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1.
General Introduction
Background

Life expectancy has increased, but the time gained is not free from disease and disability. This is problematic for several reasons: numerous studies show that older people find a good physical health important\(^1\); a functioning body is often necessary to do the things one wants to do\(^2\); and disease often comes with discomfort. This raises concerns about whether the years that we have gained are desirable. While some is already known about this, questions linger\(^3\), and investigation of this matter is warranted.

The Good Life

One problem in operationalising ‘the good life’ is that there is no consensus on what quality of a life consists of. While taxonomies of desirable and undesirable aspects of life have been construed, it is also recognised that the relevance and importance of these factors, if relevant and important at all, differ per person. Moreover, views on a good life can fluctuate within the same person over time, and this could especially be relevant to older people who are in a different life stage and face different challenges than in other life phases. Also, as physical health is an important factor for the good life even according to older people\(^1,4\), investigating whether physical decline comes with a loss of objective quality of life is redundant. In fact, quality of life measurements are validated by how well they correlate with physical health. For these reasons, a subjective approach to measuring the good life along with an objective approach to measuring physical decline is the most relevant and the most valid approach to our inquiry of the desirability of life at old age. Treating quality of life as a subjective construct means that only older people themselves can judge the quality of their own life.

Well-being

Within the frame of quality of life research, we can view our inquiry as an investigation of well-being at old age. Well-being is usually approached either from a hedonic perspective by measuring emotions, from an evaluative perspective by measuring satisfaction with life, or from the perspective of how meaningful life is (eudaimonic well-being). Life satisfaction – if measured as global satisfaction - distinguishes itself from
the other two by allowing people to make their own judgment using their own norms and values. There is also a practical reason for choosing life satisfaction in this thesis: life satisfaction in recent years has become highly socially relevant\(^5\). Medical advances have led to the uprising of chronic diseases, and the relevant question for most chronic patients is not whether they will live or die, but what impact of their afflictions on their life will be. Simultaneously, economists and policy makers acknowledge that maximising gross domestic product is not the same as maximising well-being. In the light of these developments, new outcome measures are sought after that reflect among others the well-being of people, and that is how life satisfaction has become commonly used as a tool for medical evaluations and as a guiding principle in policy making\(^6\). Because of this widespread use of life satisfaction, investigating life satisfaction in older people further will inform policy makers, physicians and all others concerned with the well-being of older people about the drivers of life satisfaction at this age, which can serve as a first step to maximise life satisfaction among older people.

**Evidence and Research Question**

In spite of the increase in attention for life satisfaction and its societal relevance, there are still questions unanswered regarding the association between life satisfaction and age-related physical decline. The gap in our knowledge starts with the paradoxical finding that studies usually find that there is a relationship between physical health and life satisfaction\(^7\)-\(^9\), but life satisfaction is still high in many older people facing disease and disability\(^3\). Also, trajectories of physical decline are not paralleled by decline in life satisfaction across the lifespan\(^10\)-\(^12\), as life satisfaction on a group level remains stable far into advanced age\(^13\),\(^14\). These conflicting findings tell us that low life satisfaction in the face of age-related physical decline is not given. This raises two questions: which characteristics separate older people with low from those with high life satisfaction? And: how is life satisfaction maintained in face of disease and disability? These questions will be answered in this dissertation.

**For whom does life satisfaction remain high?**

Research has focused on which characteristics determine whether older people have a high or low life satisfaction. Among others, demographic
variables and social resources have been linked to life satisfaction at old age\textsuperscript{15}. However, some shortcomings exist: first, from these studies, it often remains unclear how the association between these factors and life satisfaction relates to health. Second, when health is included, most studies do not use objective health indicators or use only one health indicators, leaving the question open whether the same associations would have been found with different health indicators. Third, we do not know if and how the association between characteristics and life satisfaction changes across the lifespan. Fourth, the samples used are limited in size and representativeness, especially samples with individuals at advanced age. Chapters one and two address these shortcomings.

Chapter One

Using a wide array of objective health variables, we first investigate in chapter one which health characteristics separate those with high from those with low life satisfaction. In particular, we compare physical and mental health characteristics.

The correlates of various physical and mental health characteristics and life satisfaction at old age have been investigated: both are associated with life satisfaction\textsuperscript{16}. However, mental and physical health problems frequently co-occur\textsuperscript{17,18}. Given the evidence that physical decline is not paralleled by similar decline in life satisfaction, it could be that the presence of mental health problems is the true driver behind the association between older people’s physical health characteristics and life satisfaction. To our knowledge, this possibility has not been researched before. If mental instead of physical health characteristics explain why some older people have low life satisfaction and some do not, then this can have large clinical implications: contrary to most physical conditions, mental health problems can possibly be prevented, or treated in late adulthood\textsuperscript{19-21} and some evidence suggests even at advanced age\textsuperscript{22}. Thus, through preventing or treating comorbid mental health problems, life satisfaction could be maintained even for older people with severe disease and disability. Chapter one therefore investigates the relationship between physical and mental health characteristics at old age, adjusting the association physical health characteristics for mental health and vice versa. We do this in a
Chapter One

representative population of 85-year olds using high quality, objective health indicators.

Chapter Two

Chapter two investigates whether social resources, and again mental health, can explain the difference in life satisfaction among older people facing age-related physical decline. We do this by investigating the direct effect of mental health and social resources on life satisfaction, and by investigating if mental health and social resources moderate between physical decline and life satisfaction. Although these variables have been related to each other before, the moderational models under investigation in this chapter have not been tested. If evidence exists for such moderational models, then good mental health and social resources could be protective against low life satisfaction in the face of physical health, or vice versa poor mental health and social resources could be a risk factor. Although correlation does not infer causality, we can draw from this information to guide development of interventions in people with disease and disabilities to maintain high life satisfaction. Chapter two also investigates whether the weak role of physical health in life satisfaction, as well as the moderating role by mental health and social resources, are age-dependent or equally apply at all ages after midlife. This has not been researched before, and if this is found to be the case then this will shed new light on the debate whether maintaining high life satisfaction in spite of physical decline is specific for older people or can be observed at all ages.

How does life satisfaction remain high?

Chapters three and four focus on the second question addressed in this thesis, namely how life satisfaction is maintained in older people despite physical decline.

Chapter Three

Chapter three investigates structural changes in health norms and values as people grow older as a possible mechanism through which older people maintain a high life satisfaction in spite of age-related physical decline. The idea that such shifts in health appreciation could be a way of
coping for older people, is based on the idea that people are satisfied with life when their norms align with their perceived reality\textsuperscript{23}. Hence, in order to maintain life satisfaction under worsening circumstances, people can lower their health norms, or shift to different health values that are more attainable altogether\textsuperscript{24,25}.

The occurrence of changes in health norms and values has been shown in quantitative data using older general populations before: first, a few studies found that the correlates of self-rated health shift with age. Specifically, mental health becomes more important over time for older people’s health evaluations, whereas physical health becomes less important\textsuperscript{26-29}. Second, one study found that older people’s retrospective appreciation better reflected past-year incidence of hospital admission for one night or longer compared to changes in ratings over time. The finding that self-reports of change in health are less accurate when made over two time points suggests that health evaluations at these intervals are not made holding the same norms and values\textsuperscript{30} and older people thus may shift their values of health. One shortcoming of the latter study, however, is that hospitalisation is a rather specific indicator of change in physical health, and other health indicators also need to be used to study this effect and answer the question whether older individuals lower their norms or shift their values.

Another ongoing debate is whether shifts in health norms and values are indeed a conscious or unconscious way of adapting for older people, as it is also possible that shifts in norms are simply a reporting bias. In other words: they report the same while their true experience does become qualitatively less. One way to investigate this further is to compare shifts in an older individual’s health appreciation to shifts in ratings of an outsider. As an outsider has nothing to gain from shifting norms, it can be expected that shifting occurs less in outsiders and thus this rating should more accurately reflect actual physical decline. Chapter three therefore adds to the body of research by investigating shifts in health norms and values at old age by comparing how well change in self-ratings of health, retrospective appreciation of health and change in nurse-ratings of health of the same older individuals reflect change in physical decline, using reflectors of physical decline that are more broad than hospitalisation: one year-mortality and functional decline. As health ratings are often used as a quick indicator of actual
physical health status by researchers, policy makers and healthcare professionals, understanding how sensitive these ratings are to change helps to decide which rating to use in which context and how to interpret them. Also, if it can be made assumable that response shift is adaptive at advanced age, then a next step could be to investigate how to capitalise on this coping mechanism for older people.

Chapter Four

If shifts in health norms and values occur, then that raises the question which aspects of health matter less and which matter more to older people. In chapter four, we therefore investigate the correlates of older people’s self-rated health with various aspects of health. To have an indication of how older people’s evaluations compare to views grounded in medical practice, we also compare these correlates to the correlates of physician- and nurse-rated health. Investigating correlates of self-rated health at old age may help comprehend why older people are still satisfied with their life in spite of age-related physical decline. Also, a good understanding of what self-rated health represents for older people can help physicians, researchers and policy makers adequately interpret this measure as a reflection of health status, aiding their use as an evaluative tool and prognosticum. Given the possibility that older people’s health norms and values shift, physician- and nurse-ratings could be preferable measurements of physical health status and are therefore worth exploring as well.

Studies have compared self-rated health to physician-rated health, and found that self-rated health hinges more towards mental health\textsuperscript{31}, whereas physician-rated health has stronger associations with physical health\textsuperscript{32}. This valuable information, including a wide variety of physical health indicators. to provide a more detailed account of which aspects of health matter to older people. Furthermore, this chapter also addresses a further caveat of these studies, namely the limited sample sizes. By using data from a representative sample, and employing objective, high-quality health indicators we are able to draw conclusions that are more valid and reliable than those from previous studies.