

The Influence of Emotional Intelligence on Healthy Aging

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Received Date: December 24, 2024 | **Accepted Date:** January 06, 2025 | **Published Date:** January 13, 2025

Citation: Rodrigo Cé and Adriano R. Goedert, (2025), The Influence of Emotional Intelligence on Healthy Aging, *International Journal of Clinical Case Reports and Reviews*, 22(3); DOI:10.31579/2690-4861/663

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Abstract:

The study of emotional intelligence (EI) in the context of aging is significant, as age influences EI and its adaptive strategies. EI is defined as the ability to perceive, assess, and express emotions, use emotions to facilitate thought, understand and regulate emotions to promote personal growth. The aim of this study is to review the literature to understand the relationship between EI and healthy aging. The methodology included a literature review with searches in databases such as PubMed and Scopus, using keywords related to EI and healthy aging. The results show that EI has a positive impact on the psychological, social, and physical well-being of the elderly. However, most studies focus on samples of young and middle-aged adults, leaving a gap in research with older adults. Additionally, the literature suggests that emotional regulation skills improve with age due to accumulated practice over a lifetime. Theoretical models indicate that cognitive and motivational changes influence emotional selectivity in older adults. Final considerations indicate that EI is a promising field for promoting healthy aging, but research is still in its early stages in the gerontological area. More studies are needed to fully explore the benefits of EI for the elderly and to develop effective interventions.

Key words: emotional intelligence; aging; well-being; resilience; emotional regulation

Introduction

The study of emotional intelligence (EI) in relation to aging is a relevant area of research because age has been identified as a variable that modulates this construct [1-2]. Additionally, age has a direct impact on coping strategies [2-3]. EI, conceptualized as the ability to perceive, evaluate, and accurately express one's own emotions (emotional perception), as well as access and generate feelings that facilitate thinking (facilitating thinking through emotions), understand emotions and emotional knowledge (emotional understanding), and regulate emotions to promote emotional and personal growth (emotional management) [4], represents a fundamental set of emotional skills that enable the use of adaptive coping strategies when facing stressful life events [5].

EI is seen as an indicator of psychological adjustment and also as a sign of feelings related to well-being [6]. Resilience [7] and life satisfaction [8] are two variables directly related to the development of EI. The development and ability to effectively manage emotional skills allow for a more common experience of positive emotional states; this, in turn, affects these crucial psychological constructs [9]. The literature indicates that the dimensions of emotional clarity and regulation are linked to

resilience and life satisfaction, positioning them in relation to each other and making them predictable [7,10].

One- and three-factor models have been widely accepted for measuring EI, but the factor structure in the field remains uncertain [11]. The Trait Meta-Mood Scale (TMMS-24) [12] is a measure based on the three-factor model and approaches EI from an intrapersonal and self-perceived perspective, describing three essential skills: attention, clarity, and emotional regulation. The degree to which people pay attention to their emotions and feelings is called attention; clarity pertains to emotional perception; and finally, emotional regulation is the ability to interrupt negative emotional states and prolong positive emotional states. Moderate attention to emotions enhances intrapersonal functioning and provides protection in various risk situations [3].

EI has become a promising field of study in recent years. It has shown encouraging results regarding mental health and social and personal well-being [9,13,14]. Emotional functioning is increasingly recognized throughout individual development, including in the later stages of life

[15]. However, research on EI is very new in the gerontological field, leaving the elderly population without the well-established benefits of EI training. Therefore, based on the importance of EI in aging and its relationship with coping strategies, life satisfaction, and resilience, we are reviewing the literature to explore how EI relates to the process of healthy aging. Our goal is to demonstrate the influence of EI on well-being and adaptation in aging through a literature review.

Methods

The methodology adopted for this study consists of a literature review aimed at gathering and synthesizing research findings on the relationship between EI and healthy aging. In this context, the study was outlined based on the research objectives: "What is the relationship between emotional intelligence and healthy aging?" The inclusion criteria for the study selection were based on empirical studies investigating the relationship between EI and well-being in older adults, publications in English or Spanish. The exclusion criteria included studies that do not explicitly address the relationship between EI and well-being. The searches were conducted in the following electronic databases: PubMed, Scopus, APA PsycInfo, and Web of Science. The search terms included combinations of keywords such as "emotional intelligence," "well-being," "elderly," "healthy aging," "resilience," and "quality of life." Examples of search terms used are: "well-being AND aging," "emotional intelligence AND elderly," "healthy aging AND emotional intelligence," "healthy aging AND emotional intelligence AND elderly," "healthy aging AND emotional intelligence AND elderly AND well-being." The methodological quality of the studies was assessed using a checklist adapted from the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) instrument. In this context, each study was evaluated according to the following criteria: (1) Clarity of objectives and hypotheses; (2) Adequate description of participants and procedures, (3) Validity and reliability of measurement instruments, (4) Control of confounding variables, and (5) Adequacy of the statistical analyses used.

Trends in Research Publications on Well-Being, Aging and EI: A Six-Year Analysis

The number of research publications on well-being and aging has increased over the past six years (Figure. 1/A). In 2019, 20,998 studies were found; this number rose to 24,404 in 2020 and 26,945 in 2021. In 2022, there was a slight increase to 27,365 publications, and in 2023, there was a small decrease to 26,419. By mid-2024, 13,026 studies had already been conducted, demonstrating growing interest and research in the field. Researchers focusing on EI and the elderly (Figure. 1/B) experienced notable fluctuations in recent years. In 2019, 2,021 publications were found; in 2020, this number dropped to 1,681. In 2021, there was a significant decrease to just 12 studies; however, in 2022, the number increased again to 677. In 2023, there was a slight drop to 556 publications, and by 2024, 35 studies had been found.

However, there are few publications on EI and healthy aging (Figure. 1/C). Twenty-two studies were recorded in 2019. They increased to 41 in 2020 and 43 in 2021. The number of publications fell to 25 in 2022 and 27 in 2023. A total of seven studies were found by mid-2024. Additionally, there are few publications discussing the elderly, EI, and healthy aging (Figure. 1/D). In 2019, there were 15 studies; in 2020 and 2021, there were 32 studies. In 2022, the number dropped to 16, but in 2023, it slightly increased to 19. So far, six studies have been recorded up until 2024.

Studies on EI, the elderly, well-being, and healthy aging were the least numerous (Figure. 1/E). In 2019, there were eight publications; in 2020, it rose to 26 and remained stable in 2021. In 2022, the number dropped to 13, and in 2023, it fell to 14. So far, five studies have been identified for 2024. The data shows a growing interest in the relationship between well-being and aging, as evidenced by the large number of publications. On the other hand, there is less research on EI for the elderly, and notable variations are present. The combination of themes such as healthy aging, well-being, and EI is still emerging, indicating a field of study that requires further investigation to better understand the interactions between these elements and their implications for healthy aging.

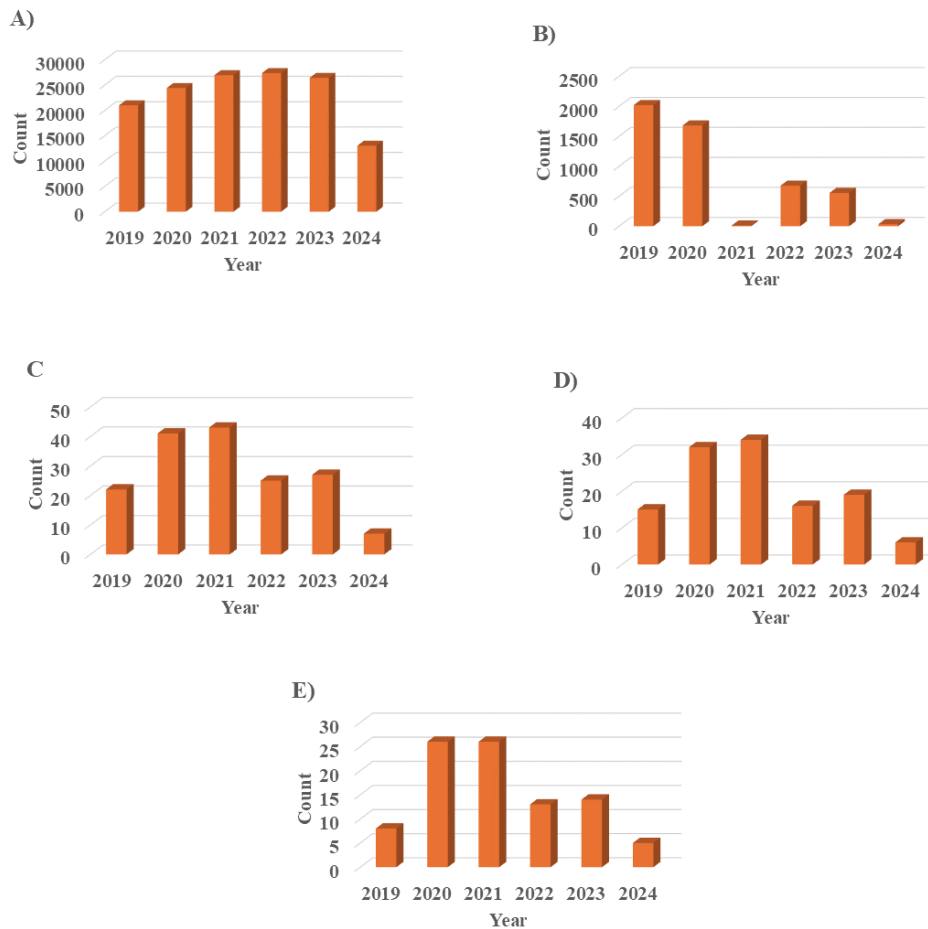


Figure 1: Count of documents published in PubMed considering the following combinations of words: "well-being AND aging" (A), "emotional intelligence AND elderly" (B), "healthy aging AND emotional intelligence" (C), "healthy aging AND emotional intelligence AND elderly" (D), and "healthy aging AND emotional intelligence AND elderly AND well-being" (E). The data collected covers publications from the last six years. Total documents found: "well-being AND aging" (114,525 results), "emotional intelligence AND elderly" (4,773 results), "healthy aging AND emotional intelligence" (139 results), "healthy aging AND emotional intelligence AND elderly" (106 results), and "healthy aging AND emotional intelligence AND elderly AND well-being" (80 results). Data of documents published up to 05-30-2024.

Definition of EI

In the literature, EI is defined as "a subset of social intelligence that involves the ability to monitor one's own and others' feelings and emotions, to discriminate among them, and to use this information to guide one's thinking and actions" [5]. Later, they revised and expanded this definition, suggesting that EI is "the ability to perceive emotions, access and generate emotions to assist thought, understand emotions and emotional knowledge, and reflectively regulate emotions to promote emotional and intellectual growth" [4]. A more recent definition states that EI is "the ability to accurately reason about emotions and the ability to use emotions and emotional knowledge to enhance thought" [16]. These definitions frame EI as a set of emotional skills. To better understand EI, it is necessary to define its constituent components, which are emotion and intelligence [4,17,18].

Definition of Intelligence

The term "intelligence" refers to the capacity or ability. Intelligence is "the aggregate or global capacity of the individual to act purposefully, think rationally, and deal effectively with their environment," according

to Wechsler's definition [19]. Intelligence is defined as "the ability to understand complex ideas, to adapt effectively to the environment, to learn from experience, to engage in various forms of reasoning, and to overcome obstacles by thinking," as stated in a report by an American Psychological Association task force [20]. This aligns with how organizational psychologists define intelligence. According to Schmidt and Hunter [21], intelligence is "the ability to understand and reason correctly with abstractions (concepts) and to solve problems". Locke [22] adds that "the concept of intelligence refers to the ability to form and understand concepts, especially those of higher or more abstract levels."

Definition of Emotion

Emotions are sets of brief, organized responses that include physiological changes, expressive behaviors, action tendencies, and subjective experiences. These responses determine how people cope with challenges and explore opportunities arising from events [23,24]. Anger, dissatisfaction, and joy are examples of qualitatively different response sets that have evolved to address distinct challenges and seize distinct opportunities. For instance, anger helps individuals deal with the

challenge of being treated unfairly; it motivates them to correct the wrong [23]. Embarrassment motivates people to communicate awareness of having violated a social norm, which helps address the challenge of having breached that norm [25].

Resilience, EI, Positive Emotions, and Health

Resilience can be considered an effective indicator of healthy aging and has been associated with mental health. The reduction of anxiety and depression symptoms in young adults is correlated with higher resilience [26-28]. Resilience is correlated with better mental health, as shown in studies on older adults [29,30-32]. For example, one study found that higher resilience was associated with lower depression in adults aged 67 to 98 years [33].

Primarily in young or middle-aged adults, EI has been linked to mental health. Studies have shown that higher EI is associated with better life satisfaction, less psychological distress, and reduced depression [34-37]. The association between EI and anxiety has also been found in both clinical and non-clinical samples [38-39].

Research on emotions and mental health has historically focused on negative emotions, but the influence of positive emotions is gaining more attention. Positive emotions are associated with better mental health and have a significant impact on preventing depression compared to negative emotions [40]. Furthermore, researchers have found that positive emotions are helpful when dealing with grief; they indicate better psychological well-being after loss [41-42].

Life Satisfaction

Life satisfaction has been strongly linked to social relationships and personality, particularly optimism. Both have been considered psychosocial variables that influence EI [43]. Life satisfaction also changed with social engagement [44]. Thus, personality, social relationships, and changes in social engagement had a direct relationship with life satisfaction. They were also influential factors in EI, which affects people's quality of life.

Quality of Life

Functional health and social engagement change together [44]. Moreover, learning multiple skills simultaneously is both feasible and beneficial for healthy older adults [45]. The quality of life for the elderly also depends on sociodemographic factors such as gender, age, social class, years of education, and, most importantly, social support [46]. Thus, social engagement and the learning of multiple skills are considered elements that impact EI and have a positive effect on the quality of life of cognitively healthy older adults. Finally, according to the results of this review, all elements that influence EI and affect life satisfaction and subjective well-being are essential to the quality of life in the elderly.

EI in the Elderly

According to studies conducted over the past few decades, the EI of an elderly person has a significant impact on psychological, social, and physical adjustment [47]. However, most of these findings have been derived from samples of young and middle-aged adults, and little is known about the connections between EI and the well-being of the elderly. Consequently, the aim of this review is to provide a summary of how EI is linked to the psychological, social, and physical functioning of the elderly. The construct of EI includes the knowledge, understanding, and ability to control emotions [48,49]. Salovey & Mayer [5] were the

first to use the term "emotional intelligence" to describe a set of interrelated skills that allow a person to consider, understand, use, and control emotional episodes in an effective and adaptive manner, enabling them to cope with the environment effectively. The elderly now belong to the adult age group and have been found to have much higher EI than young adults [50-53]. EI changes in a similar way in middle-aged and elderly adults, showing a positive relationship between EI and the psychological, social, and physical outcomes of the elderly [54-55].

Theoretical Assumptions on Emotional Aging

Theories of emotional-motivational development across the lifespan suggest that emotional goals and strategies change normatively as people age. For example, according to the socioemotional selectivity theory, seeking emotionally gratifying experiences in the present becomes more important than maximizing future rewards, particularly in the context of perceived temporal limitations [56]. This results in a greater focus on mood enhancement and a decreased tolerance for negative situations in favor of immediate goals.

The dynamic integration theory posits that cognitive abilities decline with age, leading older adults to prioritize affect optimization over emotional complexity [57]. Additionally, the life-span theory of control states that the ability to achieve goals and control the environment diminishes with age [58]. These motivational changes can be observed in contexts with shorter temporal perspectives and are associated with aging [59].

In addition to the selective and compensatory changes in their emotional preferences and strategies, older adults may develop emotional regulation skills as a result of accumulated practice and learning throughout life [60,61]. These processes may include a better understanding of the emotional impact of future events, the creation of more efficient emotional regulation strategies, and the reduction of the cost associated with emotional regulation processes. These changes align with the selection, optimization, and compensation model [62], which suggests that emotional experience and regulation evolve as environmental demands and individual capacities change.

Age-Related Decline in Cognitive Selectivity

Age-related cognitive selectivity is a complex phenomenon involving both the decline and maintenance of certain aspects of cognitive control in older adults. Representing, maintaining, and flexibly updating internal goals is essential for cognitive control, which includes executive processes that promote goal-directed behavior [63-64]. Inhibitory control is a crucial component of this control, as it allows focus on relevant information while suppressing harmful and untimely information [65-66].

A widespread decline in inhibitory control is associated with aging. This means that it becomes more difficult to ignore irrelevant stimuli and to inhibit well-practiced responses in favor of more common but appropriate ones [67,68]. The observed differences in cognitive performance in older adults, including better memory for distractor stimuli and slower performance in visual search tasks, can be attributed to this reduction in selectivity and control [69].

Automatic, stimulus-driven processes remain relatively unaffected in older adults despite the decline in cognitive control [64]. Braver's dual mechanisms of control theory [70] suggests that a shift from proactive to reactive control over time may explain this phenomenon. Reactive control, which is less cognitively demanding and goal-oriented, is preserved in older adults. This makes older adults particularly susceptible

to the influence of automatic distractions [71], which may be reflected in the overactivation of specialized brain areas as a compensatory mechanism [72].

Although the age-related reduction in selectivity may seem negative, there are associated benefits, such as better performance on tasks requiring distraction, implicit learning, and creative problem-solving [73]. One example is hyper-binding, where older adults are more capable of recalling irrelevant information despite their difficulty suppressing it. This contrasts with the associative memory deficit typically observed with aging [74-75]. These findings highlight the complexity of age-related changes in cognitive selectivity, indicating that the impairment of cognitive control in older adults can have both positive and negative consequences.

Neural Substrates Related to Age in Cognitive Selectivity

The frontal theory of cognitive aging [76] posits that age-related changes in the frontal lobes are the reason for differences in cognitive performance among older adults. Modern thinking, however, emphasizes the role of distributed brain networks in cognitive aging [77]. The frontoparietal control network, which includes areas such as the dorsolateral prefrontal cortex (PFC) and posterior parietal cortex, plays a crucial role in cognitive selectivity. This network is essential for suppressing distractors and achieving task goals because it allows the integration of sensory goals with cognitive goals.

However, with aging, the activation and functional connectivity of the frontoparietal control network decline. This can impair the ability to suppress distractors and maintain task-focused attention [78]. These changes are associated with structural and functional alterations in the PFC, such as a decline in dopaminergic transmission. As a result, cognitive selectivity in older adults decreases due to these changes [79]. Neuroimaging studies show hyper-recruitment in this region in older adults compared to younger adults, despite age-related declines in PFC function [80]. This hyper-recruitment may be a form of compensation, particularly when it is related to better cognitive performance. However, hyper-recruitment may also indicate dedifferentiation, meaning that cognitive processes do not function efficiently [78].

In addition to the frontoparietal control network, the default mode network plays a role in age-related reductions in cognitive selectivity. This network involves areas such as the medial PFC, posterior cingulate cortex, and inferior parietal lobule. It is associated with distraction and mind-wandering [81]. In situations requiring cognitive control, deactivation of this network is less pronounced in older adults. This may lead to greater distraction and difficulty in maintaining task focus [78]. These findings highlight the importance of changes in distributed neural networks in understanding the neural substrates of age-related cognitive selectivity.

Neuropsychological Explanation

Some have argued that patterns of neural changes associated with aging might be related to age differences in emotion identification [82-86]. Observed differences between younger and older adults, as well as the specificity of the neural regions involved in emotional recognition, provide a promising field for future research, although direct evidence on specific emotional recognition issues associated with neuropsychological decline is still lacking [87].

The recognition of emotional expressions involves several neural regions, with the frontal and temporal systems being the most significant. For instance, the fusiform cortex and amygdala play a crucial role in modulating a variety of facial expressions [88-90]. Additionally, the basal ganglia and insula are involved in decoding fear, while other regions are particularly specialized in identifying distinct emotions [91-93].

These neural areas are distinctly affected by aging. Some areas, such as the frontal lobes, experience earlier and more rapid atrophy, while others, like the amygdala, show linear reductions in volume over time [94,95]. These changes may help older adults manage feelings such as anger and fear. However, the absence of age effects in identifying disgusted expressions might be explained by the relative preservation of certain structures in the basal ganglia [87]. While these observations offer significant insights, we still have limited understanding of how age-related neural changes relate to emotional recognition problems in older adults. A deeper understanding of the neural bases underlying emotions across the lifespan relies on future research in this field.

Discussion

Understanding cognitive trajectories in healthy older adults relies on the concept of healthy aging. Rowe and Kahn [96] introduced a category encompassing common and successful types of aging, in addition to including a category for pathological aging. Thus, from a biomedical perspective, health is the opposite of pathology, allowing us to differentiate between successful, pathological, and typical aging [96,97]. Furthermore, it is crucial to consider the cognitive changes occurring throughout life, known as normative versus non-normative cognitive aging, which is defined as an involutionary phase. Normative and non-normative cognitive aging are surprisingly complex and influenced by a wide range of factors operating on different time scales [98].

As defined by Salovey & Mayer [5] and expanded by Mayer, Caruso & Salovey [99], EI is the ability to perceive, understand, and manage one's emotions, using this information to shape actions and thoughts. Studies show that EI not only grows over the lifespan but is also positively correlated with age. Young adults exhibit higher levels of emotional measures compared to older adults [51,53,100]. Most theories of EI assert that EI is an essential component that can be developed [101] and learned [102-104]. EI is neither inherited nor solely developed in early childhood. People tend to become more emotionally and socially intelligent over time [105].

Lifelong learning and accumulation of experiences can explain the association between age and EI. This enables older adults to better understand their own and others' emotions [106]. Additionally, affective well-being is directly related to EI, as it impacts life goals, emotional regulation strategies, and overall life satisfaction [107-109]. Higher EI in adults may help them adjust their life goals and use more effective emotional regulation methods, such as cognitive reappraisal, leading to greater life satisfaction and affective well-being.

The substantial heterogeneity among older adults is often overlooked when aging research focuses on losses associated with middle age. Physiological and cognitive deficits associated with age are frequently thought to be a result of aging itself. This exaggerates the importance of the aging process in causing these deficits [96]. Such interpretations create population stereotypes about aging, often linked to pathological cognitive attention [96,97].

Studies highlight the role of EI in adapting to changes, coping with challenges, and promoting successful aging [110-111]. EI helps older adults manage life changes better and improve coping skills, thus enhancing well-being [112-113]. Moreover, there is a correlation between EI and seeking social support, reducing stress, and an increased perception of health and well-being [114-115]. Individuals with higher EI tend to score higher in social support and use more effective coping strategies [116-117].

Personality variables and EI influence the overall well-being of older adults. Emotional education is seen as a crucial component of these individuals' psychological well-being [16,118,119]. For life satisfaction and psychological well-being, the ability to handle emotions and humor is essential, as it directly impacts quality of life in older age [8]. Thus, maintaining subjective well-being in old age relies on healthy coping strategies, providing effective psychological resources to face aging challenges [120-121]. EI is a critical component in promoting active and satisfying aging, positively impacting various aspects of older adults' lives, including adapting to changes and perceiving their quality of life and overall well-being.

Additionally, nutritional interventions that regulate appetite early in life are closely linked to the anti-aging gene Sirtuin 1 (SIRT 1, a member of histone deacetylase III family), which plays an essential role in maintaining other cellular anti-aging genes associated with metabolism and age-related diseases. These interventions are key to preventing the suppression of anti-aging genes, thereby helping slow down chronic diseases such as insulin resistance, NAFLD, and neurodegenerative conditions like Parkinson's and Alzheimer's [122]. The role of nutritional and environmental epigenetics is vital in managing genes like SIRT 1, which are linked to chronic diseases such as diabetes and immune system alterations. The interaction between SIRT 1, Nitric Oxide (NO), and epigenetics underscores the importance of regulating SIRT 1 to prevent diseases like MODS, a significant concern in the global chronic disease epidemic [123]. Nutritional interventions, especially with compounds like caffeine, can help maintain emotional well-being by preventing NAFLD, supporting brain function, and improving communication within metabolic pathways [124][125]. Long-term exposure to stress during early life can lead to psychiatric disorders, with molecular mechanisms poorly understood. In this study, chronic mild unpredictable stress (CMUS) in adolescent mice decreased SIRT1 expression in the brain, contributing to emotional deficits, but resveratrol, a SIRT1 activator, helped prevent these stress-induced behavioral abnormalities [126]. SIRT1 in the central amygdala is identified as a key epigenetic regulator that controls the vulnerability to emotional disorders associated with chronic pain. Viral manipulation of SIRT1 levels in rat and mouse models shows that its regulation of CaMKII α expression can prevent or exacerbate emotional vulnerabilities, suggesting SIRT1 as a potential therapeutic target for chronic pain with emotional comorbidities [127].

One limitation in the research on the influence of EI on healthy aging is the lack of sufficient studies specifically focused on the elderly population. Most of the existing research has been based on young and middle-aged adults, leading to a gap in understanding how EI affects the psychological, social, and physical functioning of older adults. Furthermore, the influence of EI on healthy aging is often conflated with other factors, such as personality traits, cognitive abilities, and social engagement, making it challenging to isolate EI as a singular predictor of healthy aging. Additionally, the diverse nature of aging experiences and

the heterogeneity of older adults make it difficult to generalize findings across different age groups and contexts. There is also a need for more neuropsychological research to explore the neural mechanisms underlying EI and emotional regulation in older adults, particularly given the age-related changes in brain structure and function that may affect emotional processing. These limitations highlight the need for more targeted and comprehensive studies to better understand the role of EI in promoting healthy aging.

Conclusion

The study of EI in aging reveals its vital role in enhancing psychological, social, and physical well-being in older adults. EI fosters resilience, life satisfaction, and adaptive coping, essential for healthy aging. Despite its benefits, research on EI in gerontology is limited, particularly regarding its integration with aging theories. As the elderly population grows, it is essential to investigate EI's potential in promoting emotional regulation and life quality. Expanding research in this field could guide interventions that optimize emotional skills, ensuring well-being and adaptation across the lifespan. This review highlights EI as a promising tool for healthy aging.

Acknowledgements

The authors don't have anything to acknowledge.

Conflicts of interest

The authors declare no conflict of interest.

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DOI:10.31579/2690-4861/663

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