I Representations

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Three Key Longings of Humankind Related to Ageing Seen Through the Lenses of Contemporary Gerontology

Eternal Youth, Immortality, and Wisdom

Abstract

Biological, behavioural, and social ageing research is well-established as an important and necessary conceptual and empirical substance in ageing science. The current work aims to transcend this now classic bio-psycho-social model by making explicit linkages with the humanities, and with history in particular. The chapter commences with input on three key longings of humankind across history as related to ageing, i. e., (1) the striving for eternal youth while getting older, (2) getting older, but having immortality, and (3) becoming wiser with age. Once these longings are described with the aid of a selection of historical examples, they are juxtaposed with key findings and enduring issues in contemporary gerontology. With respect to the longing for eternal youth, research shows that we see increasing lengths of phases characterised by relatively high cognitive and physical functioning in the later human lifespan. Additionally, successful bio-behavioural interventions can to some extent be interpreted as serious indications that ageing may be further slowed down in the future. In some contrast to this 'controlled optimism' the long for wisdom increasing with age does not seem to be validated by concurrent empirical research. In conclusion, the emerging – rather ambivalent – picture does not confirm any of the longings, but the existing evidence suggests that we have come closer to fulfilling such longings than ever before in history.

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1 Introduction

Gerontology has been an interdisciplinary endeavour since its inception.[1] In this chapter, behavioural and social ageing research will be at the centre of analysis, enriched by inputs from the bio-gerontological and cultural sciences. Both behavioural and social gerontology are well-established as needed conceptual and empirical contributions to ageing science.[2] Behavioural gerontology, also termed the psychology of ageing, has strong roots in psychology and addresses a broad range of domains such as cognitive abilities, personality, social-emotional functioning, and the mental health of older adults. Ageing and the social sciences, also termed social gerontology and rooted in sociology and demography, regards ageing as a process driven by social and economic forces enacted in families, communities, policies, and cultural norms. Whereas behavioural ageing research concentrates more on individual ageing, social gerontology emphasises the societal and political perspectives forces impacting on ageing. However, behavioural, and social gerontology have a considerable overlap in terms of major themes, methods, and interdisciplinary orientations. For example, they share a deep common interest in key issues of ageing well such as social relations, quality of life, well-being, and health. Both also prioritise the assessment of large samples of older adults with a strong focus on structured questionnaire-based approaches for quantitative analysis. Additionally, both disciplines operate with close connections to the medical, health, and biological sciences concerned with ageing and echo the importance of the humanities and cultural sciences for understanding human ageing.[3]

An example of the latter can be seen in work on cognitive ageing that takes a historical-cultural perspective by using historical material to address the development of adult intellectual functioning. The research by Williams and her colleagues contributes to this tradition by building on the robust assumption anchored in cognitive science that a decrease in language complexity occurs as a result of ageing due to a lowered

1 Edmund V. Cowdry (Ed.), Problems of Ageing. Biological and Medical Aspects, Baltimore 1939; Donald O. Cowgill / Lowell D. Holmes (Eds.), Aging and Modernization, New York 1972 (Sociology Series).

2 Manfred Diehl / Hans-Werner Wahl, The Psychology of Later Life. A Contextual Perspective, Washington D. C. 2020; Kenneth Ferraro / Deborah Carr (Eds.), Handbook of Aging and the Social Sciences, [9]New York 2021 (The Handbooks of Aging).

3 Christian Alexander Neumann, Perspektiven einer Gerontomediävistik, in: Quellen und Forschungen aus italienischen Archiven und Bibliotheken 98 (2019), pp. 387–405.

working memory capacity and rate of information processing.[4] At the same time, age-related stability in terms of vocabulary and life knowledge has repeatedly been shown in empirical ageing research.[5] The former is treated under the heading of fluid intelligence or the mechanics of intellectual functioning, whereas the latter is subsumed under the umbrella of crystallised intelligence or the pragmatics of mental performance. A linguistic analysis of 57 letters of King James VI / I (1566–1625), written from the years 1604 to 1624, was conducted by Williams and her colleagues. As shown in figure 1, the data modelling reveals a quadratic pattern of decline in written language complexity (left panel), but simultaneously an increase of richness of the vocabulary in King James's letters written between the ages of 38 and 58 (see fig. 1).[6] Such empirical analysis embedded in historical contexts may provide valuable insight for understanding historical figures, the actions throughout the course of their lifespan development, and ageing as a whole.[7]

Similarly, historical-cultural perspectives play a role in a behavioural ageing research study targeting negative-positive age stereotypes across historical time. Reuben Ng and his colleagues found a linear *increase* of negative stereotypes relating to age from 1810 to 2010 based on a linguistic analysis of the "Corpus of Historical American English (COHA)", a U. S. database of 400 million words that includes a range of printed sources from 1810 to 2009.[8] Additional data covering a period of 21 decades until 2019 and based on a similar research approach have confirmed these findings.[9]

4 Kristine Williams / Frederick Holmes / Susan Kemper / Janet Marquis, Written Language Clues to Cognitive Changes of Aging. An Analysis of the Letters of King James VI / I, in: The Journals of Gerontology. Series B 58 (2003), pp. 42–44.

5 Paul B. Baltes / Ulman Lindenberger / Ursula M. Staudinger, Life-Span Theory in Developmental Psychology, in: William Damon / Richard M. Lerner (Eds.), Handbook of Child Psychology, 4 vols., New York ^{6}2006, vol. 1: Theoretical Models of Human Development, pp. 569–664.

6 On the figure, note: MLU = Mean length of sentences in words, indicating language complexity; Type Token Ratio = Index of words with different word roots indicating vocabulary variation.

7 Martin Wagendorfer, Die Schrift des Eneas Silvius Piccolomini, Città del Vaticano 2008 (Studi e testi. Biblioteca Apostolica Vaticana 441).

8 Reuben Ng / Heather G. Allore / Mark Trentalange / Joan K. Monin / Becca R. Levy, Increasing Negativity of Age Stereotypes Across 200 Years. Evidence from a Database of 400 Million Words, in: PLoS ONE 10 (2015), pp. 1–6.

9 Reuben Ng / Ting Yu J. Chow, Aging Narratives over 210 Years (1810–2019), in: The Journals of Gerontology. Series B (2020) (DOI: 10.1093/geronb/gbaa222).

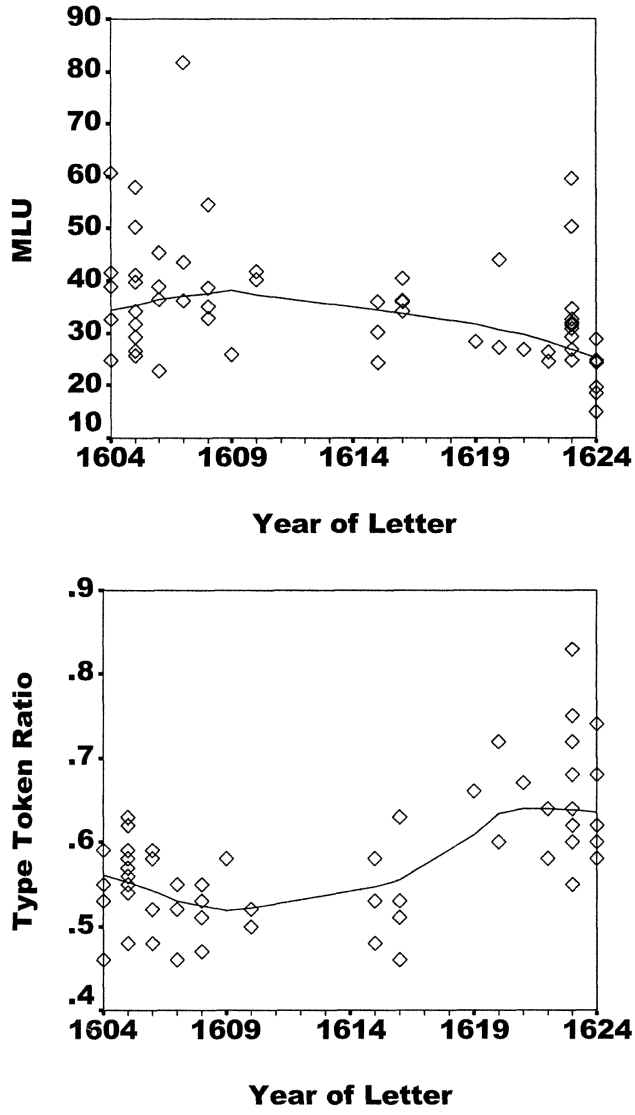


Fig. 1: Findings of a language-based analysis of fifty-seven letters written by King James VI/I (1566–1625); MLU = Mean length of sentences in words, indicating language complexity; Type Token Ratio = Index of words with different word roots indicating vocabulary variation. Source: Kristine Williams et al., Written Language Clues to Cognitive Changes of Aging. An Analysis of the Letters of King James VI/I, in: The Journals of Gerontology. Series B 58 (2003), pp. 42–44, at p. 43.

Finally, a special issue on "The Role of Historical Change for Adult Development and Aging" in the flagship journal of behavioural ageing, "Psychology and Aging", published in 2019, provided a full scope of empirical work on how recent historical-cultural change has shaped a range of psychological and social variables important for ageing well such as cognitive functioning, control beliefs, loneliness, and friendship (for an overview of findings, see the guest editorial to the Special Issue).[10] Most of these cohort-flow based studies reported gains in various indicators of ageing well in more recent cohorts of older adults as compared to previous cohorts of similar chronological age. This body of historical and societal change-driven evidence therefore largely supports the impression of the 'improvement of old age' across historical time, except for the aspect of increased negative age stereotyping of older adults. The emerging paradox[11] may be explained by the "Modernisation Theory of Ageing"[12] that argues that increasing modernisation / industrialisation of societies correlates with an increasing loss of status of older adults. Some of the most significant reasons for such a status decline of older adults could be related to their decreasing capability to cope with technological innovations, combined with a general perception of older adults as being less competent to deal with modernisation. The devaluation of elderly people as being competitors for limited societal resources also plays an important role.

Against this – to a large extent – ambivalent picture of the unfolding of ageing, both individually and societally in modern times, the objective of this chapter is to start from three key longings of humankind that can be found across cultures since antiquity and that have neither lost their actuality nor their nature of being formidable scientific challenges right up to the present day: (1) the longing for eternal youth, (2) the longing for significantly increased longevity (if not immortality), and (3) the longing for wisdom to grow with age. Subsequently, these three fundamental longings are confronted with established evidence based on contemporary behavioural and social gerontology research with cross-linkages to biogerontology.

10 Johanna Drewelies / Oliver Huxhold / Denis Gerstorf, The Role of Historical Change for Adult Development and Aging. Towards a Theoretical Framework about the How and the Why, in: Psychology and Aging 34 (2019), pp. 1021–1039.

11 Becca R. Levy, Age-Stereotype Paradox. Opportunity for Social Change, in: The Gerontologist 57 (2017), pp. 118–126.

12 Cowgill / Holmes (Eds.), Aging and Modernization (see note 1).

2 Three Key Longings of Humankind regarding Ageing throughout History. Eternal Youth, Immortality, and Wisdom

First, there is the idea of eternal youth that prompts the search for effective measures to combat ageing, which is regarded as being an undesirable aspect of the human condition.[13] The idea resonates across historical periods as can be observed in efforts that include all kinds of alchemic recommendations (e. g., drinking gold water),[14] searching for the fountain of youth and bathing in vitalising and rejuvenating waters dating back to the Hindu legend of Cyavana (ca. 700 BC). Alexander the Great's (356–323 BC) intensive, but ultimately unsuccessful, quest to find the "source of the living water"[15] also falls under this category. In the Middle Ages, the Franciscan friar Roger Bacon's (ca. 1214–1292) treatise "De retardatione accidentium senectutis" ("On the Retardation of the Effects of Old Age") gained much resonance as an attempt to explain that the rate of ageing can be retarded. Contemporary 'anti-ageing medicine' may be seen as the modern expression of the striving for eternal youth.[16] The climax of searching for rejuvenation in water can be seen in Ponce de León's (1460–1521) expeditions that were well-staffed by the Spanish crown. Although these enterprises resulted in the discovery of Florida in 1513, they unfortunately did not enable a definite localisation of the fountain of youth.[17] It appears that youth was valued above old age across cultures and societies and that, even in the modern context of 'greying societies', most older adults do not like to be referred to as 'old'. Interestingly, the majority of older

13 Georges Minois, History of Old Age, New York 2012; Pat Thane (Ed.), A Long History of Old Age, Los Angeles 2005; David G. Troyansky, Aging in World History, New York 2016 (Themes in World History).

14 Philippe Charlier / Joël Poupon / Isabelle Huynh-Charlier / Jean-François Saliège / Dominique Favier / Christine Keyser / Bertrand Ludes, A Gold Elixir of Youth in the 16th Century French Court, in: BMJ 339 (2009), pp. 1402–1403; Michela Pereira, Projecting Perfection. Remarks on the Origin of the "Alchemy of the Elixir", in: Agostino Paravicini Bagliani (Ed.), The Impact of Arabic Sciences in Europe and Asia, Firenze 2016 (Micrologus 24), pp. 73–94.

15 Tommaso Tesei, Survival and Christianization of the Gilgamesh Quest for Immortality in the Tale of Alexander and the Fountain of Life, in: Rivista degli Studi Orientali. Nuova Serie 83 (2010), pp. 417–440, at p. 420.

16 Carole Haber, Anti-Aging Medicine. The History. Life Extension and History. The Continual Search for the Fountain of Youth, in: The Journals of Gerontology. Series A 59 (2004), pp. 515–522.

17 W. Andrew Achenbaum, Crossing Frontiers. Gerontology Emerges as a Science, New York 1995.

adults claim to feel about 20 % younger than their chronological age.[18] Contemporary research on subjective age and its premise that feeling younger is both good and desirable[19] has led to a debate in gerontology regarding whether this perspective reflects an ageistic attitude.[20] Given the apparent ambivalence related to eternal youth, one feels reminded of the Greek myth of Selene, the goddess of the moon, who asked Zeus to grant eternal youth to her lover, Endymion. Zeus granted her wish and put Endymion into eternal sleep. Every night, Selene visits the sleeping Endymion.[21]

A second and related idea prevalent throughout history, and still very much alive in contemporary gerontology, is the idea to greatly increase longevity, if not to achieve immortality.[22] Probably the most famous source on the concept of immortality is the "Gilgamesh Epic" (about 1800 BC, possibly much older), particularly its tablets IX, X, and XI. Similar to what happened to Alexander the Great or, much later, Ponce de León, the hero Gilgamesh already has the plant promising immortality in his hand, but then a serpent steals it, immediately loses its old skin, and then goes away forever, thus fulfilling the will of the divine.[23] According to Gruman, the hope for immortality survived until modern times through myths stating there are territories on earth where immortality is a reality.[24] Francis Bacon's (1561–1626) famous fable on the "Nova Atlantis" ("New Atlantis") (published in 1627, one year after his death) has been an important milestone for making the idea of immortality survive to contemporary

18 Martin Pinquart / Hans-Werner Wahl, Subjective Age from Childhood to Advanced Old Age. A Meta-Analysis, in: Psychology and Aging 36 (2021), pp. 394–406; David C. Rubin / Dorthe Berntsen: People over Forty Feel 20 % Younger than their Age. Subjective Age across the Lifespan, in: Psychonomic Bulletin & Review 13 (2006), pp. 776–780.

19 Felicia Alonso Debreczeni / Phoebe E. Bailey, A Systematic Review and Meta-Analysis of Subjective Age and the Association with Cognition, Subjective Well-Being, and Depression, in: The Journals of Gerontology. Series B. Psychological Sciences and Social Sciences (2020) (DOI: 10.1093/geronb/gbaa069).

20 Tracey L. Gendron / Jennifer Inker / Ayn Welleford, "How Old Do You Feel?" The Difficulties and Ethics of Operationalizing Subjective Age, in: The Gerontologist 58 (2018), pp. 618–624.

21 Richard L. Gordon, Selene, in: Der Neue Pauly (DNP), vol. 11, Stuttgart 2001, cc. 353–354.

22 Chris Gilleard, Renaissance Treatises on 'Successful Ageing', in: Ageing and Society 33,2 (2013), pp. 189–215; Chris Gilleard, Ageing and the Galenic Tradition. A Brief Overview, in: Ageing and Society 35,3 (2015), pp. 489–511.

23 Tesei, Survival and Christianization (see note 15), pp. 417–440.

24 Gerald J. Gruman, A History of Ideas about the Prolongation of Life. The Evolution of Prolongevity Hypotheses to 1800, Philadelphia 1966 (Transactions of the American Philosophical Society 56,9).

scientific enterprises.[25] Already in 1999, the president of the "American Academy of Anti-Aging Medicine" announced that "immortality is within our grasp".[26]

Thirdly, a further recurring perspective on human ageing is that wisdom comes with old age and that extraordinary life knowledge and expertise can only be found in older persons. A major echo of this perspective can be traced in Platon's writings such as in his "Politeia",[27] where the argument is presented that bodily decline can be compensated, and even optimised, by the accumulation of life experiences.[28] A similar way of thinking can be observed for the Middle Ages. As long as the office existed between the 8th and 18th century, the doges of Venice were mostly very old in comparison to the average life expectancy of that time, not seldom above the age of 80 years. Simone de Beauvoir[29] interpreted this tradition as a strategy of the Venetian political system to limit the power of the holders of the highest office by installing frail older men who could not rule for too long. Moreover, this strategy of selection ensured a regular transition-making in the Venetian system of governance. On the other hand, it may also be interpreted as acknowledgement of the competence and skills related to advanced old age on the part of Venetian society and there is evidence supporting a rather positive view of ageing at the time. As Finlay resumed in his in-depth analysis of the Venetian gerontocracy:

> "Stability and harmony were virtues to be placed before the uncertain attractions of novelty and contention. Those virtues, along with the qualities that were seen to typify the patrician character, found expression in the "myth of Venice". In effect, the "myth" proclaimed what the political system promoted: it was wise for a patrician

25 Achenbaum, Crossing Frontiers (see note 17), pp. 5–6.

26 URL: https://www.thepharmaletter.com/article/immortality-is-within-our-grasp-claims-medical-futurist-and-a4m-president; 7. 6. 2022.

27 Maria Nühlen-Graab, Philosophische Grundlagen der Gerontologie, Heidelberg-Wiesbaden 1990; Fabian Schulz, Gerontokratie *avant la lettre*? Platon und Aristoteles über die Herrschaft der Alten, in: Monika Schuol/Christian Wendt/Julia Wilker (Eds.), *Exempla imitanda*. Mit der Vergangenheit die Gegenwart bewältigen? Festschrift für Ernst Baltrusch zum 60. Geburtstag, Göttingen 2016, pp. 173–186.

28 Hartwin Brandt, Wird auch silbern mein Haar. Eine Geschichte des Alters in der Antike, München 2002 (Beck's Archäologische Bibliothek); Tim G. Parkin, Age and the Aged in Roman Society, Oxford 1992.

29 Simone de Beauvoir, La veillesse, Paris 1970.

> to be deferential, conventional, self-sacrificing, and anonymous. Venice's governors enjoyed a justified reputation for being temperate, prudent, and unimaginative".[30]

Indeed, biological decline may be regarded being a requirement for intellectual sharpness (Platon, Symposion 219 a). This view has been incorporated in modern lifespan conceptualizations, particularly in the work of Erik H. Erikson[31] on "ego-integrity", which he regards as only being possible when a number of psychosocial crises have been solved during previous life stages. Similarly, "Gerotranscendence Theory" argues for a new existential experience, which is possible only late in life and that builds on the bodily limitations and constraints connected with old age.[32] Furthermore, according to Platon's "Nomoi" ("Laws"), only old age allows for certain difficult decisions; for instance, only old age qualifies one to pass a judgment regarding the death penalty. The Roman statesman and philosopher Cicero,[33] author of one of the most famous treatises on old age ever written ("Cato major de senectute", 44 BC) made the following statement on wisdom in his "Tusculanae Disputationes" ("Tusculan Disputations", 45 BC): "For there is assuredly nothing dearer to a man than wisdom, and though age takes away all else, it undoubtedly brings us that".[34] And in Cicero's "De Officiis" ("On Duties", 44 BC) it says: "The old ... should have their physical labours reduced; their mental activities should be actually increased. They should endeavor too, by means of their counsel and practical wisdom to be of as much service as possible to their friends and to the young, and above all to the state".[35] Could it thus be that old age's obvious disadvantages in terms of physical and mental decline are irrelevant given the wisdom-related potentials that unfold during that life stage? As Cicero also stated in his "De Senectute", becoming slower could even be a requirement for deep thinking and for

30 Robert Finlay, The Venetian Republic as a Gerontocracy. Age and Politics in the Renaissance, in: Journal of Medieval and Renaissance Studies 8 (1978), pp. 157–178, at p. 178.

31 Erik H. Erikson, Childhood and Society, New York 1950.

32 Lars Tornstam, Gerotranscendence. A Developmental Theory of Positive Aging, New York 2005.

33 Marcus Tullius Cicero, Cato maior de senectute, in: M. Tulli Ciceronis De re publica. De legibus. Cato maior de senectute. Laelius de amicitia, ed. by Jonathan G. F. Powell, Oxford 2006 (Scriptorum classicorum bibliotheca Oxoni-ensis), pp. 267–315.

34 Quoted from Karen Cockayn, Experiencing Aging in Ancient Rome, London 2003 (Routledge Classical Monographs), p. 92.

35 Quoted from ibid., p. 96.

juxtaposing different points of view, and should thus not be regarded as a weakness but rather a strength of old age.[36]

3 Eternal Youth, Immortality, and Wisdom in the Light of Contemporary Gerontology's Evidence

3.1 Longing for Eternal Youth in the Light of Contemporary Gerontology's Evidence

Although the prospect of eternal youth continues to remain unrealistic, it still informs and drives gerontology and its research programmes as well as several enduring societal questions. We address three major variations of contemporary gerontology that can shed new light on the 'old' hope for eternal youth: (1) Historical / cohort-related improvements in cognitive ageing, (2) Historical / cohort-related improvements in healthy ageing, and (3) interventions to slow ageing.

3.1.1 Historical / Cohort-Related Improvements in Cognitive Ageing

Old age as we witnessed it during the past 70 years is increasingly becoming 'younger' at various levels, particularly in terms of cognitive functionality. A major empirical study was conducted by the cognitive ageing researcher Klaus W. Schaie in the "Seattle Longitudinal Study". This study commenced in 1956 and included 500 randomly selected participants who ranged in age from their early 20s to their late 60s.[37] The ground-breaking idea by Schaie, in conjunction with an early seminal conceptual article, was to not only re-assess the original sample on later measurement occasions as is typical in longitudinal research, but to also add a new group of randomly selected people of the same age range every seven years.[38] To date, over 6 000 people have participated in this study at some time point, thereby enabling cohort-sequential analyses

36 Thorsten Burkard, Der alte Mann und die Macht. Zum Lob des Alters in Ciceros 'Cato major' und seinen kulturellen und sozialen Voraussetzungen, in: Angelika C. Messner / Andreas Bihrer / Harm-Peer Zimmermann (Eds.), Alter und Selbstbeschränkung. Beiträge aus der Historischen Anthropologie, Wien-Köln-Weimar 2017 (Veröffentlichungen des Instituts für Historische Anthropologie e. V. 14), pp. 201–234.

37 Klaus Warner Schaie, Developmental Influences on Adult Intelligence. The Seattle Longitudinal Study, New York ²2013.

38 Id., A General Model for the Study of Development Problems, in: Psychological Bulletin 64 (1965), pp. 92–107.

and multiple comparisons of later-born and same-age cohorts of adults with earlier-born cohorts. The reasoning behind has been that different birth years / cohorts and early lifespan socialisation are significantly associated with factors such as the amount and quality of education, health literacy, and quality of medical treatment. In general, later-born cohorts are expected to have benefitted from higher levels of education, better health literacy, and improved medical treatment. Gender issues also deserve attention. For example, older women from earlier-born cohorts received less education compared with men of the same cohort, which affected how their cognitive abilities developed over the course of adulthood. Additionally, older women from later-born cohorts are more likely to have had a professional career or to have spent long periods in the labour force, which can be seen as a cognitive training that previous cohorts of women did not experience.[39]

Schaie reported substantial positive developments from earlier to later cohorts for crystallised abilities (verbal meaning) and fluid abilities (spatial orientation and inductive reasoning).[40] Other studies also indicate that today's 75-year-olds are cognitively much fitter than the 75-year-olds of 20 years ago.[41] It is interesting to note that Christensen and his colleagues even found increased cognitive functioning in large samples of Danish adults aged 93 and 95 years that were only ten years apart in their birth years (1905 vs. 1915).[42]

3.1.2 Historical / Cohort-Related Improvements in Healthy Ageing

Alvar Svanborg was a forerunner in this area with his study in Finland that started in the 1970s.[43] What Svanborg and his colleagues showed for the first time was cohort-

39 Gizem Hülür / Jelena Sophie Siebert / Hans-Werner Wahl, The Role of Perceived Work Environment and Work Activities in Midlife Cognitive Change, in: Developmental Psychology 56 (2020), pp. 2345–2357.

40 Schaie, Developmental Influences (see note 37).

41 Denis Gerstorf / Gizem Hülür / Johanna Drewelies / Sherry L. Willis / Klaus Warner Schaie / Nilam Ram, Adult Development and Aging in Historical Context, in: American Psychologist 75 (2020), pp. 525–539.

42 Kaare Christensen / Mikael Thinggaard / Anna Oksuzyan / Troels Steenstrup / Karen Andersen-Ranberg / Bernard Jeune / Matt McGue / James W. Vaupel, Physical and Cognitive Functioning of People Older than 90 Years. A Comparison of two Danish Cohorts Born 10 Years Apart, in: The Lancet 382 (2013), pp. 1507–1513.

43 Alvar Svanborg / Stig Berg / Dan Mellström / Lars-Göran Nilsson / Göran Persson, Possibilities of Preserving Physical and Mental Fitness and Autonomy in Old Age, in: Heinz Häfner / Günther

comparative data that revealed a decrease in the number of occurrences of strokes in later born cohorts as well as an overall better physical condition. Later on, the portfolio of such positive cohort-related trends found enrichment based on a range of health indicators. For example, cohort-driven research now shows that rates of dementia[44] as well as heart disease and stroke[45] have declined over the last decades. There are also data suggesting that functional health, which is defined as the ability to function well in everyday life and to conduct daily activities successfully and independently, has improved particularly among those who are in "young-old age" category.[46] There are also findings indicating that functional health increases in later born cohorts can be observed in very old adults.[47]

At the demographic and epidemiological level, the relative portion of healthy life expectancy (i. e., years of life characterised by high levels of daily functioning and independence) of total life expectancy has been shown to increase from earlier to later cohorts of older adults.[48] However, the data shows that the proportion of unhealthy older adults of the total cohort enjoying an increase in life expectancy is also growing.[49] A major reason for this can certainly be attributed to the growing proportion of very old individuals, a significant number of whom have survived a "terminal" illness earlier in their lives, which they would no doubt have died from around 30 years ago. Such survivorship of "terminal" illness early in the lifespan appears to come with increased vulnerability late in life.[50]

Moschel / Norman Sartorius (Eds.), Mental Health in the Elderly, Berlin-Heidelberg 1986, pp. 195–202.

44 Kenneth M. Langa, Is the Risk of Alzheimer's Disease and Dementia Declining?, in: Alzheimers Research and Therapy 7 (2015), pp. 34–38.

45 Jung Ki Kim / Jennifer A. Ailshire / Eileen M. Crimmins, Twenty-Year Trends in Cardiovascular Risk among Men and Women in the United States, in: Aging Clin Exp Res 31 (2019), pp. 135–143.

46 Anna Zajacova / Jennifer Karas Montez, Explaining the Increasing Disability Prevalence among Mid-Life US Adults, 2002 to 2016, in: Social Science & Medicine 211 (2018), pp. 1–8.

47 Christensen et al., Physical and Cognitive Functioning (see note 42).

48 Sarah Harper, Economic and Social Implications of Aging Societies, in: Science 346 (2014), pp. 587–591.

49 Joshua A. Salomon / Haidong Wang / Michael K. Freeman / Theo Vos / Abraham D. Flaxman / Alan D. Lopez / Christopher J. L. Murray, Healthy Life Expectancy for 187 Countries, 1990–2010. A Systematic Analysis for the Global Burden Disease Study 2010, in: The Lancet 380 (2012), pp. 2144–2162; Clemens Tesch-Römer / Hans-Werner Wahl, Successful Aging and Aging with Care Needs. Arguments for a Comprehensive Concept of Successful Aging, in: Journal of Gerontology. Social Sciences 72 (2017), pp. 310–318.

50 Eileen M. Crimmins / Yuan S. Zhang, Aging Populations, Mortality, and Life Expectancy, in: Annual Review of Sociology 45 (2019), pp. 69–89.

3.1.3 Interventions to Slow Ageing

Slowing the course of ageing is the primary ambition of all current gero-interventions that attempt to shape the 'normal' flow of ageing. A major assumption of all such gero-interventions is that there is plasticity in ageing organisms that needs unfolding by means of systematic external input ranging from direct gene and cell manipulations to intensive behavioural training.[51] Another fundamental idea is that ageing is a process taking place on multiple levels, indicating that there is not just one single pathway for slowing it, but possibly many. One such mechanism of ageing, for example, is the accumulation of cell damage due to free radical release that increases the rate of the ageing process. It has been proposed that measures that are able to reduce the release of free radicals could help to slow ageing at the biological level. From an evolutionary viewpoint, the disposable "Soma Theory of Ageing" argues that the investment in biological repair mechanisms decreases after the end of the reproductive phase of an organism, leading to ageing.[52] In other words, evolutionary dynamics seems to value investments and adaptive gene selectivity more highly during the reproductive phase than in the post-reproductive part of the lifespan. On the other hand, manipulating such dynamics as part of bio-cultural co-evolution may be possible.

The methods that are currently available, and have to some extent been tested, have resulted in enthusiasm on the part of some bio-gerontologists,[53] and scepticism on the part of others.[54] For example, there is emerging evidence that the drug Metformin, which was originally used to treat diabetes, may help to prevent cellular senescence.[55] There is also hope and some evidence that stem cell therapy might be able to secure prolonged youthfulness.[56] The use of growth hormones has been considered and tested as a means to

51 Diehl / Wahl, The Psychology of Later Life (see note 2); Ferraro / Carr (Eds.), Handbook of Aging (see note 2).

52 Thomas B. L. Kirkwood, Evolution of Ageing, in: Nature 270 (1970), pp. 301–304.

53 David A. Sinclair / Matthew D. LaPlante, Lifespan. Why We Age – and Why We Don't Have, New York 2019.

54 Suresh I. S. Rattan, Naive Extrapolations, Overhyped Claims and Empty Promises in Ageing Research and Interventions Need Avoidance, in: Biogerontology 21 (2019), pp. 415–421.

55 Nir Barzilai / Jill P. Crandall / Stephen B. Kritchevsky / Mark A. Espeland, Metformin as a Tool to Target Aging, in: Cell Metabolism 23 (2016), pp. 1060–1065.

56 Abu Shufian Ishtiaq Ahmed / Matilda H.-C. Sheng / Samiksha Wasnik / David J. Baylink / Kin-Hing William Lau, Effect of Aging on Stem Cells, in: World J Exp Med. 7 (2017), pp. 1–10.

slow ageing, but adverse side effects were also found in the studies performed.[57] Finally, treatment with antioxidants such as vitamins A, C, and E could result in an age-slowing effect, although the high doses needed to see such effects might go along with adverse side effects such as a decrease of bone density.[58]

At the behavioural level, training-oriented trials aimed at enhancing cognitive and physical function have resulted in a substantial body of promising evidence.[59] The key learnings from this data portfolio can be summarised under the aspects outlined here. First, in one of the largest cognitive training projects ever, the "Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE)" study with older adults aged between 65 and 94 years and based on rigorous randomised control study methodology,[60] the training gain observed in the 2-year follow-up interval after training completion was of a magnitude that corresponds with the natural decline in cognitive functioning across a 7 to 14 year period, depending on the cognitive outcome targeted. To put this in another way, the cognitive training resulted in those being trained becoming 7 to 14 years 'younger'. Importantly, at least some of the training gain along with better day-to-day functioning could still be observed in the 10-year follow-up compared to the control group.[61] Second, when regarding limitations, it can be observed that intensive training of only one aspect of cognitive functioning (such as, for example, focused memory) also results in a gain over rather long periods of time of up to several years, but the gain in one aspect does not necessarily generalise to other functions. In other words, the participants of such measures become 'younger' in one cognitive function, but not automatically in

57 Marc R. Blackman et al., Growth Hormone and Sex Steroid Administration in Healthy Aged Women and Men. A Randomized Controlled Trial, in: JAMA. Journal of the American Medical Association 288 (2002), pp. 2282–2292.

58 Goran Bjelakovic / Christian Gluud, Surviving Antioxidant Supplements, in: JNCI. Journal of the National Cancer Institute 99 (2007), pp. 742–743.

59 Diehl / Wahl, The Psychology of Later Life (see note 2); Ferraro / Carr (Eds.), Handbook of Aging (see note 2).

60 Karlene Ball / Daniel B. Berch / Karin F. Helmers / Jared B. Jobe / Mary D. Leveck / Michael Marsiske / John N. Morris / George W. Rebok / David M. Smith / Sharon L. Tennstedt / Frederick W. Unverzagt / Sherry L. Willis, Effects of Cognitive Training Interventions with Older Adults. A Randomized Controlled Trial, in: JAMA. Journal of the American Medical Association 288 (2002), pp. 2271–2281.

61 George W. Rebok / Karlene Ball / Lin T. Guey / Richard N. Jones / Hae-Young Kim / Jonathan W. King / Michael Marsiske / John N. Morris / Sharon L. Tennstedt / Frederick W. Unverzagt / Sherry L. Willis, Ten-Year Effects of the ACTIVE Cognitive Training Trial on Cognition and Everyday Functioning in Older Adults, in: Journal of the American Geriatrics Society 62 (2014), pp. 16–24.

another. Third, it must be pointed out that although high-dose training and what has been labelled as "testing-the-cognitive-limits" is generally successful – and in some rare older adults indeed does produce large gain effects not too far from a mnemonist – it does not appear to be possible to restore the performance of younger years, even after a year-long intensive training exposure.[62]

From the above it is clear that the prospect of eternal youth continues to drive contemporary behavioural and social ageing research as well as biogerontology. In a sense, ageing research still is in the middle of an ongoing process to fully understand the potentials and limits of plasticity in the ageing process and how such plasticity is related to historical, societal, scientific, and cultural change. That said, one may argue that the ageing process has never in history been under such dramatic transition as has been seen in the last 100 years.

3.2 The Longing for Greatly Increased Longevity (If Not Immortality) in the Light of Contemporary Gerontology's Evidence

To achieve symbolic immortality seems not to be a problem for humankind. In lifespan theory and gerontology, the concept of generativity introduced by Erik H. Erikson in his theory of psychosocial development describes "the concern in establishing and guiding the next generation"[63] and "everything that is generated from generation to generation: children, products, ideas, and works of art"[64]. However, such symbolic 'eternal life' seems to not be fully convincing for humankind or for gerontological research.

Considering unlimited lifespans or significant increases of life expectancy, at least the latter appears ever more achievable. In particular, "hydra" is an animal system that seems in a sense to live forever.[65] Human life expectancy has been significantly and rather consistently increasing since the beginning of the 20th century, with a marked jump after

62 Paul B. Baltes / Ulman Lindenberger / Ursula M. Staudinger, Life-Span Theory (see note 5), pp. 569–664; Diehl / Wahl, The Psychology of Later Life (see note 2); Ferraro / Carr (Eds.), Handbook of Aging (see note 2).

63 Erik H. Erikson, Childhood and Society, New York ²1963, p. 276.

64 Richard I. Evans, Dialogue with Erik Erikson, New York 1967 (Dialogues with Notable Contributors to Personality Theory 3), p. 51.

65 Ralf Schaible / Alexander Scheuerlein / Maciej J. Dańko / Jutta Gampe / Daniel E. Martínez / James W. Vaupel, Constant Mortality and Fertility over Age in *Hydra*, in: Proceedings of the National Academy of Sciences 112 (2015), pp. 15701–15706.

World War II. When we consider the fact that the life expectancy at birth has nearly doubled from about 43 years at the end of the 19th century to 83 years for women and 79 years for men in Germany in the present day,[66] the prospect that this dynamic may even triple in the next 100 years, given the current scientific medical progress, no longer seems illusory. Other countries such as South Korea have seen a similar increase in life expectancy (and decrease in reproduction rate) in half the time than in European countries. Certainly, the rate at which life expectancy increases varies across the different regions of the globe, but the trend towards an increase is consistent.[67] For example, life expectancy in one of the poorest countries both in Africa and in the world, Burkina Faso, has increased from 34.4 years in 1960 to 61.2 years in 2018.[68]

However, simply waiting for what is happening in naturally evolving life expectancy due to medical progress and socio-economic growth does not seem to fit with the scientific ambitions of gerontology, particularly of biogerontology. In the following section, we will explore (1) contemporary biogerontological findings on increasing the human lifespan and (2) contemporary behavioural and social gerontology insights related to longevity respectively to mortality in somewhat more detail.

3.2.1 Contemporary Biogerontological Findings on Increasing the Human Lifespan

The now classic and most established area here is the role played by caloric restriction for living longer lives. The repeatedly reported major finding is that a reduction of calorie availability by about 20–50 % (not to the point of undergoing undernutrition) can extend the maximum lifespan in short-lived species such as rodents by up to about 50 %. A key mechanism for this 'success' in the animal model discussed is that caloric restriction is also linked to general health improvement and a decrease in age-related diseases.[69] However,

66 German Federal Statistical Office / Statistisches Bundesamt, 2019 (URL: https://www.destatis.de/DE/Presse/Pressekonferenzen/2019/Bevoelkerung/pressebroschuere-bevoelkerung.pdf?__blob=publicationFile; 7. 6. 2022).

67 Vasilis Kontis / James E. Bennett / Colin D. Mathers / Guangquan Li / Kyle Foreman, Future Life Expectancy in 35 Industrialised Countries. Projections with a Bayesian Model Ensemble, in: The Lancet 389 (2017), pp. 1323–1335; Joshua A. Salomon et al., Healthy Life Expectancy for 187 countries (see note 49), pp. 2144–2162.

68 URL: https://data.worldbank.org/indicator/SP.DYN.LE00.IN?end=2018&locations=BF&start=1960; 7. 6. 2022.

69 Fabien Pifferi / Jérémy Terrien / Julia Marchal et al., Caloric Restriction Increases Lifespan but Affects Brain Integrity in Grey Mouse Lemur Primates, in: Communications Biology 1 (2018), p. 30 (DOI: https://doi.org/10.1038/s42003-018-0024-8).

although there is some evidence that the effect can also be found in long-lived species such as rhesus monkeys, a transfer of the concept to humans seems challenging especially in light of the fact that research suggests that caloric restriction progressively loses its impact for extending lifespan in more complex organisms.[70] However, the most recent findings based on a rat model are promising and may stimulate new trials also involving human participants.[71] Indirect evidence supporting the role of caloric restriction also at the human level comes from the Japanese island of Okinawa, where calories intake of indigenous islanders is by eating tradition significantly lower than to other largely comparable Japanese regions. This difference seems to go along with an increase in life expectancy and a decrease in major age-related diseases; Okinawans who move away from the island and presumably lost their protective lifestyle showed mortality rates higher than those Okinawans who remain on the island.[72]

Furthermore, genetic evidence supports the assumption that only about 20 % of the variation in longevity in humans can be explained by genetic differences.[73] Hence, the greater number of influences relevant for longevity are derived from environmental and lifestyle factors, e. g., avoiding risk behaviour such as smoking, low levels of physical activity and high levels of sedentary behaviour, obesity, and alcohol consumption. All these factors are, at least in principle, subject to human control. Barbi and her colleagues reported that established quantitative mortality prediction models (the "Gompertz Mathematical Model", in particular) no longer work in this extreme of the human lifespan and that they are no longer more effective than random prognoses of death.[74] This could be interpreted as an indication that – starting from an extreme time window of the human lifespan – death becomes totally unpredictable and, in a sense, may happen or not in principle terms.

70 Arthur V. Everitt / David G. LeCouteur, Life Extension by Calorie Restriction in Humans, in: Annals of the New York Academy of Sciences 1114 (2007), pp. 428–433.

71 Shuai Ma et al., Caloric Restriction Reprograms the Single-Cell Transcriptional Landscape of Rattus Norvegicus Aging, in: Cell 180 (2020), pp. 984–1001.

72 Leonie K. Heilbronn / Eric Ravussin, Calorie Restriction and Aging. Review of the Literature and Implications for Studies in Humans, in: The American Journal of Clinical Nutrition 78 (2003), pp. 361–369.

73 James W. Vaupel et al., Biodemographic Trajectories of Longevity, in: Science 280 (1998), pp. 855–860.

74 Elisabetta Barbi / Francesco Lagona / Marco Marsili / James W. Vaupel / Kenneth W. Wachter, The Plateau of Human Mortality. Demography of Longevity Pioneers. A Study of Centenarians in Italy Suggests that Human Mortality is Approximately Constant in Extreme Old Age, in: Science 360 (2018), pp. 1459–1461.

3.2.2 Contemporary Behavioural and Social Gerontology Insights Related to Longevity and Mortality

It seems trivial to argue that genetic make-up and environmental factors are interacting as we age and in how long we live. The interaction is nevertheless poorly understood and most research in the area is not able to offer a balanced picture in terms of considering genetic *and* environmental data as well as the best aspects in terms of research design such as the twin study format and the more sophisticated ways to analyse genetic-behaviour interactions.[75] For example, personality factors as shown in having a high score for neuroticism have a strong genetic basis, but certainly also lead to risky behaviours such as smoking or provoke more stressful events that have a negative impact on longevity. Against this complexity, it seems clear in terms of accumulated evidence in the behavioural and social sciences that external factors play a significant role in longevity, although the interlinkage with genetic factors is never lost.

A primary observation is that differences in longevity have been found to depend on socio-economic factors throughout the course of history. At present, and at the more macro-level, for instance, life expectancy in the U. S. varies with approximately 7 years between states – with West Virginians having an life expectancy of 74.8 years while those in Hawaii generally live to an age of 82.3 years.[76] At the micro-level, women from a poor socio-economic background in Germany have a life expectancy that is 8 years lower compared to that of women from backgrounds with good to excellent socio-economic conditions.[77] Socio-economic differences, such as differences in levels of education, have consistently been found to be a major predictor of mortality across the full lifespan in that higher socio-economic status (SES) is aligned with better health and functional ability, as well as lower incidences of chronic diseases and all-cause mortality. For example, in their study covering deaths in the UK, Lewer and his colleagues found that about 36 % of premature deaths were attributable to SES inequality.[78] The main causes of death in which SES inequality was

75 Rocío Fernández-Ballesteros / Macarena Sánchez-Izquierdo, Are Psycho-Behavioral Factors Accounting for Longevity?, in: Frontiers in Psychology 10 (2019), p. 2516.

76 URL: https://en.wikipedia.org/wiki/List_of_U.S._states_and_territories_by_life_expectancy; 7. 6. 2022.

77 Robert-Koch-Institute, Zahlen und Trends aus der Gesundheitsberichterstattung des Bundes (GBE Kompakt, 5/2010) (URL: https://www.rki.de/DE/Content/Gesundheitsmonitoring/Gesundheitsberichterstattung/GBEDownloadsK/2010_5_Armut.pdf?__blob=publicationFile; 7. 6. 2022).

78 Dan Lewer / Wikum Jayatunga / Robert W. Aldridge / Chantal Edge / Michael Marmot / Alistair Story / Andrew Hayward, Premature Mortality Attributable to Socioeconomic Inequality

implicated included tuberculosis, opioid use, infection with human immunodeficiency virus (HIV), psychoactive drug use, viral hepatitis, and obesity, each with more than two-thirds of cases being attributable to SES inequality – a frightening magnitude.

Looking back in history, the Venetian Doge Enrico Dandolo[79] made it to 98 years of age and lived through nearly the entire 12th century and still 5 years more (1107–1205), which is not that different from the longest lifespan ever confirmed, namely that of Jeanne Calment, who passed away in 1997 at the age of 122.4 years.[80] That is, Dandolo exceeded the estimated average life expectancy at birth at the time in Italy of approximately 30 years by nearly 70 years, while Calment's age at death exceeded the life expectance of around 40 years for her 1875 birth cohort in France with over 80 years. Carrieri and Serraino, in their state-of-the-art demographic analysis of ancient data, found that between 1200–1599 and 1600–1900, the median age of the popes when starting their pontificate increased from 60.0 to 65.5 years, while the median duration of their pontificate increased from 6.5 to 11.0 years, respectively.[81] The median age at death for the popes increased, on average, from 66 to 77 years in the study period between the 13th and 19th century.[82] Borscheid showed that the life expectancy of Hessian priests during the time of the Reformation in the 16th century was rather high, with about 30 % reaching an age of over 60 years, roughly 21 % an age of about 70 years, and 9 % even living to the age of 80 years. This was likely due to higher SES in terms of better nutrition, living arrangements, and a low levels of manual labour.[83] As can be seen in figure 2, life expectancy at the age of 25 years, disregarding all the methodological problems that come with such an analysis, roughly varied between 25 and 34 years in the three selected monasteries between 1395 and 1430, then declined considerably before recovering again, albeit to a lower level than

in England between 2003 and 2018. An Observational Study, in: The Lancet Public Health. Open Access (2019), pp. 33–41.

79 Thomas F. Madden, Enrico Dandolo and the Rise of Venice, Baltimore 2007.

80 Jean-Marie Robine / Michel Allard / François R. Herrmann / Bernard Jeune, The Real Facts Supporting Jeanne Calment as the Oldest Ever Human, in: Journal of Gerontology. Medical Sciences 74 (2019), pp. 13–20.

81 Maria Patrizia Carrieri / Diego Serraino, Longevity of Popes and Artists Between the 13th and the 19th Century, in: International Journal of Epidemiology 34 (2005), pp. 1435–1436.

82 W. Andrew Achenbaum, (When) Did the Papacy Become a Gerontocracy? in: Klaus Warner Schaie / id. (Eds.). Societal Impact on Aging. Historical Perspectives, New York 1993, pp. 204–231.

83 Peter Borscheid, Geschichte des Alters. Vom Spätmittelalter zum 18. Jahrhundert, München 1989.

80 years prior (see fig. 2).[84] The now famous German 'longevity expert' and reviver of the historical approach of *Makrobiotik*, Christoph Wilhelm Hufeland (1762–1836), gave clear advice in his 1797 book "Die Kunst das menschliche Leben zu verlängern" ("The Art of Prolonging Human Life"), which cumulated in his somewhat sanctimonious recommendation of "Die goldene Mittelstraße in allen Stücken" (free translation: "The Golden Middle Path in All Involvements").[85]

In addition, at the psychological level, major predictors of longevity that are supported by robust empirical evidence include higher intelligence, higher satisfaction with life, better subjective health, and more positive attitudes toward own ageing.[86] Data now available and spanning about 80 years of observed lifetime indicate that differences in intelligence even at the age of 11 years are able to predict differences in late-life mortality.[87] Regarding personality, higher conscientiousness has been identified as a key factor able to predict lowered all-cause mortality.[88] Additionally, higher levels of positive affect and life satisfaction correlate with a decrease in mortality.[89] Finally, convergent longitudinal evidence shows that negative self-stereotyping and views on ageing are associated with shortened longevity when controlling for other factors important for longevity such as sex, education, and health status.[90] Although there is no room in this chapter also to go into the details of how such linkages might be explained (these range from risky

84 John Hatcher / Alan J. Piper / David Stone, Monastic Mortality. Durham Priory. 1395–1529, in: Economic History Review 59 (2006), pp. 667–687, at p. 674.

85 Christoph Wilhelm Hufeland, Makrobiotik oder die Kunst, das menschliche Leben zu verlängern (1796/1798), Berlin-Boston ^{8}2017.

86 Rocío Fernández-Ballesteros / Macarena Sánchez-Izquierdo, Are Psycho-Behavioral Factors Accounting for Longevity?, in: Frontiers in Psychology 10 (2019), p. 2516.

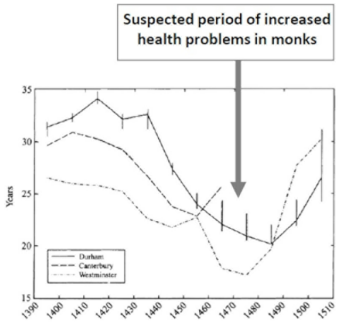
87 Ian J. Deary / Martha C. Whiteman / John M. Starr / Lawrence J. Whalley / Helen C. Fox, The Impact of Childhood Intelligence on Later Life. Following up the Scottish Mental Surveys of 1932 and 1947, in: Journal of Personality and Social Psychology 86 (2004), pp. 130–147.

88 Leslie R. Martin / Howard S. Friedman / Joseph E. Schwartz, Personality and Mortality Risk across the Life Span. The Importance of Conscientiousness as a Biopsychosocial Attribute, in: Health Psychology 26 (2007), pp. 428–438.

89 Natalia Martín-María / Marta Miret / Francisco Félix Caballero / Laura Alejandra Rico-Uribe / Andrew Steptoe / Somnath Chatterji / José Luis Ayuso-Mateos, The Impact of Subjective Well-Being on Mortality. A Meta-Analysis of Longitudinal Studies in the General Population, in: Psychosomatic Medicine 79 (2017), pp. 565–575.

90 Gerben J. Westerhof / Martina Miche / Allyson F. Brothers / Anne E. Barrett / Manfred Diehl / Joann M. Montepare / Hans-Werner Wahl / Susanne Wurm, The Influence of Subjective Aging on Health and Longevity. A Meta-Analysis of Longitudinal Data, in: Psychology and Aging 29 (2014), pp. 793–802.

health behaviour to adverse biological, physiological, inflammatory, and immunological processes),[91] it now seems clear that mortality is also driven by behavioural factors; in some studies, they have even been found to operate in the same effect size magnitude as other well-established risk factors such as smoking.[92]



Switzerland: 57 years	Senegal: 45 years
Japan: 57 years	Philippines: 44 years
UK: 55 years	Sierra Leone: 38 years
Germany: 54 years	Lesotho: 34 years

Fig. 2: Life expectancy at the age of 25 years in three British monasteries from 1395–1529 (left) and contrast with life expectancy at the age of 25 in various countries in 2018 (right). Sources: John Hatcher/Alan J. Piper/David Stone, Monastic Mortality. Durham Priory. 1395–1529, in: Economic History Review 59 (2006), pp. 667–687, at p. 674; URL: https://www.worldlifeexpectancy.com/your-life-expectancy-by-age-male; 7.6.2022.

3.3 Longing for Wisdom in Old Age in the Light of Contemporary Gerontology's Evidence

To address this topic in the light of contemporary behavioural and social gerontology, we (1) consider overall trends in cognitive ageing research, followed by (2) the description of existing empirical wisdom and ageing research.

91 Becca R. Levy, Stereotype Embodiment. A Psychosocial Approach to Aging, in: Current Directions in Psychological Science 18 (2009), pp. 332–336.

92 Becca R. Levy / Martin D. Slade / Stanislav V. Kasl, Longitudinal Benefit of Positive Self-Perceptions of Aging on Functional Health, in: The Journals of Gerontology Series B. Psychological Sciences and Social Sciences 57,5 (2002), pp. 409–417.

3.3.1 Overall Trends in Cognitive Ageing Research

Since its inception, cognitive ageing research oscillates between a deficit model of ageing versus, in a broad sense, a wisdom-oriented model. The deficit model has for decades been driven by the fundamental idea that ageing goes hand in hand with a continuous age-related slowing of the brain's information processing capacity.[93] In its strongest variant, the "Slowing Hypothesis of Ageing" argues that age-related decline in information processing speed is to a large extent the cause of the overall cognitive decline seen in processes such as working and episodic memory, inductive reasoning, and problem-solving deficits. On average and particularly in the natural sciences, great inventors and Nobel prize winners made their cutting-edge interventions / scientific discoveries before the age of 40, although a wide age distribution from 19 to well beyond 70 years of age can be observed. Also of interest in terms of 'age improvement' is the finding that the mean age of such great achievements increased by about 6 years from the period before 1935 to the period after 1965.[94]

Additional support for the ageing and wisdom model comes at least indirectly from the observation that many political leaders throughout history have been rather old, which is a trend that continues to the present day.[95] As Förstl shows, no significant increase in average age can be observed across the recent decades as the mean age of political leaders has generally been high and continues to be, with the current (2022) 'championship' being led by Queen Elizabeth II (passed away in 2022 at the age of 96 years), the Emir of Kuwait Sabah al-Ahmad al-Jaber al-Sabah (passed away in 2020 at the age of 91 years), and the first secretary of the Cuban Communist Party Raul Castro (resigned at the age of 90 years in 2021).[96] As also noted by Förstl, though solely based on anecdotal evidence, the estimated Body Mass Index (BMI), an established risk factor

93 David Madden / Philip A. Allen, History of Cognitive Slowing Theory and Research, in: Nancy A. Pachana (Ed.), Encyclopedia of Geropsychology, 3 vols., New York 2017, vol. 2, pp. 1086–1084; Timothy A. Salthouse, The Processing-Speed Theory of Adult Age Differences in Cognition, in: Psychological Review 103 (1996), pp. 403–428.

94 Benjamin F. Jones, Age and Great Invention, in: The Review of Economics and Statistics 92 (2010), pp. 1–14; Dean Keith Simonton, Age and Outstanding Achievement. What Do We Know after a Century of Research?, in: Psychological Bulletin 104 (1998), pp. 251–267.

95 Manuel Eisner, Killing Kings. Patterns of Regicide in Europe. AD 600–1800, in: The British Journal of Criminology 51 (2011), pp. 556–577.

96 Hans Förstl, Aging Heads of State. The Politics of Dementia and Geriatric Cognitive Disorders, in: Dementia and Geriatric Cognitive Disorders 49 (2020), pp. 121–128.

for late life illnesses such as cardiovascular disease and mortality,[97] has been far over what currently is considered as a 'normal' BMI (18–24) in a number of outstanding political leaders, namely Henry VIII, King of England (1491–1547, BMI: 39.6), Augustus II, the Strong, Elector of Saxony and King of Poland (1670–1733; BMI: 35.5), Otto von Bismarck, Chancellor of Germany (1815–1898; BMI: 40.7), William H. Taft, President of the United States (1857–1930; BMI: 42.3), and Winston Churchill, Prime Minister of the United Kingdom (1874–1965; BMI: 38.6). Less publicly considered, but meanwhile an established finding in cognitive ageing research, is also that what has been labeled as crystallised / pragmatic intelligence (see also above) does not decrease in old age as long as a minimum of overall information processing capacity is available.[98]

3.3.2 Empirical Wisdom-Related Research: The Berlin Wisdom Model

Since the 1990s, wisdom in a narrow and philosophical sense also became the target of empirical ageing research. One model that has received a great deal of attention in the psychological literature is the wisdom "Berlin Wisdom Model" developed by Paul B. Baltes and Ursula Staudinger.[99] The authors suggest five defining criteria for the concept of wisdom, namely that wise individuals: (a) possess rich, well-organised, and differentiated knowledge (i. e., factual knowledge), (b) know very well how the world works (i. e., procedural knowledge), (c) have lifespan contextualism, insights into the specifics of different life stages and the understanding that a life stage is embedded in and shaped by other life stages, (d) think and act in a non-dogmatic way (value relativism) and do not assume only one view is seen as correct, and (e) they have a profound understanding of and appreciation for the uncertainties of life.

In these studies, the participants, who were typically of a broad age range of between 20 to 80 years of age, were presented with vignettes describing a challenging life situation. Examples of such situations included a complex life planning task, an evaluation of difficult past life experiences (i. e., life review), or an existential situation (e. g.,

97 Herman A. Taylor, jr. / Sean A. Coady / Daniel Levy / Evelyn R. Walker / Ramachandran S. Vasan / Jiankang Liu / Ermeg L. Akylbekova / Robert J. Garrison / Caroline Fox, Relationships of BMI to Cardiovascular Risk Factors Differ by Ethnicity, in: Obesity 18 (2010), pp. 1638–1645.

98 Denise C. Park / Patricia Reuter-Lorenz, The Adaptive Brain. Aging and Neurocognitive Scaffolding, in: Annual Review of Psychology 60 (2009), pp. 173–196.

99 Paul B. Baltes / Ursula M. Staudinger, Wisdom. A Metaheuristic to Orchestrate Mind and Virtue toward Excellence, in: American Psychologist 55 (2000), pp. 122–136; Ute Kunzmann, Wisdom. Berlin Model, in: Susan K. Whitbourne (Ed.), The Encyclopedia of Adulthood and Aging, 3 vols., Hoboken 2015, vol. 3, pp. 1437–1440.

an adolescent girl talks to her parents about her thoughts of committing suicide). The participants were asked to provide detailed descriptions of their view on how best to deal with these situations. Next, several raters who had been trained to achieve high interrater reliability provided assessments of the answers based on the five wisdom criteria. Finally, ratings were merged into one composite wisdom score, and the distribution of the score was examined in relation to chronological age. The findings showed that a correlation between chronological age and the composite ratings of wisdom are close to zero. Hence, in contrast to a widely held assumption and stereotype of people becoming 'older and wiser', old age of itself was not associated with a higher score. In conclusion, growing older is far from being a guarantee for becoming wiser.

4 Conclusions and Outlook

In Shakespeare's "King Lear", written around 1605, the Earl of Gloucester says: "Oh let me kiss that hand!" to which Lear replies: "Let me wipe it first; it smells of mortality". Against this pessimistic self-perception of an aged ruler, the longings as focused on in this chapter represent fundamental hopes of humankind, albeit in a certain hierarchy of pragmatism. The best scenario might be eternal youth, but if this cannot be attained then living for as long as possible (regardless of the condition in which one does) would be a second-best option. If this also does not happen, at least becoming wiser as we age would be still a good option. But if wisdom is also not an option of living a long life onto advanced old age, then what remains? The answers might be provided by the anti-ageing movement that we currently see around the globe. It was already anticipated in Prentice Mulford's (1885–1890)[100] essay series "Your Forces and how to Use Them", which urged consideration of the power of thought over bodily function and was translated into German under the catchy title "Unfug des Lebens und des Sterbens" ("Nonsense of Living and Dying", 1977): Yet, is the neglect of ageing as the anti-ageing movement does a promising way out?

This chapter asked what happens if we contrast major longings of humankind related to ageing with a 'reality check' informed by contemporary gerontology. Several insights emerge from this exercise. Although the fulfilment of the longings described still seems unrealistic at present, humankind has come much closer to reaching this goal in light of the progress made in scientific lifespan and ageing research. As Scheibe and her colleagues argue, "life-longing" ("Sehnsucht") means the continuous quest towards

100 Prentice Mulford, Your Forces and how to Use Them. Essay Series, London 2008.

collective and individual progress and innovation to make life more complete and to move it to its greatest heights in principle terms.[101] Although remaining utopia by definition, life longings may fulfil important functions at the individual but also at the scientific level and continue to motivate expensive research programmes in gerontology.

That said, on the one hand it is amazing how far the omnibus construct of "plasticity" and the exploitation of a large degree of available reserve capacity has brought gerontology in terms of the development of training, intervention, and rehabilitation efforts. On the other hand, even excessive amounts of behavioural training cannot provide complete 'cognitive rejuvenation' to that of the level of young adulthood. Biogerontology might become more successful in the future based on the premise that attacking fundamental ageing processes at the cellular and genetic level could help to maintain or regain younger phenotypes overall. However, it seems that current achievements are still far from any robust and safe application in humans. In other words, the step-in rejuvenation from the 'wet lab' to the 'dry lab' on a larger scale still seems difficult to achieve.

Similarly, humankind has seen – in a relatively short historical timespan – an approximate doubling of its average life expectancy at birth, which might have been regarded as coming close to immortality, if this were told to someone in medieval times. Although the striving for the prolongation of life seems to be as old as mankind itself and can be traced back to the 4000 year-old "Smith Papyrus" and later to the "Dead-Sea-Scrolls" around 250 BC,[102] Francis Bacon's rational striving for immortality recently has been transformed to a formidable research programme. Further impetus came from cases of extreme longevity based on valid birth certificates such as Jeanne Calment, which contradicted the previously widely held assumption that the maximum lifespan cannot be longer than 120 years. It is however worth noting that, so far (2022), no other human being has surpassed this threshold. Still, extrapolating from what has been achieved in the recent 100 years in the 'natural' extension of the human lifespan, as well as what recent biogerontology has to offer in terms of established life prolongation, significant

101 Susanne Scheibe / Alexandra M. Freund / Paul B. Baltes, Toward a Developmental Psychology of Sehnsucht (Life-Longings). The Optimal (Utopian) Life, in: Developmental Psychology 43 (2007), pp. 778–795.

102 Gordon F. Streib / Harold L. Orbach, Aging, in: Paul Lazarsfeld (Ed.), The Uses of Sociology, New York 1967, pp. 612–640.

lifespan increases may be achieved in a not too far future.[103] Eventually, such a scenario may even be more likely than that of 'automatically' growing wiser as we get older and older in the future.

We close with a citation from Olshansky and Carnes, who already wrote in 2009: "... it is impossible to know with certainty whether anticipated advances in the biomedical sciences will yield an intervention that slows ageing in people and if it does how much it might influence life expectancy. What is known is that there is a concerted effort to find the means to slow ageing in people and now there is reason to be optimistic that such developments will occur in this century".[104] Let's see.[105]

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103 S. Jay Olshansky / Bruce A. Carnes, The Future of Human Longevity, in: Peter Uhlenberg (Ed.), International Handbook of Population Aging, Heidelberg 2009 (International Handbooks of Population 1), pp. 731–745.

104 Ibid., pp. 743–744.

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