



The effects of age and optimism on physical health and well-being in older age

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Abstract

This study examined the relationship between optimism, well-being, and physical health in older adults. Studies showed that despite physical worsening, aging is associated with increased well-being; optimism may contribute to this. Therefore, the current study expected that; well-being would be higher in the oldest adults compared to the younger older adults; physical health would be the lowest in the oldest adults compared to the younger older adults; optimism would be a supportive factor for higher well-being and optimism would lead to a less detrimental experience of physical health. A cross-sectional study was conducted using questionnaires among 3,844 older adults. The data came from The Health and Retirement Study. The LOT-R (optimism measure), the SWLS (well-being measure) and a question about the experienced physical health were used for the analyses, done with one-way ANCOVA. Well-being was significantly higher and physical health was significantly lower in the group of older adults 80 years and older than in the group of older adults aged 60-79 years. Optimism did not show a moderating effect on the relationships of age, well-being, and physical health. Optimism was thus not a protective factor for decrease in physical health and not a supportive factor for higher well-being. In conclusion, in line with former literature, the current study found that older adults of 80 years and older experienced more well-being and experienced a worse physical health than younger older adults. However, these relationships were not influenced by optimism, further research is recommended.

Keywords: Age, optimism, well-being, physical health

The effects of age and optimism on physical health and well-being in older age

The world population is aging rapidly, 11 percent of the world's population is over 60 years old, with an expected increase up to 22 percent by 2050 (Kanasi et al, 2016). It is no longer unusual to live up to the age of 70 years or 80 years (He et al., 2016). Population aging is caused by the older aging baby boomers, the advancements of the medical world, and lower fertility rates (Goklany, 2007; He et al, 2016; Newgard & Sharpless, 2013). This growing population creates emerging challenges and difficulties for caregivers, individuals, and social systems (He et al., 2016). Additionally, due to increased longevity, the primary causes of death have shifted, with diseases such as cancer, heart disease, Alzheimer's, and dementia, accounting for a growing share (Prince et al., 2015). Furthermore, older adults need to adapt to their impairing physical health, because diseases, comorbidities, and frailty also increase with increasing age (Howlett et al., 2021; Milbrandt et al., 2010; Mitchell, 2015). Given the aging population and its pressure on healthcare, it is critical for older individuals' well-being and longevity to strive for healthy aging (Peel et al., 2005). Healthy aging is defined by the World Health Organization as “the process of developing and maintaining the functional ability that enables well-being in older age” (WHO, 2020). So, health and well-being are inextricably linked to each other (Steptoe et al., 2015). How is it possible to create and maintain higher well-being, and what factors take part in this process? The current study aims to investigate physical health and optimism as antecedents of well-being among older adults (Carver et al., 2010; Heidrich, 1993).

Well-being

Well-being is a positive indicator that individuals believe their lives are going well, it is about how someone feels at a certain moment (CDC, 2018). It encompasses emotional responses to events, feelings, joys, life satisfaction, and happiness in specialized domains like marriage and

employment (Diener et al., 2003). In addition, previous literature stated that well-being, positive emotions, and the absence of loneliness, are conditions for successful aging and adaption in later life (Baltes & Baltes, 1993). Furthermore, well-being exists out of three different types; the first is evaluative well-being which is also known as life satisfaction, the second type is eudemonic well-being which is about meaning in life and having a life goal, the last type is hedonic well-being which are feelings about happiness, sadness, rage, worry, and pain (Kahneman et al., 2003; Steptoe et al., 2015). The current study will be addressing evaluative well-being because the data that is used assessed one's life satisfaction on a global level (Diener et al., 1985). Furthermore, as aforementioned, as people age, there is development of more health limitations (Mitchell, 2015). However, not every older person develops many health limitations, some older persons show no health limitations at all (Niccoli & Partridge, 2012). In addition, when older adults experience more health limitations, they experience a lower well-being (Sprangers et al., 2000). Nevertheless, it is known from previous literature that from adolescence through middle age, overall well-being drops with the lowest levels of well-being occurring between the ages of 45 and 54, then rises again until the age of 85 years (Stone et al., 2010). This phenomenon is known as the well-being paradox or the u-shape of well-being. Besides, Stone et al. (2010) discovered that the negative side of well-being declines in older adults, seen by decreased scores on stress, worry, anger, and sadness. So, older adults show increased health limitations, but according to the well-being paradox there are also lots of older people with still a high well-being despite health limitations (Mitchell, 2015; Stone et al., 2010). Nevertheless, the factors that influence well-being in older age are not well understood and as a result will the current research further explore this. However, former literature showed there is an increased interest in what factors might influence well-being (Jenkins & Mostafa, 2015). For instance, it is discovered that internet use, leisure activities,

learning, positive time perspective, social responsibilities, activities, optimism and social support seem to benefit well-being (Desmyter, 2012; Heo et al., 2015; Inder, 2012; Jenkins & Mostafa, 2015; Ryu & Heo, 2018; Steptoe et al., 2015). In addition, especially optimism appears to have a major beneficial influence on physical and mental well-being, since optimism provides a better health perception (Conversano et al., 2010; Hurt et al., 2014; Sprangers et al., 2000). What is the role of physical health and optimism in well-being and the well-being paradox? Especially since physical health plays such an important role in aging and optimism has such a positive influence on well-being (Conversano et al., 2010); Mitchell, 2015).

Physical health

The current research aims to better understand the relationship between physical health and well-being. Physical health is an important factor in older age because the more people get older, the more diseases they develop and the lower their physical health and physical quality of life (Mitchell, 2015). This is due to the progressive decrease in skeletal muscle mass and function, the higher risk of illness, and the increase of disability (Trombetti et al., 2016; RIVM, 2011). As a result, younger older adults (i.e. between 60-79 years of age) will thus have less physical health problems than older adults who are 80 years and older. Physical health is a concept that is hard to define since it can be broad in its definitions because of the various disease endpoints, ranging from symptoms described by patients themselves to mortality (Rasmussen et al., 2009). However, an overarching definition of physical health is the body's natural and normal functioning in all aspects; a standard development of biological processes that guarantees survival and reproductive successes, a harmony between the body's functions and the environment, involvement in social activities, absence of diseases or pain, and the skill of the body to adapt and stay in harmony to the everchanging external environment (Koipysheva et al., 2018). Physical health also includes

cognitive health. Cognitive health is the ability to think, learn, and recall things clearly, and being cognitively healthy means the absence of diseases like dementia (Jedrziwski et al., 2007). The current study addressed physical health via the subjective participants' evaluation of physical health. In addition, being physically healthy has many positive consequences, such as positive psychological effects (adaptive coping and positive affect), and lower risks of diseases and illnesses (Bower et al., 2008). Also, poor health was linked to higher levels of depression and anxiety, as well as less social connectedness and independence, which are all indicators of poor well-being (Heidrich, 1993). Therefore, it can be assumed that better physical health goes together with higher well-being. However, a decrease in well-being is also linked to lower physical health (Stephoe et al., 2015). These findings suggest a bidirectional relationship between well-being and physical health (Stephoe et al., 2015). So, can optimism be a possible explanation for the well-being paradox, in which the oldest adults show the highest well-being, despite their health limitations?

Optimism

It is critical to comprehend and promote positive aspects of well-being in older adults, given the aging world population. The current study aims to gain more knowledge about optimism in relation to well-being and physical health. Dispositional optimism is an individual difference that represents the degree to which individuals have broad positive expectations for the future, optimists believe that positive things will happen to them (Carver et al., 2010). Furthermore, optimism has negative effects on hopelessness, which is a predictor of depression (Alloy et al., 2006). Optimism causes many positive effects, such as adaptive coping styles, better physical health, resilience, higher emotional well-being, and social support (Segerstrom et al., 2017; Carver et al., 2010). However, in the current literature, there is not much known about optimism and aging,

especially among older adults. But it is known that older adults' optimism develops as a reverse u-shape, optimism increases from the age of 50 years until the age of 70 years, and after this optimism decreases (Chopik et al., 2015). The Socioemotional Selectivity Theory contradicts this by claiming that as people become older, they become more conscious of the importance of emotional meaning, emotion regulation, and well-being, and thus have a more optimistic look at life (Carstensen, 2006). In addition, it was discovered that when older persons' optimism grew, they experienced better health and fewer chronic diseases; therefore, optimism plays an important part in healthy aging and well-being (Chopik et al., 2015; Ferguson & Goodwin, 2010). Additionally, optimism is related to health-enhancing behaviors like eating more healthily and more physical activity (Diener & Chan, 2011; Mulkana & Hailey, 2001). Besides, optimists are more likely to endure adversity and deal with obstacles than pessimists and hence take advantage psychologically (Wimberly et al., 2008). Optimism also provides resources to improve physical and mental health (Carver et al., 2010). These resources concern coping, cognition, and contextual factors; optimism seems to provide resilience in stressful life events, reduced hopelessness, and optimism is related to higher socio-economic status and social support (Alloy et al., 2006; Karademas, 2006; Martínez-Martí & Ruch, 2017; Schutte et al., 1996). Additionally, optimism is found to be a protective factor in different areas while aging, optimists show less pessimistic aging self-perceptions, less experienced pain, less cardiovascular diseases, and seem to better maintain cognitive functioning (Basten-Günther et al., 2019; Gawronski, 2016; Kim et al., 2011; Wurm, & Benyamini, 2014). Overall, optimism could be a possible explanation for the well-being paradox. However, as mentioned before, there still remain gaps in the literature regarding optimism and older persons. The current study attempts to address this gap, and because optimism has been

thoroughly studied in younger people, it is predicted that optimism will also have beneficial consequences for well-being and physical health in older adults.

In the current study, there will be an age specification between younger older adults, known as the third age, and older adults who are 80 years and older, known as the fourth age (Baltes & Baltes, 1993). This age specification is a result of the literature indicating various distinctions between older adults aged 80 and younger older adults (Baltes & Baltes, 1993; Becker, 1994; Menec & Chipperfield, 1997). The current research defined older adults as 80 plus years, and the younger older adults as 60 years until 79 years. The younger older adults are still relatively healthy and active in comparison to the older adults who are 80 years and older, who have an increased risk for physical and cognitive problems (Trombetti et al., 2016; RIVM, 2011). And as aforementioned, according to the well-being paradox, older aged individuals show higher well-being in comparison to the younger aged individuals (Stone et al., 2010). However, in older age, you have more losses versus gains in life, and the more losses the lower the well-being (Baltes & Carsten, 1999). Even though specific aspects for healthy aging are influenced by culture and personal beliefs, it is agreed that healthy aging must include maximizing gains while reducing losses as people age (Baltes, 1987). So, since well-being is unexpectedly high in older age despite decreases in physical health, experiencing more losses, and optimism seeming to decline after the age of 70 years, it is necessary to further examine this connection in the two age groups (60 years - 79 years and 80 years and older) (Chopik et al., 2015; Mitchell, 2015; Stone et al., 2010).

As described in the above paragraphs, physical health and optimism are vital determinants of enabling well-being (Seegerstrom et al., 2017; Steptoe et al., 2015). Well-being is a determinant for successful aging and adaption in later life (Baltes & Baltes, 1993). In addition to this, physical health and well-being have a positive relationship (Steptoe et al., 2015). Also, optimism has

positive effects on well-being and physical health (Carver et al., 2010). The current study tries to add to the literature by diving deeper into the well-being paradox by replicating it. The relationship between age groups, physical health and well-being will be researched. In addition, optimism will be researched as a moderator in this relationship, because according to the literature, optimism may contribute to understand why some individuals experience high levels of well-being despite experiencing more health limitations (Chopik et al., 2015; Ferguson & Goodwin, 2010). This will be contributing to understanding the mechanisms underlying the well-being paradox. As a result of the literature search, research questions appeared: Will higher age come with higher well-being and lower physical health in older adults? Will optimism be a supportive factor for higher well-being in older adults? Will optimism be a protective factor for the decrease in physical health in older adults? Based on the research questions the following hypotheses are set: (1) According to the theory of the well-being paradox (Stone et al., 2010) it is expected that well-being is higher in the group of 80 years and older in comparison to the group younger older adults, (2) in the group of 80 years and older the physical health rating will be lower than in the group of younger older adults, (3) well-being will be higher in the group of 80 years and older in comparison to the group younger older adults and optimism will be a supportive factor for higher well-being, so when experiencing optimism this will lead to an even higher well-being, (4) physical health will be rated worse in older adults aged 80 and older than in the group of younger older adults, but when they experience more optimism in life, physical health is perceived as less detrimental. Besides when physical health is perceived as less detrimental, it is likely that also higher well-being is experienced, however this expansion will not be researched in the current study (Steptoe et al., 2015). Furthermore, the current research will address these research questions by means of cross-sectional research.

Methods

Study Sample

Data is used from The Health and Retirement Study (HRS), a longitudinal study financed by the National Institute on Aging and the Social Security Administration (Health and Retirement Study, n.d.). Since 1992, every two years, roughly 20,000 people in the United States are surveyed. The HRS covers subjects such as wealth and income, cognition, medical services, employment and retirement, and family.

Participants

The current study included $N = 3.844$ older adults, from the HRS wave in 2018, who completed telephone interviews about demographics and experienced health, as well as the Leave-Behind Questionnaire (LBQ) in the HRS. The LBQ was added to provide additional information without lengthening the interview. The LBQ contained questions on the level of participation in general activities, connections with others, and perspectives on both general and specialized areas of life. In the current sample the ages of the participants ranged from 60 years to 102 years ($M = 72.39$, $SD = 8.58$), with 2.239 (58.2 percent) of the participants being female. A total of 2.232 participants (58.1 %) were married. A total of 17.685 participants were excluded from the original sample because the Life Orientation Test-Revised (LOT-R) questionnaire, the Satisfaction with Life Scale (SWLS), and the question about physical health experience were not (correctly) filled in. Furthermore, participants who had dementia or lived in a nursery house and all participants younger than 60 were also excluded.

Measures

Experienced physical health

Experienced physical health was assessed with the 2018 HRS wave questionnaire about physical health. One question concerned the experienced physical health; “Would you say your health is excellent, very good, good, fair, or poor?” Answer options ranged from 1 = excellent to 5 = poor. There is also a sixth and seventh option; 6 = don’t know and 7 = refuse, these options were not considered in the analyses. A lower score on this question meant a better experience of physical health, so the answer options were recoded to make it easier to interpret, thus 1 = poor and 5 = excellent.

Optimism

Optimism was assessed with the revised Life Orientation Test (LOT-R) (Scheier et al., 1994). The six-item Life Orientation Test-Revised was used, without filler items; three items indicate optimism, while the other three assess pessimism. This questionnaire had a good discriminant and convergent validity, as well as a high level of reliability (Scheier et al., 1994). On a 6-point Likert scale ranging from *strongly agree* to *strongly disagree*, respondents stated how much they agreed with each topic. An optimistic item example was; “Overall, I expect more good things to happen to me than bad”. A pessimistic item example was; “If something can go wrong for me, it will.” After reverse coding the pessimistic items, a total score could range from 0 to 24, a higher score indicated more optimism. A score between 0 and 13 points, indicated that the respondent was low in optimism, while a score between 14 and 18 points, indicated that the respondent was moderate in optimism, and a score between 19 and 24, indicated the respondent was high in optimism. Former research that used the LOT-R demonstrated a good internal

consistency (Cronbach's $\alpha = 0.810$) (Kim et al., 2011). In the current study, Cronbach's α was 0.759, which also showed a good internal consistency.

Well-being

Well-being was assessed with the Satisfaction with Life Scale (SWLS), which has been commonly utilized as a measure of well-being in prior studies (Chen & Feeley, 2014; Diener et al., 1985). This scale is developed to assess one's life satisfaction on a global cognitive level. The scale has been proved to be a valid and reliable measure of life satisfaction, with good internal consistency and reliability (Diener et al., 1985). The following five items were included in this scale: "In most ways my life is close to my ideal," "The conditions of my life are excellent," "I am satisfied with my life," "So far, I have gotten the important things I want in life," and "If I could live my life over, I would change almost nothing." On a 7-point Likert scale ranging from *strongly agree* to *strongly disagree*, respondents stated how much they agreed with each topic. A total score could range from 5 to 35. A score of 20 represented an average score. A score between 5 and 9 points, indicated that the respondent was severely dissatisfied with life, while a score between 31 and 35 points, indicated that the respondent was extremely satisfied. Former research that used the SWLS demonstrated high internal consistency (Cronbach's $\alpha = 0.880$) (Heo et al., 2015). In the current study, Cronbach's α was 0.883, which also showed high internal consistency.

Procedure

Data was collected via multi-stage national probability sampling (Fisher & Ryan, 2018). The HRS oversampled, blacks, Hispanics, and Florida residents on purpose. Before taking part in the study all participants had to give their informed consent. HRS interviews were conducted by trained survey interviewers and took place every two years. Half of the interviews were conducted

in person, while the other half was conducted over the phone. In every wave, these methods of interviewing changed.

Statistical analysis

All analyses are done with SPSS (version 27, IBM). First, to clean the data, all the participants with missing data, concerning not filling out the LOT-R, SWLS, and the question about physical health were excluded. Furthermore, participants outside of the age range (participants younger than 60 years), participants who had dementia, and participants who lived in a nursing home were also excluded, because the current study was about healthy older adults. Second, to calculate the ages of the participants, the year of the interview was reduced by the year of birth. After this, the answer options for question about physical health were recoded. Subsequently, for the LOT-R the three pessimistic items were recoded to match the rest of the items, and after this the total score per participant was calculated for the LOT-R and for the SWLS. Furthermore, the Cronbach's alphas were calculated. Next was creating a new variable with two groups of participants according to their age (60 years - 79 years and 80 years and older). After this was done, descriptive statistics were performed. Differences in the participants' sociodemographic characteristics were compared using *t*-tests for continuous variables and chi-square tests for categorical variables, comparing the participants aged 60-79 years with the participants aged 80 plus years. The mean values and standard deviations of the sociodemographic characteristics were calculated. Experienced physical health, optimism, and well-being were continuous variables and age group was a categorical variable. For all hypotheses two groups were compared; the group of participants aged 60-79 years and the group of participants aged 80 plus years. All hypotheses were examined by means of a one-way Analysis of Covariance (ANCOVA).

ANCOVA is used when groups are compared on a dependent variable and expected is that another variable (the covariate) will affect the independent variable and the dependent variable (Field, 2009). Age group was the independent variable (60 years - 79 years and 80 years and older), well-being (total score of SWLS) and physical health (rating of physical health) were dependent variables, and optimism (totals score of LOT-R) was a covariate to examine the moderation by means of an interaction. The between-subjects factors were the two groups based on their age (60 years - 79 years and 80 years and older). The one-way analyses of covariance (ANCOVA) were run to examine whether well-being differed between the age groups, whether well-being differed between the age groups controlled for optimism, whether physical health ratings differed between the age groups, and whether physical health ratings differed between the age groups controlled for optimism.

Preliminary checks were completed to assess the assumptions of normality, linearity, homogeneity of regression slopes, and homogeneity of variance. Due to the large sample size ($N = 3,844$) it was assumed that the dependent variables were normally distributed. A scatterplot indicated that the relationship between optimism and age was linear in both age groups. Additionally, an F -test indicated that there was no interaction between optimism and age for well-being, $F(1, 3840) = 1.63, p = .202$, and for physical health $F(1, 3840) = 1.32, p = .251$, so the regression slopes were similar for all hypotheses. Levene's test indicated that the assumption of homogeneity of variance was violated for the hypotheses with well-being as dependent variable $F(1, 3842) = 4.73, p = .030$, so for these hypotheses there was a higher chance of rejecting the null hypothesis incorrectly. However, for hypotheses with physical health as dependent variable the Levene's test indicated that the homogeneity of variance was not violated, $F(1, 3842) = 1.31, p = .252$.

Results

Sociodemographic characteristics

First, the descriptive statistics are presented in table 1. The table concerns a comparison between the younger older adults and the 80 plus older adults. The participants in the category younger older adults were significantly longer educated, more often partnered, and rated their health better. In addition, no significant results were found for gender.

Table 1

Sociodemographic statistics

	Total population (<i>n</i> =3844)	60 -79 years (<i>n</i> =2954)	80+ years (<i>n</i> =890)	<i>p</i> -value
Gender (<i>N</i> (%))				.901
Female	2239 (58.2)	1719 (58.2)	520 (58.4)	
Male	1605 (41.8)	1235 (41.8)	370 (41.6)	
Age (mean (<i>SD</i>))	72.39 (8.6)	68.71 (5.7)	84.60 (4.1)	< .000
Years of education (mean (<i>SD</i>))	13.29 (2.9)	13.4 (2.9)	12.93 (2.7)	< .000
Marital status (<i>N</i> (%))				< .001
Partner	2427 (63.2)	2001 (67.7)	426 (47.9)	
No partner	1415 (36.8)	951 (32.2)	464 (52.1)	
Health rate (<i>N</i> (%))				.006
Excellent	320 (8.3)	264 (8.9)	56 (6.3)	
Very good	1216 (31.6)	954 (32.2)	262 (29.4)	
Good	1380 (35.9)	1052 (35.6)	328 (36.9)	
Fair	755 (19.6)	563 (19.1)	192 (21.6)	
Poor	173 (4.5)	121 (4.1)	52 (5.8)	

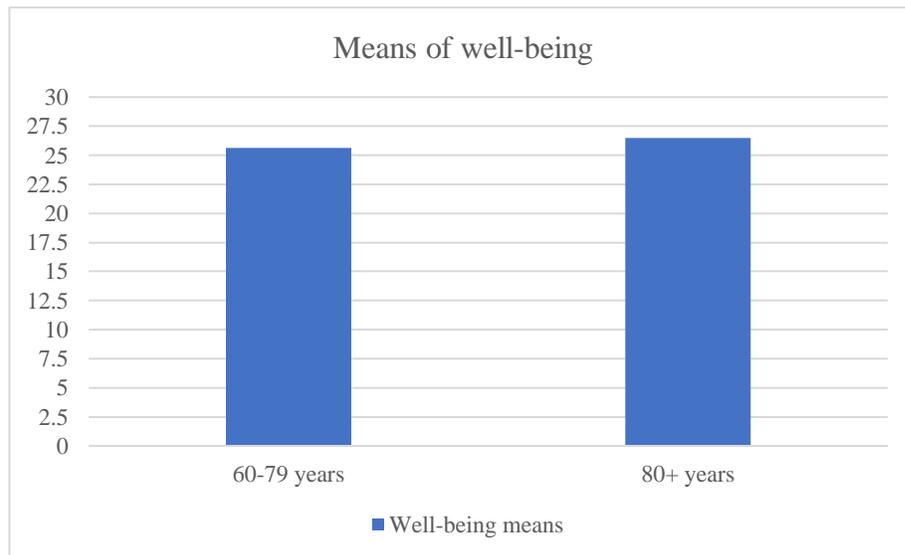
Note. *Marital status: partner = married or partnered; no partner = separated, divorced, widowed, never married. *N* = number of participants. *SD* = standard deviation. *p*-value is based on chi-square test and *t*-test.

Older age and well-being by optimism

A one-way ANCOVA including age group as between factor and optimism as covariate was used to analyze group differences in well-being between the two age groups and optimism. The ANCOVA revealed a significant main effect of age group ($F(1, 3841) = 9.95, p = .002$, partial $\eta^2 = .003$) showing that well-being was higher in the group of participants aged 80 plus years ($M = 26.50, SD = 6.92$) than in the group of participants aged 60-79 years ($M = 25.64, SD = 7.27$). Furthermore, the effect of the covariate on well-being was significant ($F(1, 3841) = 13.82, p = .001$, partial $\eta^2 = .004$) indicating that optimism positively predicted the values on well-being significantly. The interaction did not turn out to be significant ($F(1, 3840) = 1.63, p = .202$, partial $\eta^2 = .000$) indicating that there was no moderation effect of optimism, so only main effects were interpreted. See figure 2 for the means of both age groups.

Figure 1

Comparison of the group of participants aged 60-79 years and the group of participants aged 80 plus years in well-being



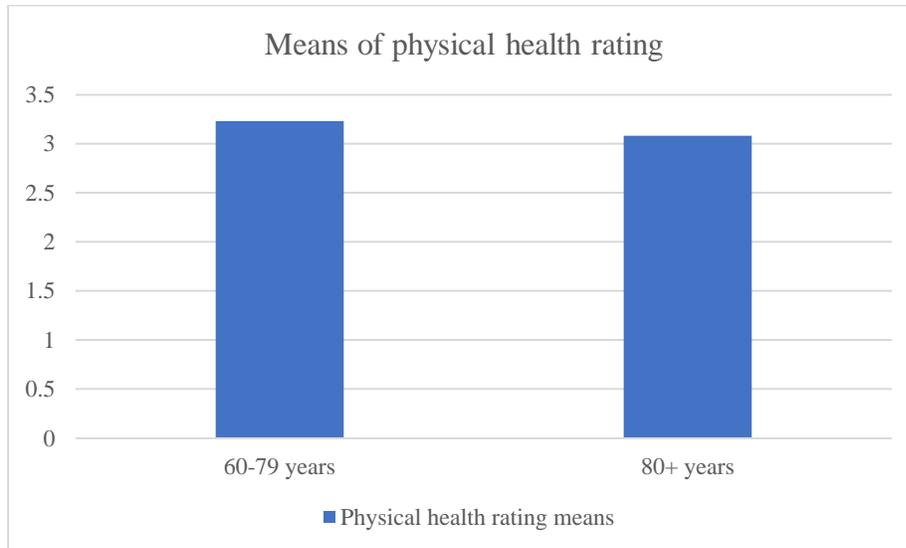
Note. The higher the score, the better the well-being. $N = 3844$. Participants in the group of 80 years and older reported higher well-being ($SD = 6.92$) than participants of the group aged 60-79 years ($SD = 7.27$).

Older age and physical health by optimism

A one-way ANCOVA including age group as between factor and optimism as covariate was used to analyze group differences in physical health rating between the two age groups and optimism. The ANCOVA revealed a significant main effect of age group ($F(1, 3841) = 15.14, p = .001$, partial $\eta^2 = .004$) showing that physical health rating was lower in the group of participants aged 80 plus years ($M = 3.09, SD = .99$) than in the group of participants aged 60-79 years ($M = 3.2, SD = .99$). Furthermore, the effect of the covariate on physical health rating was significant ($F(1, 3841) = 35.75, p = .001$, partial $\eta^2 = .009$) indicating that optimism positively predicted values on physical health rating significantly. The interaction did not turn out to be significant ($F(1, 3840) = 1.32, p = .251$, partial $\eta^2 = .000$) indicating that there was no moderation effect of optimism, so only main effects were interpreted. See figure 2 for the means of both age groups.

Figure 2

Comparison of the group of participants aged 60-79 and the group of participants aged 80 plus years in physical health rating



Note. The higher the score, the better the physical health. $N = 3844$.

Participants in the group of 80 years and older reported lower physical health ($SD = .99$) than participants of the group aged 60-79 years ($SD = .99$).

Discussion

The aim of the present study was to investigate the relationship of optimism, physical health, and well-being in older adults. The current literature showed that there are gaps to be filled about the effects of optimism on physical health and well-being in older adults. However, since the effects of optimism among younger adults showed many positive effects, it was likely to expect the same among older adults. Therefore, the current study expected that optimism would have notable positive effects on the relationship of age, well-being, and physical health. The first hypothesis, according to the well-being paradox, assumed that well-being would be higher in the group of 80 years and older in comparison to the group younger older adults (Stone et al., 2010). This hypothesis was confirmed by the results. The results revealed that, the group of older persons

aged 80 years and older showed a higher level of well-being than the group of older adults aged 60 to 79 years. However, the results showed that the differences between the age groups were not large, there was a small effect size. The second hypothesis assumed that the group of 80 years and older the physical health rated their physical health lower than in the group of younger older adults. This hypothesis is confirmed by the results. The results showed that, the group of older adults of 80 plus years experienced lower physical health than the group of older adults aged 60-79 years. The results revealed that the differences between the age groups were minor, there was a small effect size. The third hypothesis assumed that well-being would be higher in the group of 80 years and older and that optimism would be a supportive factor for higher well-being. This hypothesis has not been confirmed; however, optimism influenced well-being, but optimism did not influence the relationship of age group and well-being. The fourth and last hypothesis assumed that physical health would be rated worse in older adults aged 80 and older, but when they experienced more optimism in life, physical health would be perceived as less detrimental. This hypothesis has not been confirmed; however, optimism influenced physical health, but optimism did not influence the relationship of age group and physical health.

So, it was found that well-being was higher in the group of adults aged 80 years and older, an interesting finding, because the same participants rated their physical health as being less excellent. Especially since former literature stated that a lower physical health is related to lower well-being (Bower et al., 2008; Sprangers et al., 2000). In addition, selection, optimization, and compensation (SOC model) are assumed to promote successful development and aging by maximizing gains and minimizing losses associated with aging (Baltes & Baltes, 1990). So, when getting older, people need to learn how to manage with increased losses in life and how to maximize gains. The younger older adults are still more active and in the middle of their life and may not

have experienced as many losses as the older adults aged 80 and up have. As a result, the group of younger older individuals experience less health limitations and not so many losses, so should show a higher level of well-being. However, the findings in the current study did not support the SOC model but supported the well-being paradox that states that overall well-being drops with the lowest levels of well-being occurring between the ages of 45 and 54, and then rises again until the age of 85 years (Stone et al., 2010). Moreover, it was predicted that optimism would affect the relationship between age group and well-being, but not in line with the expectations there was not found an effect of optimism on the relationship. An explanation could have to do with the concept psychological capital, which is defined as “an individual's positive psychological condition of growth”, which is characterized by owning high levels of the four components; hope, (self-) efficacy, resilience, and optimism (HERO) (Fred Luthans, et al., 2007). Since optimism alone did not influence the association between age group and well-being, it is possible that psychological capital, which also includes hope, (self-) efficacy, and resilience, does. However, more importantly, the results showed that there was a direct effect of optimism on well-being, so independent of the age group, when individuals experienced more optimism, they also experienced higher well-being. Therefore, experiencing a higher level of optimism benefits older adults in general. Adaptive coping strategies, improved physical health, resilience, higher emotional well-being, and social support, are all positive consequences of optimism, and they appear to be present younger populations, but the current study found that they must be present in older persons as well (Segerstrom et al., 2017; Carver et al., 2010).

Moreover, in line with the expectations, the group of older adults aged 80 years and older rated their health as worse than the groups of older adults aged 60-79 years. This finding supported previous research which stated that the more people get older, the more diseases they develop and

the lower their physical health (Mitchell, 2015). Furthermore, not in line with the expectations, optimism did not have an influence on the relationship of age group and the rating of physical health. The expectation was based on the finding that that when older persons' optimism grew, they experienced better health and fewer chronic diseases (Chopik et al., 2015). This can be explained by the fact that little is known about how optimism fluctuates and evolves over time among older persons, therefore there are still gaps to be filled in the third and fourth age (Baltes & Baltes, 1993; Chopik et al., 2015). On the other hand, the results showed that there was a direct effect of optimism on physical health, so independent of the age group, when experienced more optimism, they also experienced better physical health. This finding is in line with the former literature that stated that when older persons' optimism grew, they experienced better health and fewer chronic diseases (Chopik et al., 2015; Ferguson & Goodwin, 2010). This is also consistent with previous findings about optimism and physical health in younger populations (Carver et al., 2010).

Further, there are a number of limitations and shortcomings in the study's design and implementation that should be noted. Firstly, experienced physical health is measured with only one question, what may have caused incomplete information about the physical health. There could be symptoms or first losses in physical health that do not appear immediately, this may have caused inaccuracy, especially since it was a self-report question. Second, the current study was thus based on self-report questionnaires. Although self-reports are a time- and cost-effective method to conduct research, it was likely that participants would provide socially appropriate responses. Third, the assumption of homogeneity of variance was violated for the hypotheses with well-being as dependent variable. This violation possibly led to an underestimation of the significance level. However, due to the group size difference being not that big, it was decided to

proceed with the analysis. Fourth, the sample of the current study included only individuals from the United States, what was also the case in the study of Stone et al. (2010) about the well-being paradox. Fifth, it is possible that other mechanisms could have played a role in the relationship of optimism, well-being, and physical health in older adults. It is possible that cognition and personality can influence the relationship between aging and well-being since both mechanisms can influence the aging process and well-being (Borson, 2010; Moor et al., 2006; Schimmack & Kim, 2020; Sirgy, 2021). In addition, former literature mentioned that living in an economically developed nation could also be a possible explanation for the well-being paradox (Swift et al., 2014). Lastly, there could have been a personal positive psychology bias in the current study what could have led to too big expectation of optimism. Despite these limitations, there were also several strengths. The current study is the first study to examine the relationship of optimism, well-being, and physical health among older adults. Furthermore, taking optimism into account as a possible influence on the relationship of age group, well-being, and physical health in this study, made the results of the study more reliable. Additionally, the study contained a large sample size, which adds to improved generalization of the results.

The current study contributes to the field of science by having investigated a positive aspect of aging, optimism. Since the group of older adults is expanding, healthy aging is benefitting for the society. It is therefore critical to continue conducting research in these areas. Future research could focus on the other mechanisms, such as personality and cognition, that could possibly influence well-being and physical health among older adults, since there was found no moderating effect of optimism in the current study. Furthermore, it is critical to investigate the exact role of the SOC model in relation to well-being and physical health experience, can this model be a possible explanation or solution? Additionally, when investigating the relationship between age, well-

being, and physical health, more positive psychology concepts such as psychological capital, gratitude, self-awareness, and the use of character strengths should be considered. Positive interventions for older adults can be developed using these positive psychology concepts in order to achieve a high level of well-being in later life. Moreover, it is suggested that future research attempts for improved reliability by considering more than one question to measure the experienced physical health. Lastly, future research should focus on taking other countries and continents into account to see whether the well-being paradox is not only perceptible in the United States.

The current research has clarified the relationship between optimism, physical health, and well-being in older adults. It has been found that older adults of 80 years and older experienced more well-being than younger older adults, but this relationship was not influenced by optimism. Also, it has been found that older adults of 80 years and older experience a worse physical health than younger older adults, but also in this case, optimism had no influence on the relationship. However, it was found that there were direct positive effects of optimism on well-being and physical health in all older adults. Despite some limitations, the current study adds to the literature. All of this suggests that further research is necessary to completely comprehend the precise links between age, optimism, well-being, and physical health. More research into positive (read: optimistic) quality-of-life-enhancing interventions for elderly people is needed, since physical health and well-being are of great importance in healthy aging (WHO, 2020). Broadening knowledge about the mechanisms that can influence physical health and well-being in older adults is therefore strongly recommended to take care of the growing and aging world population.

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