

Health benefits for ageing: positive affect and life satisfaction, exercise and coping, and telomere length.

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Citation: Archer T. Health benefits for ageing: positive affect and life satisfaction, exercise and coping and telomere length. *J Ment Health Aging*. 2017;1(1):13-17.

Received date: October 12, 2017; **Accepted date:** November 24, 2017; **Published date:** December 01, 2017

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Abstract

Normal ageing is not as harmonious and regulated as the television advertisements would have us believe: anxiolytic and pain-treating compounds are prescribed widely in a population particularly sensitive to stress with a penchant for stress-inducing cognitions and encumbered by deficits in problem-focused and emotion-focused coping styles, elevated depressive mood, and a lack of divergent thinking in these older and elder older adults. Taken together with the situation that normal human cells experience telomere shortening with each successive cell division and that aging is accompanied by a decline of executive function, a less than optimistic form of reality arises to encompass elderly population; nevertheless, it is found regularly that resistance/aerobic exercise training induces moderate improvements of cognitive domains (i.e., attention, processing, executive function, memory) in senior citizens. The purpose of the present account was to review and describe the probable and possible situation confronting ageing populations in the context of affective status and satisfaction with life, the necessity of exercise and coping applications and the preservation of telomeric length.

Keywords: Ageing, Stress, Health, Telomere, Exercise.

Positive Affect and Ageing

Among the four different age-groups, 65-74 years, 75-84 years, 85-94 years and 95-104 years, three types of three emotional profiles have emerged: (i) 'dissatisfied' demeanour, which encompassed elderly individuals expressing high levels of negative affect and loneliness presenting unhappiness with their lives but apply problem-solving measures to regulate their emotional behaviour, (ii) 'happy' individuals expressing high levels of positive affect accompanied dispositional life satisfaction, low levels of loneliness and negative affect together with restricted applications of passive coping strategies, and (iii) 'resilient' individuals who were defined by low levels of both positive and negative affect with intermediate levels of loneliness who expressed adequate satisfied with their life fortunes accompanied by passive coping strategies to regulate their emotional behaviour [1]. The authors found a relationship between age and profile whereby the happy profiles was most common in the under-85s and resilient in the over-85s. The frailty-multimortality overlap is associated with widespread health deficit accumulation, neurodegenerative biomarker onslaughts, e.g. telomeric shortening and diverse functional impairments [2]. Against this background of pathological ageing, the negative influences of

social isolation ought to be weighed: social isolation showed a marked, position correlation with depression and a marked, negative correlation with well-being among 7609 aged participants in the Aging Trends Study [3]. During later adulthood and ageing, the presence or absence of positive interpersonal relationships may affect physical and psychological health and well-being due to the upsurge of long-term, chronic health risks/conditions, often linked to disability, such as frailty, among individuals [4,5]. There has accumulated much evidence to support the contention that, among older adults, there is a greater propensity to express higher levels of satisfaction than among younger adults [6,7]; additionally, older adults appear to avoid actively those occasions that may induce the occurrence of negative social encounters [8]. Among older individuals, the maintenance of positive, attractive appearances formed an essential portion of these individuals' daily life activities fulfilling the necessity, not only of presenting an attractive face and body but also the predisposition to enjoy their comportment with accompanying 'ritualistic grooming-type' expressions [9]. Thus, both emotionally-satisfying and invariably positive social ties together with the penchant for "keeping up appearances" may provide marked protective effects against a reality of accumulating manifestations of physical and mental limitations

as well as confrontational issues arising from everyday encounters, since despite assurances of satisfactory social links the aged may yet in reality face conflicts and ambivalence amongst with whom they interact [10]. Furthermore, the eventual and unavoidable loss of friends and relative during the aging process, linked to personal health deterioration, implies an essential re-structuring of personal interactions. Finally, perinatal stress/malnutrition that induces dysregulation and disharmony of the hypothalamic-pituitary-adrenal axis implies notable disadvantages for healthy ageing [11] while childhood adversity arises as the harbinger for both cognitive-affective disorders and health problems among the aged [12].

Active Ageing

An active ageing proclivity among individuals generally exerts a noteworthy and positive avenue for maintaining dispositional life satisfaction and in conjunction with positive, effective coping strategies may be instrumental for the induction of active ageing [13]. In a German 20 year longitudinal study involving 10,597 older adults, the level of life satisfaction together with life-changes exerted greater predictive influences upon mortality-risk within this population [14]. It was observed that 'perceived control' was related to lower levels of mortality-risk although these influences were reduced among those individuals who were experiencing an acceleration of the decline in life satisfaction. Notably, it has been indicated that the life satisfaction of elderly adults was a function of (i) the level of positive affect and the ability of relatives to set goals, and (ii) the care-giving capacity of health-care workers in enabling empowerment [15]. The PER3 gene which encodes the period circadian protein homolog 3 protein in humans regulates the circadian rhythm of locomotors activity, metabolism, and behaviour. It was observed that, among older adults, the amplitude of PER3 expression was correlated positively with moderate-to-vigorous levels of physical exercise and peak oxygen uptake [16]. The notion of active ageing presents a process of lifelong adaptation measures to promote and maximize health and independence among individuals, physical and cognitive functioning, positive affect regulation and control, well-being and social engagement [17]. Among a group of 76 older adults, aged 60+ years, they observed higher levels of positive affect and increments in the frequency of intellectual, cultural - artistic, and social activities, perceptions of aging, satisfaction with social relationships, and self-efficacy for aging, as well as improved cognitive performance. 'End-of-life' associated Terminal decline represents an ultimate life-span stage wherein 3-to-7 years after the onset of cognitive abilities decline death occurs and well-being, Terminal decline begins 3-to-5 years prior to death [18].

Physical Exercise in Ageing

Regular aerobic exercise promotes advances in cardiovascular functioning; this in turn bolsters the development of improved cerebral blood flow regulation and angiogenesis, thereby diminishing the risk for dementia disorders among the elderly [19]. As reflected by the benefits accruing from park-running

among older adults [20], the greater health expectations during ageing are related to the persistency of adherence to moderate-to high-intensity physical exercise during a two-year activity schedule with a lower level of expectation pertaining physical aging effects inducing a possible barrier to the compliance for physical activity among these adults [21]. Beneficial ageing health outcomes, whether among cognitive, somatic or biomarker domains, are associated with expressions of positive affect [22,23]. In a study that controlled for several factors, including the presence of daily stressors, age-of-participants, and their baseline "awareness of age-related changes", it was found that the day-to-day increases in "awareness of age-related changes" deficits were connected to incremental changes in expression of negative affect and a cross-level interaction analysis implicated that this influence was more marked for those individuals with those individuals presenting a greater positive "attitudes towards own ageing" [24]. These observed gains and losses underwent alterations on a day-to-day basis, implying that those interventions which targeted the variations of contextual environment occurring in daily life could offer worthwhile possibilities for betterment. This study demonstrated that those individuals presenting an invariably positive expression concerning the ageing experiences of themselves, even though they show a lesser likelihood of reporting their awareness of daily/periodical age-related deficits, appear to present greater levels of vulnerability under conditions wherein the arising deficits ensue. Nevertheless, any attempts that bring about the reduction daily "awareness of age-related changes" deficits, i.e. by limiting activities as a result of ageing, provision of aid due to care-givers and significant others assuming age-related deficits) may provide opportunities for improvement of the daily well-being and activity-propensity of the older adults involved. There exist marked, positive relationships between muscular strength, muscle mass, resulting from resistance exercise and reduced all-cause mortality accompanied by a wide range of physiological and psychological health benefits [25]. Preventative and interventional agents for AD and dementia conditions should include physical activity, proper and appropriate lifestyle ingredients, cognitive-affective and intellectual stimulation and the management of conditions such as hypertension, diabetes and obesity [26,27] whereas the persistence of ageing individuals to a lifestyle defined by unrestricted intake of unhealthy food and drink intakes and a chronically sedentary characteristic over the lifespan will inevitably prove disastrous for salubriousness and longevity since in the search for health and well-being it is evident that ageing individuals must be active, exercise regularly and eat selectively if they may be recipient of longevity and relative resilience to illness [28,29]. For example, in a six-month study of older individuals with Type 2 diabetes who were given progressive aerobic and resistance exercise, it was observed that cognitive performance improved despite expected deterioration [30].

Coping in Ageing

Problem-focused coping behaviour aims at identifying the 'source-of-stress', identifying the problem(s) and then

devising suitable efforts to remove/reduce it at source. In a study of 196 community-dwelling adults (ranging in age from 18-89 years), the participants described the most stressful situation they had experienced during the past month and the availability coping strategies, together with their levels of positive and negative affect during that period of time [31]. There was marked age differences in the types of stressors reported among the elderly individuals with essentially three type of coping strategy presented: (i) problem-focused, (ii) positive emotion-focussed, and (iii) negative emotion-focused coping. It was observed that the older adults showed a lesser likelihood of applying problem-focused coping and concurrently expressed lower levels of positive affect with a path analysis indicating that that problem-focused coping mediated the relationship between age and positive affect, implying the necessity for interventional coaching to develop problem-focused coping strategies among the older adults. In this line of endeavour, the capability for enjoying positive life events is associated with higher levels of emotional well-being [32]. Nevertheless, there is a paucity of studies exploring the 'enjoyment-capability' of older adults. In a longitudinal design identifying changes in perceived 'enjoyment-capability' and its associations with perceived health in older adulthood, 131 older adults (N=131) expressed their beliefs-expectations regarding 'enjoyment-capability' during baseline testing and during follow-up testing two-and-a-half years later. The expressions of perceived anticipation (future 'enjoyment-capability') and reminiscing upon events (past 'enjoyment-capability') propensity deteriorated from the baseline test to the follow-up test. Higher levels of perceived health during baseline predicted higher levels of perceived reminiscing and anticipation abilities during follow-up testing accompanied by higher perceived 'enjoyment-capability' for on-going events predictive of greater health benefits during follow-up. The authors imply that the ageing process itself combined with health-decline may cause the thoughts of the elderly to target upon present-moment pleasures, which may or may not benefit their health, but could concomitantly induce deficits in the ability to involve anticipation and reminiscing expressions. In the application of reactive and proactive affect regulation strategies, respectively, adults between 20 and 55 years use problem-solving and positive reappraisal more intensively but in a reactive manner compared with those less than 20 years whereas older adults, over the age of 55 years, applied a more intensively proactive exploitation of these strategies. In a population of mildly-moderately and above stressed 50 to 85 year-olds, mindfulness mediation intervention improved self-rated levels of stress and negative affect, mental health component scores and neuroticism [33]. A resistance training program given to healthy older adults induced marked increases in hope and sense of coherence and decreases in negative affect even among participants over 65 years old age [34].

Negative Affect and Mortality

In a study of 8542 participants, aged 32-86 years, originating from the National Health and Nutrition Examination Survey, higher levels of positive affect were linked with the lower risk

for mortality [35]. The authors observed marked interactions between positive affect and perceived stress in a manner through which the association between positive affect and mortality risk was stronger among those individuals who had reported higher stress levels: accordingly, one standard deviation increment in expression of positive affect resulted in a 16% reduction in the risk for mortality among those elderly individuals who had expressed higher levels of the stress experience. Among participants expressing lower levels of stress the association between positive affect and mortality risk was weaker and did not achieve significance levels. In this context of 'affective-profiles' [36], "negative affect interference" was associated with hedonic decline, anhedonia, affect regulation problems, negative affect, and neuroticism, with eventual increases in posttraumatic stress disorder. It has been shown that baseline levels of physical strength, defined by hand-grip performance and strength, were linked, in positive or negative directions, to several self-regulatory attributes, including neuroticism, mindfulness, anxiety sensitivity, perceived stress and positive affect [37]. In a study of frailty and risk for mortality among 80 geriatric patients, female gender, C-reactive protein, prior myocardial infarction and use of an antidepressant treatment were associated negatively with grip strength [38]; cognitive-emotional functioning, somatic co-morbidity and type of medical treatment affected the grip strength as a measure of physical frailty among geriatric in-patients. Based on the premise that affect-health links are modulated by negative affect valuation, a rather different notion to negative affect per se, it was found that the stronger the valuation place upon negative affect, the lesser the extent of associations between everyday experiences of negative affect and a variety of indicators of poorer psychosocial functioning, including, emotional health problems, social integration, and physical health, such as the number of health conditions, health complaints, hand grip strength, momentary physical well-being [39]. In a study of grip strength and hope as mediators of quality-of-life among 344 older Israeli adults, it was observed that poor grip strength was related to poor quality-of-life among those older adults expressing less hope but not among those who expressed reader hopefulness [40]. During ageing there is a marked elevation in the levels of numerous amino acids and fatty acids that are linked closely with inflammation and AD biomarkers, impaired blood-brain barrier functioning and reduced cerebral blood flow, compromised learning and memory, increased bouts of chronic anxiety, depressive episodes and detrimental changes in brain metabolic, vascular and cognitive functioning, together with gut micro biome structure and diversity, contributing to accelerated inflammation and neurodegeneration [41].

Preservation of Telomere Length

Adverse environmental conditions predict the shortening of telomere length in humans and other mammals, such as resilience to judicial unfairness among Afro-Americans and age-dependent effects in Roe deer, with beneficial interventions inducing a lengthening [42,43].

Citation: Archer T. Health benefits for ageing: positive affect and life satisfaction, exercise and coping, and telomere length. *J Ment Health Aging* 2017;1(1):13-18.

Positive dispositional persona characteristics accounted for a significant variance in telomere length, with $R=0.40$, through the two central individual characteristics, i.e., higher levels of optimism and greater emotional intelligence being related to the lengthened expression of telomeres following adjustment for age and gender [44]. The telomeric length – optimism association, as well as the other positive characteristics, was significant also after this adjustment (e.g. $r=0.30$). Ill-being and poor health are generally linked to shorter telomeric length, with older age; male sex, obesity, and less physical activity were associated with shorter telomere length as well as chronic pain [45]. Furthermore in this regard, marked positive relationships (with effect sizes less than 0.05%) were obtained between the trait extraversion polygenic score and measures of well-being, concurrent with a marked negative association between the polygenic neuroticism score and life satisfaction [46]. Additionally, observed genetic correlations of -0.49 and -0.55 were estimated between neuroticism with life satisfaction and positive affect, respectively, using genome-wide association data. The moderate genetic correlation between neuroticism and well-being converges with twin research implying that genetic influences on well-being were shared also with other independent domains of personality. Applying the “Big-five” and D-personality questionnaires, it was observed the leucocyte telomere length was associated positively with ‘agreeableness’ and negatively with ‘neuroticism’ with Type-D personality associated negatively also with telomeric length [47]. Among ageing participants presenting varying levels of hearing impediments, i.e., age-related hearing loss, a descending/deteriorating trend for leucocyte telomere length was observed [48]. In older adults, telomere length was inversely related to risk for mortality, body fat, waist circumference and body mass index [49]. Essentially, shorter telomere lengths are linked to less healthy lifestyles but it ought to be borne in mind that individuals showing shorter telomeric length accompanied by high-risk lifestyles benefitted markedly in their cognitive, particularly executive functioning, capability from multi-domain lifestyle interventions [50].

Conclusion

In conclusion, there are innumerable psychological expressions that are associated with healthy, robust ageing, including psychological well-being, positive affect, life satisfaction, dispositional optimism, resilience, relevant coping strategies and regular physical exercise. Concurrent the expressions of somatic/physical health among ageing individuals are numerous also and include muscular strength and versatility, as described by grip strength, biomarkers against degenerative influences and the preservation of telomeric length all of which elevate personal well-being and reduce the risk for mortality.

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