically using the following steps. First, a subjective aging index (SAI) made up of biological, mental and social sub-indices is created and confirmed to have face validity and internal reliability. Although a self-reported index, the statements of the SAI were crafted based on objective and observable behavior. Secondly, empirical data are collected from a sample of older individuals using Amazon Mechanical Turk. Subsequently, data analysis is done using partial least squares (PLS) path modeling, a recommended methodology for research that is exploratory and focused on creating new theory (Hair, Sarstedt, Ringle, & Mena, 2012). The first stage of
the PLS analysis involves the validation of the dependent variable, subjective age, as a formative latent variable according to recommendations for doing so in PLS (Hair, Hult, Ringle, & Sarstedt, 2013). This approach is preferable to simply averaging the four dimensions of subjective age as it enables a deeper understanding of the concept of subjective age than currently exists in the marketing literature. Afterwards, the SAI is also confirmed to be psychometrically valid according to guidelines for PLS. Finally, the overall model is evaluated and findings across different age-groups are compared.

**Measures and Scale Development**

Subjective age, the dependent variable is a composite of feel-age (In actual years, I feel as though I am …), do-age (In actual years, I do most things as though I am …), look-age (In actual years, I look as though I am …) and interest age (In actual years, my interests are as though I am …) (Barak & Schiffman, 1981). In addition, two measures related to subjective age were collected to verify the convergent validity of the dependent variable. These measures are judged age, a measure of other people’s perceptions of an individual’s age (Overall in actual years, people think I am…), as well as a single overall measure of subjective age (Overall in actual years, I feel like I am…).

The independent variable, the Subjective Aging Index (SAI), consists of three sub-indices: biological, mental and social, such that a high score on the SAI would relate to higher subjective age. Similar to the dependent variable, the SAI is measured formatively and so recommended guidelines for content and indicator specification were followed to ensure the validity of the measures (Diamantopoulos & Winklhofer, 2001). The SAI consists of some newly created items, but it leans heavily on prior literature. To develop the Biological Aging Index we used and adapted items from the MOS SF-36 scale (Haley, McHorney, & Ware Jr, 1994; McHorney, Ware Jr, &
Raczek, 1993) as well as the perceived physical fitness scale (Abadie, 1988). To develop the Mental Aging Index items were taken or adapted from the cognitive failures questionnaire (Broadbent, Cooper, FitzGerald, & Parkes, 1982), the mental exercise scale (Salthouse, 2006) and the MOS SF-36 scale (Haley et al., 1994; McHorney et al., 1993). To develop the Social Aging Index, items were taken and adapted from measures of social isolation (Cornwell & Waite, 2009) and the International Personality Item Pool (Goldberg, 1999). An initial pool of about forty items was created for the biological, mental and social sub-dimensions after which expert judgment and consensus were used to reduce this initial number by half for each of the sub-scales, i.e., to twenty items each.

**Scale Pre-Testing**

The reduced scale was pre-tested on thirty individuals between the ages of 30 and 70 to ensure the wording of the items was clear, to obtain initial feedback as well as to evaluate initial psychometrics of the SAI. Responses indicated there were no issues with the wording of the items and further analysis showed internal consistency of each of the sub-scales (reliability above recommended cutoffs of 0.7 for early stages of research (Nunnally, 1978 as cited in; Lance, Butts, & Michels, 2006). Therefore, we proceeded with data collection for the main study with the items unchanged.

**Data Collection**

A stratified random sampling strategy was used to obtain a representative sample of females and males aged between forty and seventy. Participants were recruited from Amazon.com’s online paid labor system Mechanical Turk, a common source of respondents for such studies (Buhrmester, Kwang, & Gosling, 2011; Goodman, Cryder, & Cheema, 2012; Horton, Rand, & Zeckhauser, 2011). Subjects were presented with an online survey hosted on Qualtrics. Necessary steps were taken to ensure the validity of the data collected. For example, IP blocking, a feature of
Qualtrics that ensures only one response can be recorded from a home/office internet connection, was utilized. Also, the length of time spent on the survey was tracked to prevent data runs from uninterested participants. Participation was restricted to adults located in the USA. In total, 1245 people attempted to take the survey of which only 594 responses were collected due to the age and gender restrictions of our sampling strategy.

After data collection was complete, we conducted a data cleaning process that was based on the following criteria. First, chronological age was collected twice, first as year of birth and secondly as age on the 1st of January. All entries that showed a disparity between both numbers were dropped. Secondly, gender was also collected twice and responses with non-matching genders were dropped. Finally, because a survey such as this asking subjective age in actual years is prone to exaggerated answers by some subjects, all responses where the difference between actual age and subjective age was beyond three standard deviations of the sample mean were excluded from the final analysis. This process resulted in a final sample of 552 respondents.

Females represented 53.8% of the participants (compared to our sampling target of 50%), with only 4.7% of the females and 7.8% of the male sample being seventy years or older (compared to our sampling target of 25% each) (see Table 1 for details). The purposive sample likely had fewer respondents in the oldest age category (seventy and older) due to the small number of people in those age groups who are active users of MTurk (Ipeirotis, 2010). Analyses of other characteristics of our sample indicate 36.1% had a 4-year college degree and an additional 25.7% had a degree from some college. Also, 60% had income below 50,000 dollars a year. Detailed information on the demographics of the sample can be found in Appendix A.
Analysis and Results

Dependent Variable

As a first step, the four-item scale from Barak & Schiffman (1981) was validated to be an appropriate measure of subjective age. Previous studies using this measure have specified the concept as being reflective despite the fact that the dimensions are unique and cannot be expected to always correlate with each other (e.g., Wilkes, 1992). For example, an individual may look younger than their age (look-age), but also have interests (interest-age) as though they are much older than their chronological age. To tackle this, we measure subjective age as a formative first-order latent variable in acknowledgement of the uniqueness of the four indicators.

To establish the convergent validity of our chosen subjective age measure, we verified that the formatively measured subjective age construct correlated highly with reflective measures of the same construct, a process also known as a redundancy analysis (Chin, 1998; Hair et al., 2013). This was done by regressing the four-item measure of subjective age against overall subjective age and judged age, two single global items that summarize the essence of the construct. The formative measure explained 70.2% and 70.6% in overall subjective age and judged age respectively, exceeding the recommended 64% cut off (Chin, 1998).
A unique advantage of using PLS-SEM for specifying formative constructs is the ability to generate outer weights, which represent the contribution of the item to the latent variable that it measures. While reflectively measured variables primarily use outer loadings (i.e., the results of single regressions of each indicator variable on their corresponding construct), these are less important for formative constructs (Hair et al., 2013). Rather, outer weights (results of a multiple regression of a construct on its set of indicators) which assess each indicator’s relative importance in the measurement model, are more informative about the nature of the latent construct (Hair et al., 2013). Both the outer loadings and the outer weights are tested for significance using bootstrapping techniques, as PLS-SEM does not make common parametric assumptions. SmartPLS 3.0 (Ringle, Wende, & Will, 2014), the PLS-SEM tool used for this analysis provided both outer loadings and outer weights which are interpreted as follows.

The indicator for each of the four dimensions of subjective age loaded highly on the latent factor (the outer loading for interest-age was 0.61 while the rest were above 0.85) indicating that each item correlates strongly to the latent variable. Furthermore, by regressing each item on the other three and checking that tolerance and VIF were within acceptable ranges (Hair et al., 2013), it was confirmed that the sub-dimensions of subjective age are not collinear.

Finally, to determine the contribution of each of these dimensions to the latent subjective age construct, a bootstrap of 5,000 samples was drawn and the significance of indicator outer weights was tested. Feel-age and look-age contribute about twice as much as do-age to subjective age, while interest-age seems to not have a significant contribution. However, because interest-age had a high (and significant) loading on the latent subjective age construct, this is interpreted to mean that interest age is important to subjective age (i.e., significant outer loadings) but not as relatively important (i.e., insignificant outer weights) as the other dimensions (Hair et al., 2013).
Nonetheless, interest-age was retained in the construct due to its theoretical relevance in the original conceptualization of the subjective age measure (Barak & Schiffman, 1981). After validating the measure of subjective age, the complete model was fit, the psychometric properties of the SAI were evaluated and findings were analyzed.

**Independent Variables**

The subjective aging index, although a self-reported scale, was designed to be an objective composite measure of different habits and behavior along the biological, mental and social dimensions. Therefore, items were created to extensively sample each dimension and focus was paid to face validity of the measures. As a result, most of the items in each sub-scale were only moderately correlated, a property common with such formative constructs. To achieve parsimony while maintaining the face validity of the SAI, a principal components analysis was used to identify the underlying structure among the items as recommended by Treiblmaier, Bentler and Mair (2011). A PCA makes different assumptions than an EFA, which make it more suitable for reducing a number of variables to a smaller set of components that accounts for a large amount of observed variance (Kashy, Donnellan, Ackerman, & Russell, 2009).

The PCA was conducted in two stages with all sixty items of the SAI first, and then with the twenty items of each individual sub-dimension in turn. Carrying out a PCA with all sixty items confirmed that items for each sub-dimension loaded on unique factors, providing support that the three sub-dimensions of the SAI are indeed unique. In the second stage, the PCA was used to identify the underlying structure of each sub-index scale. The factor loadings and analysis of each sub-index scale showed that all three scales consisted of two major factors. Therefore, the sixty item SAI was reduced to 24 items with eight items for each dimension. The biological aging index
consisted of ‘physical state’ and ‘physical conditioning effort’ factors, mental aging index consisted of ‘mental performance’ and ‘mental exploration effort’ factors, and the social aging index consisted of ‘social participation’ and ‘social engagement effort’ factors (see Appendix B for items). Subsequently, each index was specified in the partial least squares model as a formative-reflective type second order latent factor as suggested in Hair et al. (2013).

Alternative procedures were adopted to establish construct validity of the SAI in the absence of a valid reflective measure suitable for a redundancy analysis of each sub-scale (similar to what was done with the dependent variable). Establishing the validity of SAI was a three-step process. First, the internal consistency of each subscale (Cronbach alpha) was checked and confirmed to exceed recommended cutoffs (Biological = .843, Mental = .709, Social = .764). Next, a linear regression of the first item from each sub-index against the remaining seven items was run to confirm that collinearity did not exist among the items chosen (VIF <1.99). Lastly, the second-order latent factor PLS model was fit, and the outer loadings and outer weights of respective items of the three dimensions were computed and checked for both magnitude and significance. This was done to verify that the items were contributing significantly to the latent factors being measured and that they are relatively important. All but two items had significant outer loadings with twenty out of twenty four items having loadings above the recommended cut off of 0.5. Nevertheless, the full twenty four items were retained due to the overall face validity of the SAI, an approach supported by existing literature on validating formative measures (Hair et al., 2013; Petter, Straub, & Rai, 2007). All but four items had non-zero outer weights with over half of the non-zero outer weights being statistically significant demonstrating their relative importance to the constructs being measured.
Given the satisfactory form of the SAI specified as a formative construct, the final model (Figure 2) was re-fit as a first order latent factor model using the latent factor scores generated from the previous step according to guidelines of Lowry & Gaskin (2014).

**Figure 2**
The Overall Model

![Diagram of the overall model](Diagram)

*** P < 0.001 ** P < 0.01 * P < 0.05 ^ P < 0.10

**Model Results**

The final model was evaluated and found to explain 60.2% of the variance in subjective age. In particular, across the entire sample two of the three (biological and mental) sub-indices of SAI were found to significantly influence subjective age after controlling for chronological age. This supports a positive response to the question of whether subjective age be predicted by objective measures of biological factors, social factors, and mental factors in an individual after controlling for chronological age.
Comparison across Age-Groups

To examine differences in the impact of these factors on subjective age across age groups of older adults, a multi-group analysis was performed. Groups to be compared were chosen in two distinct ways: (1) organizing responses into decades consistent with the stratified sampling approach and (2) using a classification and regression tree (CART) algorithm (Wilkinson, 1992) which was sensitive to the underlying structure of the data.

Using the first method, four groups were identified (forties, fifties, sixties and seventies) with the size of the fourth group being much smaller.

JMP Pro (S. A. S. Institute, 2012) was used to identify the age ranges most similar to themselves with respect to their subjective age. Running the algorithm on part of the data (70%, randomly selected) led to the identification of five groups with a more balanced group size than using the decades approach (See Table 2 below). When this grouping was tested on the remaining 30% of the data, the findings remained consistent suggesting the robustness of the age groupings (R-square Training= 0.427; R-square Validation = 0.437).

The multi-group analysis was run with both grouping methods with findings being consistent. However, only the results from the second grouping method with more balanced group sizes are reported.

Group Differences and Similarities

It was found that marked differences exist between groups with respect to the nature of subjective age and the relative contribution of the four different dimensions. Overall, subjective-age was determined by more of the dimensions as the individual proceeded through older age-groups. For instance, do-age was found to increase in importance until between 54-58 at which time its importance declined steadily and became insignificant above 64 years. At the same time,
feel-age was observed to become more important as individuals entered their sixties. The outer weights of each dimension of subjective-age and their change across age groups are shown in both Figure 3 and Table 3 below. In other words, this suggests that as individuals advance through these age-groups, they balance their overall feelings of subjective-age by placing more focus on dimensions of subjective age that hitherto were less salient or important. It is this process of balancing one’s perceptions of subjective-age as one gets older that this paper describes as the “time-bending” effect.

**Figure 3**

Relative Importance of Subjective Age Dimensions by Age Groups

![Graph showing relative importance of subjective age dimensions by age groups.]

**Table 3**

<table>
<thead>
<tr>
<th>Dimension</th>
<th>Below 43</th>
<th>44–53</th>
<th>54–58</th>
<th>59–63</th>
<th>64+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do → SA</td>
<td>0.734***</td>
<td>0.965***</td>
<td>1.280^</td>
<td>0.675***</td>
<td>0.061</td>
</tr>
<tr>
<td>Feel → SA</td>
<td>0.593*</td>
<td>0.207</td>
<td>-0.390</td>
<td>0.419</td>
<td>0.704**</td>
</tr>
<tr>
<td>Interest → SA</td>
<td>-0.267</td>
<td>-0.301^</td>
<td>-0.637</td>
<td>0.119</td>
<td>0.190</td>
</tr>
<tr>
<td>Look → SA</td>
<td>-0.202</td>
<td>-0.066</td>
<td>-0.076</td>
<td>-0.076</td>
<td>0.204</td>
</tr>
</tbody>
</table>

Lastly, the multi-group analysis was used to evaluate differences in how well the SAI predicted subjective age across these age groups. As seen in Figure 4 and Table 4 the biological aging
index consistently predicts subjective-age across all age groups – an illustration of the well-documented importance of physical activity in maintaining a youthful and vibrant outlook as one ages. Interestingly, the mental and social dimensions of SAI have larger outer weights and become significant as well in predicting the subjective age of older individuals, indicative of the growing relevance of these dimensions for older individuals who are ‘balancing’ any shortfalls in physical activity with mental engagement and social involvement.

**Figure 4**

SAI Predictability of Subjective Age Across Age Groups

![Graph showing SAI predictability across age groups](image)

**Table 4**

<table>
<thead>
<tr>
<th>SAI Predictability of Subjective Age Across Age Groups</th>
<th>Below 43</th>
<th>44 – 53</th>
<th>54 – 58</th>
<th>59 – 63</th>
<th>64+</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age → SA</td>
<td>-0.025</td>
<td>0.168*</td>
<td>0.179</td>
<td>-0.120</td>
<td>0.389**</td>
</tr>
<tr>
<td>Bio_Stg2 → SA</td>
<td>0.491**</td>
<td>0.546**</td>
<td>0.597*</td>
<td>0.504**</td>
<td>0.448**</td>
</tr>
<tr>
<td>Men_stg2 → SA</td>
<td>-0.010</td>
<td>0.076</td>
<td>0.215</td>
<td>0.237*</td>
<td>0.148</td>
</tr>
<tr>
<td>Soc_stg2 → SA</td>
<td>0.107</td>
<td>0.077</td>
<td>0.022</td>
<td>-0.107</td>
<td>0.163*</td>
</tr>
</tbody>
</table>

**P <0.001 *P<0.10**
Comparison across Sexes

A multi-group analysis was conducted to test whether the SAI impacts subjective age differently depending on sex. The full dataset was split into two groups based on sex. The results indicate that all dimensions of subjective age were relatively important to both males and females. We also found similar patterns in the magnitude of outer weights of the dimensions of subjective age. Feel age and look age were the most important and least important to both sexes respectively (See Table 5). Additionally, we investigated the differences in how well SAI predicted subjective age between the sexes. We found that only the biological aging index significantly predicted subjective age in males. However, all three dimensions of the SAI significantly predicted subjective age in females. This suggests that the SAI is a much better predictor of subjective age in females, than in males (See Table 6).

### Table 5

<table>
<thead>
<tr>
<th>Relative Importance of Subjective Age Dimension by Sex</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do → SA</td>
<td>0.295</td>
<td>0.291</td>
</tr>
<tr>
<td>Feel → SA</td>
<td>0.325</td>
<td>0.342</td>
</tr>
<tr>
<td>Interest → SA</td>
<td>0.292</td>
<td>0.334</td>
</tr>
<tr>
<td>Look → SA</td>
<td>0.222</td>
<td>0.237</td>
</tr>
</tbody>
</table>

All outer weights significant at $P < 0.001$ level

### Table 6

<table>
<thead>
<tr>
<th>SAI Predictability of Subjective Age by Sex</th>
<th>Males</th>
<th>Females</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age → SA</td>
<td>0.664**</td>
<td>0.715**</td>
</tr>
<tr>
<td>Bio_Stg2 → SA</td>
<td>0.207**</td>
<td>0.279**</td>
</tr>
<tr>
<td>Men_stg2 → SA</td>
<td>0.082</td>
<td>0.122*</td>
</tr>
<tr>
<td>Soc_stg2 → SA</td>
<td>-0.027</td>
<td>0.138*</td>
</tr>
</tbody>
</table>

** $P < 0.001$ * $P < 0.01$

### Summary and Conclusion

In a previous paper, Agogo, Milne & Schewe (2014) proposed a framework for understanding older individuals’ tendency to take action on multiple dimensions of aging in an effort to
feel and act younger. The proposed framework provided a way of understanding the wide disparity in the aging experience among older adults as a function of factors that influence their subjective age. It described the “cost-benefit self-balancing” method practiced by older individuals as a way of facing the realities of aging. Self-balancing is practiced by older individuals by taking on as many activities as those given up in an effort to sustain youth, which leads to subjective ages that trail chronological ages. These “time-bending” activities occur on three dimensions, namely biological, mental and social.

This paper expands on Agogo, Milne & Schewe (2014) by empirically investigating the determinants of subjective age in older adults. We found that subjective age is formed by more dimensions as individuals grow older. This finding supports our notion of time-bending, as people’s subjective aging experience is not determined solely by chronological age or physical activity alone. From conducting a grouped analysis of different age groups, we found that do-age is important until individuals enter their sixties, after which feel-age becomes more important to determining subjective age. Also, we found that after controlling for age, the biological aging index is a strong predictor of subjective age across age groups, while mental and social aging index play a greater role as the individual ages.

We also investigated the difference in impact of the factors on subjective age between sexes. First, our analysis of the nature of subjective age across sexes indicates that all dimensions of subjective age (i.e., feel, look, do and interest age) were equally important to both males and females. We also found that feel age and look age were the most important and least important dimensions of overall subjective age to both sexes, respectively. Finally, we found that only the biological aging index significantly predicted subjective age in males. However, all three dimensions of the SAI significantly predicted subjective age in females. This suggests that women have
more dimensions with which to combat feeling older than men do, as men’s subjective aging experience is driven primarily by physical capability.

Our paper provides several theoretical and managerial contributions. One major theoretical contribution is the validation of subjective age as a formative latent construct comprised of four dimensions. Previous studies counter-intuitively discounted the contribution of look-age to subjective age because it failed to correlate highly with the other dimensions (e.g., Kastenbaum et al., 1972; Wilkes, 1992). By properly specifying subjective age as a formative construct, a more detailed understanding of how the different dimensions impact subjective age has been proposed.

Also, we contribute a parsimonious index called the subjective aging index (SAI) that captures six sub-dimensions, which are instructive of how the subjective aging process occurs. The SAI can be applied as a diagnostic tool that serves as a practical starting point for those seeking things to do/avoid in order to time-bend and stay meaningfully engaged.

An important managerial contribution of this paper is its role in focusing attention on the importance of equipping older people with ample opportunity to self-balance on multiple dimensions, as they age. Older people will discount the limitations in one dimension of their lives with greater participation and activity in another dimension in order to fight the inevitable draw of chronological age. Healthcare practitioners should become allies in this respect by re-designing their practices around the principles of rejuvenation and multi-dimensional care and assistance.
References


Appendix A

Demographics table for the US sample

<table>
<thead>
<tr>
<th>Demographic</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>Male (46.2%), Female (53.8%)</td>
</tr>
<tr>
<td>Age groups</td>
<td>Forties (34.2%), Fifties (35.1%), Sixties (24.5%), Seventies (6.2%)</td>
</tr>
<tr>
<td>Race</td>
<td>Caucasian (85.9%), African American (6%), Hispanic (2.5%), Asian (4%), Native American (0.7%), Other (0.9%)</td>
</tr>
<tr>
<td>Education</td>
<td>Less than High School (11.1%), High School / GED (9.2%), Some College (25.7%), 2-year College Degree (11.4%), 4-year College Degree (36.1%), Masters Degree (11.2%), Doctoral Degree (2.4%), Professional Degree (JD, MD) (2.9%)</td>
</tr>
<tr>
<td>Income</td>
<td>under $25,000 23.2%, $25,000 - $29,999 10.5%, $30,000 - $34,999 10.0%, $35,000 - $39,999 6.3%, $40,000 - $49,999 8.9%, $50,000 - $59,999 10.7%, $60,000 - $84,999 14.3%, Over $85,000 16.1%</td>
</tr>
</tbody>
</table>

Appendix B

<table>
<thead>
<tr>
<th>Age Reducing</th>
<th>Age Increasing</th>
</tr>
</thead>
</table>
| Biological Aging Index | • B19_Carry out some form of exercise?  
• B17_Carry out activities to improve your current over  
• B10_Walk briskly for twenty minutes and experience less strain than most  
people your age?  
• B18_Carry out physical tasks that you believe most people your age cannot?  
| • M5_Learn how to use new tools/devices easily?  
• M8_Play games that involve rapid thinking, matching and guessing?  
• M7_Play games that require strategic thinking, anticipation and planning?  
• M3_Experience a feeling of inspiration caused by something around you?  
| • B2_Lose energy during the course of a regular day?  
• B5_Experience disruptions of your daily activities as a result of physical aches and pain?  
• B6_Experience difficulty breathing when you exert yourself?  
• B16_Worry about your level of physical fitness?  
| Mental Aging Index | • M17_Forget where you put something like a newspaper or a book?  
• M19_Start doing one thing and get distracted into doing something else (unintentionally)?  
• M12_Forget whether you’ve turned off a light or a fire or locked the door?  
• M10_Forget why you went from one part of your house офис to the other?  
| Social Aging Index | • S10_Make yourself the center of attention in a group?  
• S7.Seek out large parties/crowded events to attend?  
• S15_Introduce or connect people together?  
• S16.Make new friends?  
| • S18_Withdraw from human contact for prolonged periods of time?  
• S6_Feel isolated from others?  
• S17_Feel uncomfortable with others?  
• S19_Purposely stay in complete silence?  
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