

Ageing, Emotion Regulation and Effectiveness of Non-Pharmaceutical Interventions



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Abstract: *The process of ageing is usually defined in terms of physical and cognitive decline. A number of observations have been associated with the process of ageing such as, reduced productivity, a conservative nature, and a preference for tranquility. However, previous studies have reported interesting findings on increased emotional abilities among older adults which enable them to critically evaluate their life to find a meaningful purpose which thereby, accord to escalate their emotional stability. The current article describes the scope of existing literature examining emotion regulation in older adults. We first describe the emotion regulation in older adults through psycho-social perspectives. Following, we discuss the cognitive and neural correlates of emotion regulation in older adults. We then lay emphasis on the use of non-pharmaceutical interventions to enhance the quality of life including emotion regulation abilities in older adults.*

Keywords: *Ageing, Emotion regulation, Cognitive and Neural correlates, Non-pharmaceutical interventions*

I. INTRODUCTION

According to Tulle-Winton and Biggs (2000; 1999), gerontology studies emotional mechanisms throughout the process of ageing which focuses on understanding and attending to problems such as cognitive decline, physical health problems and depression (Arai et al., 2011). Emotions on the other hand, include the feeling of contempt, contentment, embarrassment, excitement, guilt, pride in achievement, relief, satisfaction, sensory pleasure, and shame which is experienced in the form of either positive or negative response (Ekman, 1999). Therefore, theories of emotions have suggested some important antecedent and response-focused strategies useful during emotional reception and response modulation to regulate one's emotions and strive for greater satisfaction in life (Gross & Munoz, 1995; Gross, 1998). Interestingly, studies demonstrate emotions as a complex set of experiences which follow a non-linear slope suggesting both positive and negative drift of emotions among elderly experienced during their entire lifetime (Mather, 2012). Moreover, Charles & Carstensen (2004) defined emotion regulation as an ability to regulate one's emotions by focusing on positive affect rather than on negative outcomes.

Furthermore, older adults tend to also experience a higher flow of unavoidable negative emotions to which they respond with more hostile and aggressive behavior which needs to be addressed and regulated (Carstensen et al., 2000; Carstensen et al., 2001). Several studies emphasise that social structures of emotions depend on an individuals' social position in the society, guided by the culture which interacts with cognitive and emotional arousal (Stets & Turner, 2006). Psychological constructs, on the other hand depends on three principles, such as the structure of an individual (capacity, propensity); reaction to incoming information and storing of information and lastly the interaction with the environment (Stets & Turner, 2006; Arnold, 1970). Therefore, Schroots and Yates (1999) indicated two main trajectories of one's existence as: transformation of physical body structure and shrinkage of cognitive functions with ageing. Interestingly, Cattell (1971) explains two types of intelligence where fluid intelligence refers to a critical engagement and problem-solving abilities which allows an individual to think and reason abstractly to learn something new whereas, crystallized intelligence is based on facts and past experiences which an individual gradually acquires overtime. Evidence has discussed that fluid intelligence usually decreases with age but crystallized increases with age because cognitive flexibility and response speed weakens as an individual ages but learnings from past experiences help older adults to boost their wisdom for life (Cattell, 1971; Horn, 1970; 1982; Garlick, 2002). Thus, it acts as consequence rather than a loss of intellectual ability due to ageing (Horn, 1982). Moreover, Birren & Fisher (1995) found that fluid intelligence is maximized till the age of twenty-seven years whereas, crystallized intelligence gradually develops by the age of fifty, stabilizes until seventy years, and then finally starts to decline until death. In view of these findings, the current article is aimed at providing a collective evidence of emotion regulation in older adults by highlighting psycho-social, cognitive, and neural correlates of emotion regulation in older adults. In addition, the present article is also aimed at discussing the use of different non-pharmaceutical interventions helpful for elderly in enhancing their emotion regulation.

II. PSYCHOLOGICAL CORRELATES OF EMOTION-REGULATION IN OLDER ADULTS

A. Old age is a hundred disorders You are not your age
These are some of the common labels people use to represent ageing in society.

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Both positive and negative expressions are widely used to describe the lives of older adults around the globe (Griffiths et al., 2017). Evidence for such associations come from the studies on older adults reporting a pessimistic vision among them describing them as sad, hopeless, neglected, tired, vulnerable, and self-centered individuals (Carstensen et al., 2003; Hummert et al., 1994). On the other hand, according to the socioemotional selectivity theory (SST), older adults successfully attain emotional wisdom through their past experiences which thereby, allows them to view life outcomes as more positive rather than as negative experiences (Carstensen, Isaacowitz, & Charles, 1999; Carstensen et al., 2003; Hummert et al., 1994). Studies have also found that despite the occurrence of natural life losses, such as death of a loved one, or occurrence of a physical injury, retirement, and financial loss, older adults manage to maintain higher emotional stability when compared with younger adults. Therefore, it has been suggested that due to previous experiences and meaningful interactions with their immediate social networks, older adults tend to report higher psychological well-being (Carstensen et al., 2003; Steptoe et al., 2015).

Successful ageing has been described as an ability, which allow an individual to attune with continuous growth and development of physical and mental changes (Flood et al., 2006). Further, studies from psychosocio perspective emphasize more on finding the relation between well-being and age (Steptoe et al., 2015). Countries such as Europe, America, Latin America, and Asia replicated the findings of U-shaped curve relationship among well-being and age, and it was found that younger and older adults reported higher hedonic and eudemonic well-being while middle-aged individuals scored less on both the dimensions of well-being and life satisfaction (Blanchflower & Oswald, 2008; Weiss et al., 2012; Frijters & Beaton, 2012; Stone et al., 2010).

The *Theory of Individualism* by Jung (1960) has defined the term *individualism* by conceptualizing successful ageing as a part of accepting the past, getting accustomed to the physical decline, attaining social stability, and uniting one's own consciousness with outside world. Similarly, Erikson (1963) elaborated his eight psycho-social developmental stages explaining the role, conflicts, and impact of social relations across lifespan. The eight stages are: trust vs. mistrust; autonomy vs. shame and doubt; initiative vs. guilt; industry vs. inferiority; identity vs. confusion; intimacy vs. isolation; generativity vs. stagnation and ego integrity vs. despair. These life stages clearly demonstrate an appropriate possible success/failure course of action or behaviour occurring at any stage across an individual's life span. For example, if an individual successfully accomplishes all the stages but fails to achieve the seventh stage i.e. generativity vs. stagnation, which focuses on work and balance of parenthood, then an individual will likely to have an unsuccessful and conflicting older adulthood (ego integrity vs despair) stating failure of wisdom and poor reflection of life (Erikson, 1963; Baltes, 1987). Furthermore, *theory of successful ageing* has also described three learnings, *first*, the process of selection, where an individual focuses and selects specific tasks and goals; *second*, optimization where an individual tries to accomplish the target; and *third*, maintaining a positive

attitude throughout the phase of hardships (Baltes, 1987). Finally, based on Carl Jung's and Erikson's concept, Lars Tornstam (1989) proposed the theory of *Gerotranscendence* where 'Gero' means old, and 'transcendence' means rising above. It explains a shift or transformation from a materialistic and rational view to a more cosmic and transcendent side, which thereby increases the life satisfaction among the older adults (Tornstam, 2003; 2005; 1997; Hauque, 1998). The theory of Gerotranscendence also describes a stage where, if an individual successfully reaches this phase, he/she will be more likely to learn, embrace and accept their relationships and losses, which automatically will develop a strong spiritual connection with three dimensions: *cosmic dimension* (redefining time, decreased fear of death and feeling a sense of connection with earlier generation), *self-dimension* (self-conflict, self-transformation, decrease in self-centeredness) and *personal relationships* (wisdom, reduced likings for materialistic entities, realizing importance of social contacts) (Tornstam, 1997; 1999a; 1999b; 2011). Furthermore, the theory focuses on positive ageing by depicting an individual's transformation over the lifespan towards attaining more wisdom, self-worth, and healing after retirement when an individual engages in altruistic behaviours and actions (Tornstam, 1997; Reed, 1991). Therefore, the above-mentioned theories have evidenced a gradual positive shift of emotions by attaining a balance between negative and positive life events over time.

B. Social well-being and Socioemotional Selectivity theory

Psychological perspective lays a deep connection with social well-being of an individual. Carstensen and colleagues (2003), suggests that both greatest joys and sorrows work in proximity with one's relations with other. Thus, studies on social well-being have mentioned that older adults undergo a positive approach for maintaining their affective well-being and social interaction with the environment as they age (Carstensen, 2003). A comparative study on older adults have also depicted a reduction of social sphere in order to maximize their positive experiences over the negative ones when compared to younger adults (Lee & Markides, 1990; Palmore, 1981; Fung et al., 2001; Lang & Carstensen, 1994). Moreover, studies from United States, Hong Kong, Taiwan, and Mainland China have shown a significant difference in social preferences opted by older adults (Fredrickson, 1990; Fung et al., 1999; 2001). Older adults in each of these studies, were provided with 30 minutes of leisure time to spend either with their family members, read a book, or to meet a close friend. The findings indicated that older adults preferred spending more time with their close friends and families when compared with younger adults who didn't show any preference to spend their leisure time with close friends or family members (Fung et al., 2001; Lang & Carstensen, 1994; Fredrickson & Carstensen, 1990; Fung et al., 1999).

Another set of studies investigated the age differences in affective forecasts and emotional reactions among young and older adults found on the basis of hypothetical events. The studies suggested that (a) young and older adults differ in speculating outcomes of various events, such that older adults make accurate anticipations with no errors on the positive outcomes over negative events as compared to young adults, (b) Both young and older adults show differences in emotional arousal for various gains and losses in life; such that older adults show less sensitivity towards losses and a neutral reaction towards gains, while young adults show a decreased valance for losses and an increased valance for gains (Scheibe et al., 2011; Nielsen et al., 2008). Thus, the findings conclude that older adults tend to make long-term choices that are likely to restore and promote health and well-being whereas, younger adults take more time to accept and heal from any casualty or loss faced in life (Scheibe et al., 2011; Nielsen et al., 2008). Thereby, indicating a positive shift of emotions found more prominently among older adults as they focus on life's accomplishments and satisfaction while minimizing the negative influences (Carstensen, 1995).

Furthermore, socioemotional selectivity theory, explains a phase of ageing where an individual shifts its perceived limitations of life as more emotionally meaningful rather than goals that maximize their living with obscure future (Carstensen et al., 1998; 1999). Therefore, psychological processes are responsible for fabricating an individual's social preferences and behaviors. Evidence reported by Jeanne Calment, world's oldest woman (aged 122 years) till 1997 who was interviewed at the age of 120, when asked about the kind of future she anticipated, she replied - "A very short one". This example falls in line with the socioemotional selectivity theory, which postulates that the limited time left with an individual, they usually perceive it as most significant and meaningful (Carstensen, 2003). Thus, when the future is comprehended with limited time, the attention of an individual gradually becomes internal and shifts towards their existing life events, immediate needs, and meaningful life goals. Furthermore, according to the socioemotional selectivity theory, older adults in comparison to the younger adults feel less motivated and emotional towards social connections and look for emotionally rewarding social interactions (Carstensen, 1995). To have such fine preferences and effectively selecting and focusing on goals, older adults are known to make use of strategies such as *antecedent emotion regulation* and *response focused emotion regulation* strategies, which surprisingly work well for them (Carstensen, 2003).

III. COGNITIVE CORRELATES OF EMOTION-REGULATION IN OLDER ADULTS

A. Use of Strategies Across Adulthood

Previous studies have evidenced a shift from negative to positive emotions to be a fundamental element of well-being among older adults (Schmeichel, 2008). Further in support, 'adaptive strategies' have been suggested as a responsible measure for the shift in emotions (John & Gross, 2004). Adaptive strategies at large represent age-related cognitive

differences among older and younger adults. Situation selection, situation modification, distraction and cognitive reappraisal are a few examples of adaptive strategies. For instance, strategic use of past experiences by older adults for current effective functioning, from being grateful to whatever they have, and less upset for what they missed to represent the use of adaptive strategies (Lemaire, 2010; Eldesouky & English, 2018; Baltes et al., 1990). According to Lemaire (2010), four main age-related differences occur while using various strategies during a difficult task: *first*, decrease in the variety of strategy use; *second*, both increase and decrease in the frequency of the strategy used; *third*, less efficient strategy execution; and *fourth*, not so good choice of strategy selection. Furthermore, Gross (1998) mentioned two more strategies namely, *antecedent-focused* and *response focused* emotion regulation. *Antecedent-focused* manipulates the input of information through selective attention, modification, attention deployment and cognitive change similar to cognitive reappraisal laying an emphasis on the stimulus. Whereas *response-focused* focuses on the manipulating output of events by applying effective strategies to intensify, diminish, delay or limit current emotional experience through expressive suppression of behavioral response of an emotion (Eldesouky & English, 2018). For instance, if an individual gets lodged in an argument with two options to get out of the situation: first is to avoid or settle the situation with peace (antecedent-cognitive reappraisal); second, to oversee anger till the argument gets over (response-expressive suppression). Thus, the situation clearly illustrates option one as a positive outcome of a situation, while second option is associated with the behavior, offering reduced emotional well-being among the individuals (Eldesouky & English, 2018; Webb et al., 2012; Gross & John, 2003).

Additionally, studies examined the effect of age on strategy selection, with age ranging from 14 to 75 years with two different situations, one involving interpersonal or emotionally laden situation (i.e., decision to place your mother in a nursing home) and, the other including less emotionally laden or an instrumental problem situation (i.e., returning defective merchandise) (Blanchard-Fields et al., 1995). Further, the participants were asked to solve the problems while in other case, they were asked to rate the degree to employ a specific strategy (Blanchard-Fields et al., 1995; 1997; 2007). The studies examined two categories of strategies: instrumental strategies (i.e., action oriented) and passive emotion-regulation strategies (i.e., suppressing feelings). The findings revealed that most individuals across all age groups (including both younger and older adults) used more action-oriented strategies in instrumental domains but in some situations, older adults used more instrumental, less passive and more effective strategies as compared to the younger adults (Blanchard-Fields et al., 1997). Whereas older adults in interpersonal or emotionally laden situations, used more passive emotion-regulation strategies in comparison to younger adults (Blanchard-Fields et al., 1997).



However, in situations leading to a conflict, older adults were found to be engaged in a combined use of multiple strategies including more action-oriented strategies, in order to effectively regulate their emotions (Blanchard-Fields, 2007; Watson & Blanchard-Fields, 1998). Thus, it can be speculated that older adults attempt to employ increased cognitive and emotional awareness to solve a problem effectively than younger adults (Blanchard-Fields, 2007).

B. Changes in Attention and Memory Performance

Decline is often considered as a consequence of ageing, which is characterized by deterioration (Carstensen et al., 2006; Mather & Carstensen, 2005). Decline due to ageing involves, both of physical and mental processing including major chunk of cognitive and neural functions. Several studies have found a decline in sensory function, processing speed, inhibitory control working memory, long-term memory with free- and cued-recall tasks, selective attention, divided attention, mental imagery, verbal fluency, reasoning and problem solving, language comprehension and language production among older population (Baltes & Lindenberger, 1997; Salthouse, 1991; Hasher & Zacks, 1998; Mathuranath, 2003; Burke, 2004). Studies have highlighted age related differences in emotional attention and memory. As, Mather and Knight (2005), in a series of experiments illustrated that older adults allow cognitive processes to strengthen positive and diminish negative flow of information in memory in contrast to younger adults. Hedden, Braver and colleagues (2004; 2002) depicted significant age-related cognitive decline in memory when compared with other cognitive functions. In another similar study, 52 participants (both younger and older adults) were recruited for a dot-probe task. The experimenter displayed pairs of emotional-neutral, positive, and negative facial images on the screen for few seconds and after which a dot was reflected on the screen and participants are required to locate the position of the dots it appeared. The results indicated that older adults were faster in locating the dot after the appearance of a positive facial image over neutral and negative images, while no differences were found in younger adults (Mather & Carstensen, 2003). This is because older adults extend more focus on relevant and meaningful tasks which helps them to memorize that event for a longer time (Comblain et al., 2005; Folkman et al., 1987). Similar studies have reported a crucial role of controlled cognitive processes through selective attention, strategic use, memory habits and goal-directed behaviors which favour positive outcomes while avoiding the negative ones to restore and maintain a healthy emotional well-being and stability even after the age of 60 (Issacowitz et al., 2006; Rösler et al., 2005; Lavie, 2005; Hahn et al., 2006; Mather & Knight, 2006).

IV. NEURAL CORRELATES OF EMOTION-REGULATION IN OLDER ADULTS

Previous studies have strongly associated ageing with cognitive decline, deteriorating memory functions and a shift in emotion regulation (Addis et al., 2010). Satpute & Lieberman (2006) associated ageing with changes in the prefrontal and amygdala regions, responsible for encoding emotionally stimulating information. The prefrontal cortex

involves higher order cognitive functions such as reasoning, logic, working memory, analogy, and mathematical problem solving; whereas amygdala is responsible for emotions such as fear and reward stimuli which is found to be specifically sensitive to negative over positive valance; and lastly, medial temporal lobe, is responsible for recollection and memory retrieval (Dolcos et al., 2014). In addition, studies have found over-activation of prefrontal cortex and under-activation of amygdala to be more prominent among older adults while processing negative facial expressions as compared to younger adults (Fischer et al., 2005; Tessitore et al., 2005). For instance, Tessitore and colleagues (2005) recruited young and older adults (above 60 years) for a perceptual processing task involving fearful and threatening stimuli. The findings were consistent with previous studies suggesting that older adults had relatively higher activations in prefrontal regions including Broca's area and relatively decreased activations in the amygdala and posterior fusiform gyri (Kirchhoff et al., 2000; Brewer et al., 1998; Wagner et al., 1998; Grady et al., 2003). This is because older adults were engaged in a more distributed neocortical network during the perceptual processing of emotional stimuli (Tessitore et al., 2005). Studies have depicted lower medial-temporal activations to lower the memory load in this region and have also suggested higher prefrontal activations in older adults to be a compensatory mechanism when lower para hippocampal activations were found (Cohen et al., 1999; Gutchess et al., 2005). In addition, amygdala is a vital region responsible for emotion regulation which works in conjunction with other emotion processing units including nucleus accumbens, insula, anterior cingulate cortex, medial prefrontal cortex and orbitofrontal cortex (Phan et al., 2004). Interestingly, studies on neural correlates underlying emotions have clearly mentioned voluntary suppression of negative emotions among individuals (Oshsner et al., 2002). Findings from neuroimaging studies have provided evidence for activations in the left region of the amygdala during visualization of sad and fearful situations by older adults (Adolphs et al., 1994; Price, 2007; Sallet et al., 2011; Jiang et al., 2019). Furthermore, recent studies have highlighted three segments of amygdala with key functions responsible for visualization and information processing tasks, such as, *Ventrolateral amygdala (VLA)* responsible for social perception, *Medial amygdala (MedA)* responsible for affiliation network and *Dorsal amygdala (DorA)* responsible for aversion network (Adolphs et al., 1994; Price, 2007; Sallet et al., 2011). Moreover, Jiang and colleagues (2019) demonstrated structural and neural changes in amygdala by recruiting 106 healthy participants with an age range of 10-65 years. The findings of the study suggests that the structural integrity declines, and flow of information in dorsal amygdala increases, which helps older adults to have better emotion regulation abilities (Birditt, 2014; Dolcos et al., 2014; Griffiths et al., 2017). Thus, these studies clearly illustrate that the functional and chemical mechanism do play a major role in maintaining and improving emotional regulation among individuals at any stage especially among older adults.



V. EMPHASIS ON INTERVENTIONS

Ageing might serve us with a wiser state of mind, but it also brings along cognitive decline due to structural deterioration in the brain. fMRI studies indicate an age-related decline in grey and white matter density in certain brain areas, however, despite these losses, there is evidence from various studies that suggests that the goal of an ideal, healthy ageing can be achieved, by defying all the misconceptions associated with it. A noteworthy sign has been provided by the studies based on cognitive training and physical exercises, the non-pharmaceutical interventions that have been implemented to restore or at least minimize the age-related cognitive decline. Furthermore, a substantial amount of research has been conducted to discover new ways of brain-training that can restore brain functions up to a maximum extent. Such trainings fall under the category of *non-pharmaceutical interventions* that aim to improve cognitive performance or at least delay age-related cognitive decline (Bamidis et al., 2014). Similar findings have been put forward about non-pharmaceutical interventions chiefly designed to prevent cognitive decline and memory functions, re-establishing the well-being and quality of life among older adults (Bamidis et al., 2014; Hahn & Kramer, 1995; Dolan & White, 2007; Windle et al., 2010). These non-pharmaceutical cognitive intervention techniques involve cognitive training, cognitive stimulation, cognitive exercise, rehabilitation and mental activity. *Cognitive intervention* is an umbrella term for cognitive training, cognitive stimulation, cognitive exercise, rehabilitation and mental activity. *Cognitive training* refers to a set of tasks designed specifically to increase attention, memory and problem-solving ability, *stimulation* aims to enhance cognitive and social functioning in a nonspecific manner, while *rehabilitation* is an individualized approach to identify the goals and employ strategies to address them. Cognitive training aims to target both healthy as well as individuals with cognitive deficits, while cognitive rehabilitation tasks are designed for individuals having cognitive deficits and thus, can only be given under supervision of a professional caregiver (Clare & Woods, 2003; 2004; Gates & Valenzuela, 2010; Baltes et al., 1989). The beneficial effects of cognitive training have also been highlighted at structural level (i.e., increase in brain volume, cortical thickness and density) as well as functional level (i.e., efficiency in performing tasks) in an ageing brain (Papp et al., 2009). The cognitive exercises include repeated high-intensity practice of theory-driven tasks that can be used to improve the efficiency of neuronal processes. The evidence from the *neuropsychological* studies have asserted an improved cognitive performance in problem solving in social contexts, playing strategic video games, taking a computer course and other daily-instrumental activities. In addition, a set of *physical intervention* techniques known to involve activities such as walking, cycling, occupational tasks and household chores work on improving cognitive functions either by involving a single or a combination of physical exercises (Colcombe & Kramer, 2003). Beneficial effects of physical interventions include reduced risk of cognitive decline and dementia and increased cardiovascular fitness accompanying better executive functions and memory. On

the other hand, the combined use of both the cognitive and physical interventions have shown to have a larger functional benefit on cognitive activity than alone. Additionally, evidence from the neuro-imaging techniques have suggested the contribution of physical exercises in enhancing the mental flexibility and memory with improving the gray matter volume in prefrontal and cingulate cortex and the role of cognitive training in improving brain volume, cortical thickness and density all correlated with better memory functions. However, recent technological advancements have made possible the designing of an integrated model of physical training with computers, named as 'exergaming'. These are known to promote physical stimulation and rehabilitation for cognitive decline in older adults (Martin et al., 2011; Kueider et al., 2012). Thus, physical interventions do not only prevent cognitive decline, but they also aim to enhance neuronal plasticity for strengthening the brain functioning (Simon et al., 2012; Bhome et al., 2018). This substantial information suggests that these interventions have the potential to minimize the neuroanatomical deterioration along with the cognitive and psychological decline to a great extent.

A. Interventions to delay cognitive decline

Physical and cognitive decline appear to be an unavoidable transition during ageing. Although this transition is unavoidable, several effective interventions could be developed to surpass early cognitive and emotional decline among older adults. For instance, cognitive skill development interventions can be incorporated by creating a safe space for the individuals to share and discuss the cognitive difficulties in everyday life (Bhome et al., 2018; Sanjuán et al., 2020; Chiu et al., 2017). Additionally, Simon et al. (2012) mentioned implementation of collective group activities such as the use of mnemonic rules, calendar, puzzles, manual calculations, and engagement in other brainstorming activities for healthy emotional and cognitive functioning. Moreover, additional effective strategies such as increased physical and external activities, participation in social group engagements, intake of healthy food, decreased stress, and adequate sleep collectively contribute towards a sustained cognitive capacity (Sanjuán et al., 2020). Interestingly, a recent systematic review by Sanjuan and colleagues (2020) highlighted a 10-week strategic plan for both healthy and unhealthy (i.e., individuals with cognitive impairment) adults for an effective implementation of cognitive intervention programs. Firstly, they mentioned a session length should not be more than 60-90 mins (Chiu et al., 2017; Kelly et al., 2014; Smart et al., 2017; Chandler et al., 2016). Secondly, regular follow up and homework tasks should be assigned to the participants. Thirdly, a collection of cognitive skill should be emphasized such as executive functioning, memory, and attention. Fourthly, increasing quality of life, reducing stress, and anxiety as well as participation in cognitively challenging tasks such as critically solving math problems, calculations etc.

Should be emphasized. Lastly, a consistent audit on implementation of the strategies should be rendered (Guye et al., 2016).

VI. CONCLUSION

Ageing is a natural process which can't be controlled but can be well managed by an effective strategic routine. The current article attempted to provide collective evidence of age-related emotional shifts in older adults by navigating through the psycho-social, cognitive and neural correlates. Firstly, through the psycho-social perspective, the current article laid emphasis on psychological well-being of older adults. Secondly, from cognitive perspective, studies have described age-related differences in attention, memory, processing speed, planning and decision-making which deteriorate as we age. Thirdly, the findings from brain imaging studies complement the findings from psycho-social and cognitive studies by highlighting the neuronal and structural age-related changes in the brain contributing to differential emotion regulation abilities in older adults. Lastly, the current article emphasizes the role of non-pharmaceutical interventions to enhance the overall cognitive output among older adults.

DATA AVAILABILITY

Data sharing not applicable to this article as no datasets were generated or analyzed during the current study.

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