RESEARCH PAPER

Cognitive Reserve and Emotional Adaptation in Aging: Insights from Depression and Dementia

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Abstract

This study explores the association of cognitive reserve with emotional adaptation and depression in older people, especially focusing on the psychological aspects of ageing and their implications for cognitive and emotional functioning. The research method employed was empirical, quantitative and cross sectional research design for this study with 200 respondents that were sampled using purposive sampling method in older adults. Primary data for the study was collected by using a validated structured questionnaire and analysed using SPSS and evaluated for Cognitive Reserve, Emotional Adaptation and Depression. "Descriptive statistics, Pearson correlation and simple linear regression were used to test the proposed hypotheses. The outcome indicated that there was a positive and significant relationship between Cognitive Reserve and Emotional Adaptation at low level ($r = 0.176$, $p = 0.012$) supporting H1. Cognitive Reserve significantly predicted Depression ($R^2 = 0.067$, $F(1,198) = 14.188$, $p < 0.001$), supporting H2". Emotional Adaptation also significantly predicted Depression ($R^2 = 0.126$, $F(1,198) = 28.556$, $p < 0.001$), supporting H3. The results suggest a degree of interdependence between cognitive and emotional functioning in older age, and suggest that other psychological, social, and contextual factors might play a role in depression in this group.

Keywords: *Cognitive Reserve; Emotional Adaptation; Depression; Aging; Older Adults; Dementia; Psychological Well-being.*

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Introduction

Population ageing is one of the most significant demographic and public health phenomena of modern times. Improvements in medical care, nutrition, living conditions and disease management have contributed to increased life expectancy and a rapid growth in the older population across the world (Zijlmans, J. L., et.al., (2023). According to the World Health Organization (WHO) this figure was around 250 million in 2000 and is expected to become near to 2.1 billion by 2050. But the process of ageing is not the same for everyone, and there are significant variations in how people think, feel, function and cope physically with their ageing. Therefore, new concepts for healthy ageing are beginning to stress the need for maintaining functional ability, mental capacity, social participation and psychological well-being, rather than just the absence of disease (World Health Organization, 2025).

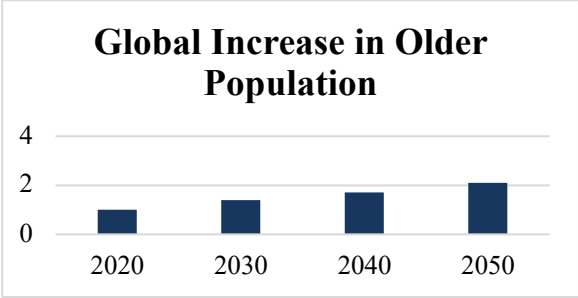


Figure 1: Projected Growth of the Global Population Aged 60 Years and Above

Source: World Health Organization (WHO), 2025

"Ageing is accompanied by gradual changes in several cognitive functions, including memory, attention, processing speed and executive functioning". However, this doesn't account for the wide variation in cognitive outcomes found across older adults. There are some people who have relatively intact brain function at fairly similar ages even when there is significant age-related or

neurological decline, and others who have significant cognitive impairment at fairly similar ages. The variability has led to increasing scientific interest in cognitive reserve, defined as an individual's ability to maintain cognitive functions in the face of ageing, brain damage or pathology due to disease (Liu, S. M., et al. (2023). While cumulative experiences like education, occupational complexity, intellectual activity, social engagement and leisure activities continue to be studied as factors affecting cognitive reserve, recent conceptual studies highlight their importance (Choi, J., & Kim, H.). (2025).

The term cognitive reserve has gained greater significance in the understanding of the diverse forms of dementia and Alzheimer's disease. Presence of cognitive reserve does not rule out accumulation of neuropathologic changes, but may affect the ability to adapt to or compensate for changes in a way that prevents clinically obvious cognitive dysfunction. A recent review on the measurement of cognitive reserve underscored the relevance of sociobehavioural, neuroimaging, electrophysiological, and genetic methods to the study of operativity of cognitive reserve both in healthy and pathological ageing (Pappalettera et al., 2024). Likewise, there is recent evidence suggesting that cognitive reserve can be neural efficiency, neural flexibility, and the recruitment of compensatory networks, but the specific mechanisms remain under investigation (2025).

The capacity to build up cognitive reserve throughout the life-course seems to be especially influential. Liu et al. (2024) conducted a systematic review and meta-analysis of 27 longitudinal studies to explore the association between cognitive reserve in early, middle and late adulthood with dementia risk. They identified that higher cognitive reserve levels at each of these life stages were linked to lower risk of dementia and that evidence indicated that life course cognitive and social experiences had some importance. Another interesting finding of the study was that social connection may be a pathway related to the cognitive reserve and risk of dementia. These results support the idea that cognitive reserve is not limited to late life, but could be a function of resources that have been built over many years (Liu et al., 2024).



Figure 2: Major components of Cognitive Reserve

Source: Adapted from Pappalettera et al. (2024)

Population ageing is a significant issue with dementia being one of the major challenges. It is characterized by problems with memory, thinking, and doing everyday activities and can be caused by multiple diseases that affect the brain (Liu, Y., et.al., (2024). "By WHO estimates, there were about 57 million people with dementia worldwide in 2021, and there were almost 10 million new cases every year. Alzheimer's disease is the most prevalent type of dementia and accounts for 60-70% of all dementia cases". Most importantly, it is important to note that the rate of ageing is the strongest known risk factor for developing dementia and the disease does not have to be a natural consequence of normal ageing. Additionally, dementia is associated with alterations in mood, emotional regulation, behavior and motivation, suggesting a possible interaction between cognitive and emotional functions in pathological ageing (World Health Organization, 2026).

Depression is also a significant psychological issue in older age, in addition to cognitive impairment. Older adults may have several transitions such as retirement, bereavement, family structure changes, loss of income, physical changes, chronic illness and loss of social roles and independence. These experiences can impact emotional health and lead to depressive symptoms. According to WHO, mental disorders continue to be significant causes of disability in older people and depression and anxiety are two of the more common disorders. The feeling of loneliness and social isolation are also known as significant risk factors to mental health in old age (World Health Organization, 2026). Therefore, to grasp the process of ageing it is necessary to consider psychological adaptation as well as cognitive and physical changes.

Empirical studies have recently yielded valuable evidence on the link between cognitive reserve and depression. Zhang et al. (2024) looked at

over 436,000 individuals in the UK Biobank and explored the association between cognitive reserve and depression and depression-related dementia. They used education, occupation, social connections, confiding relationships and leisure activities as their indicator of cognitive-reserve. Increase in cognitive reserve was correlated with reduced risk of depression and, for individuals that developed depression, reduced risk of subsequent dementia and death. The results indicate that the concept of cognitive reserve is not only relevant for cognitive decline but may also be related to psychological outcomes throughout the life span (Van Essen, K., et.al., 2025).

Longitudinal study of the relationship between depression and cognitive functioning has also been studied. Frau et al. (2025) studied cognitive reserve, depression, and executive functioning in older adults from the Wisconsin Registry for Alzheimer's Prevention (WRAP) spanning 10 years. They show that depression and cognitive reserve can both be part of a single factor when looking at longitudinal changes in EF. Likewise, Khalaila (2025) reviewed the data of 32,325 individuals aged 50 years and older from the Survey of Health, Ageing and Retirement in Europe (SHARE) and investigated if there was a moderating effect of cognitive reserve between longitudinal associations of depression and cognitive functioning. Education was especially important for the relationship between depressive symptoms and cognitive performance as were cognitive activities (Frau et al., 2025; Ishassery Pathrose, S., et.al., (2025).

Psychological and cognitive processes should be studied together, given the relationship between depression and dementia. A recent meta-analysis by Fernández Fernández et al. (2024) investigated the association between depression and dementia as possible risk factors, and added to the mounting evidence that depression and subsequent cognitive decline may be linked. A more recent systematic review of late life depression and subsequent dementia found a temporal relationship between the two, with some of the highest associations being in the first ten years after the onset of depression (2025). These results do not provide evidence for the inevitable onset of dementia in cases of depression, but rather highlight the need to consider the temporal and clinical relationship between depressive symptoms and cognitive decline (Fernández Fernández et al., 2024; 2025).

Cognition-depression relationship may also be influenced by treatment and recovery processes. “Ainsworth et al. (2024) conducted a systematic review and a meta-analysis of cognitive outcomes after antidepressant pharmacotherapy in late-life depression”. The study supports the growing research focus on cognition in the treatment of depression in older adults, highlighting the need for a measurement of the relationship between mood and cognition during treatment and recovery, and not just at one point (Ainsworth et al., 2024).

In this context, emotional adaptation is another aspect of ageing. Emotional adaptation may be seen as the ability to adjust flexibly to life changes, manage emotional responses, deal with losses and life stressors, and to keep a positive mental health despite age-related challenges. Ageing can be a process of several experiences, each of which must be psychologically adjusted, such as bereavement, retirement, physical decline, new social dynamics and the need to rely on other people. But these experiences do not have the same effect on older people. There can be significant differences in psychological adaptation in later life, as a result of variations in emotional regulation, coping resources, social support and accumulated life experiences.

Figure 4: Emotional Adaptation across the Ageing Process

Figure 3: Emotional Adaptation across the Ageing Process
Source: Adapted from Trică et al. (2024)

The study of emotional adaptation as a multidimensional process has been supported by recent research in emotional regulation. “Whitmoyer et al. (2024) investigated cross-sectional differences in emotion-regulation strategy use and flexibility in functioning across everyday life between younger and older adults”. Their findings help to fill a gap in the knowledge regarding the associations between emotional regulation patterns with emotional well-being during late adulthood. Similarly, Isaacowitz and Wolfe (2024) pointed out that it is important not to solely focus on whether older adults employ more or less specific strategies, but rather to consider the contexts in which they are used when addressing emotional regulation in ageing.

“A systematic review of emotion-regulation strategies in older adults also indicated that some emotion-regulation strategies are adaptive for older adults, and that older adults may have fewer emotion-regulation difficulties than younger adults across a variety of contexts”. Review also found that dysfunctional emotion regulation strategies are linked to psychological distress and problems with negative health-related outcomes. The findings are relevant for the current topic as emotional adaptation can not only

depend on the presence of psychological challenges, but also on the strategies and resources the person has at their disposal to respond to the challenges (2024).

"Emotional adaptation in older years is closely related to psychological resilience. Trică et al. (2024) conducted a systematic review and meta-analysis of resilience and successful ageing in adults over 60 years of age". The results showed a positive association between psychological resilience and successful ageing, but there was significant variation in the studies included, which calls for a prudent interpretation of the results. More recent findings also have conceptualized resilience in later life as a dynamic and multidimensional phenomenon that includes individual, social and environmental protective factors, but not a personal trait (Trică et al., 2024; Jacob et al., 2025).

Another aspect of social engagement that links cognitive reserve to emotional adaptation is social interaction. Social relationships offer communication, thinking stimulation, emotional support and involvement in meaningful activities. In their scoping review of 55 papers, Fowler Davis et al. (2024) found that there were links between social engagement and maintaining or improving cognitive function among older adults, especially if they were engaged in social roles. Likewise, various studies on interventions addressing social isolation and loneliness have included both cognitive and psychological outcomes such as cognition (Fowler Davis et al., 2024; Baptista et al., 2024) and depression and well-being/funktional status (Baptista et al., 2024).

The connection between social relationship and cognition is of special interest for the prevention of dementia and also healthy ageing. Joshi et al. (2024) conducted a review of the evidence regarding social connections and cognition in Alzheimer's disease and related disorders and individuals who are vulnerable to them. Social relationships have been identified as an important aspect of cognitive health and are a potential target for interventions based on the review. Furthermore, social participation has been shown to be one of the potentially modifiable dimensions related to cognitive function/cognitive frailty in older adults based on recent research (Joshi et al., 2024; Fowler Davis et al., 2024).

Cognitive reserve and emotional regulation and resilience imply that a deficit view of ageing is not sufficient. Current studies on health and ageing have shifted from considering all older people as a group to embracing the concept that older people are heterogeneous with different cognitive, emotional and social resources which can have an impact on how they cope with challenges in their later years. In a systematic review and meta-analysis of healthy ageing, Tang et al., (2025) have concluded that educational level, social participation, employment, physical activity and other socioeconomic and lifestyle factors are associated with healthy ageing. Likewise, Elhag et al. (2025) showed that interventions in the community can be effective for tackling various aspects of older adults' physical health, psychological well-being, and social connectedness.

Although there are numerous publications, there are some significant gaps in the literature. However, there is a large body of research that has focused on cognitive reserve in association with dementia, Alzheimer's disease or cognitive performance, while there has been much less research on the association between cognitive reserve and emotional adaptation as an integrated psychological construct. Depression is also typically studied as a risk factor for cognitive decline or as a consequence of ageing, and not in conjunction with cognitive reserve and emotional adaptation. Thus, the processes by which educational experiences interact with depression and dementia, and how occupational complexity, cognitive activity, social engagement, and emotional-regulation processes interact with depression and dementia, warrant further study.

In recent years, methodological problems in the definition and measurement of cognitive reserve have also been emphasized. Do, H. S., et.al., (2025) highlighted the use of a variety of socio behavioural and neurobiological indicators to operationalise cognitive reserve, and the newer literature to support longitudinal studies that combine behavioural, neurobiological and cognitive measures. The methodological variability makes it important that future studies should clearly define what cognitive reserve is and differentiate it from related terms like brain reserve, cognitive resilience and/or psychological resilience. This is especially important with regards to cognitive reserve and emotional and clinical outcomes (Ong, A. D., et.al., (2024).

1. Literature Review

Theme 1: Cognitive Reserve and Emotional Adaptation among Older Adults

Cognitive reserve is now being recognized as a multi-faceted resource that allows older adults to successfully cope with cognitive and psychological changes and life stressors. Recent studies have focused on the importance of reserve as a product of a person's intellectual, educational, occupational and

social experiences and, potentially, a factor in resilience during adulthood. Richards et al. (2024) pointed out that cognitive reserve life experiences are correlated with higher levels of resilience to cognitive decline related to old age, meaning that those with higher levels of cognitive reserve may possess more resources to adapt to challenges that come with old age. Cabeza et al. (2024) also pointed out that brain-related resources, individual traits, and environmental experiences all play a role in resilience in aging, but it is not solely driven by any one of these factors. In a psychosocial context, this means that cognitive reserve may afford older adults with more flexibility in how they perceive a situation when it is difficult, choose coping strategies to use, and behave adaptively. Moreover, Livingston et al. (2024) highlighted modifiable life-course factors such as education, social contact, and cognitive activity as having a beneficial effect on healthy cognitive aging. The results as a whole suggest a broader importance for cognitive reserve, and that it could be related to the ability of older adults to cope with changing contexts.

Emotional adaptation is especially relevant in later life as there are numerous changes that occur such as retirement, social role changes, bereavement, declining physical function and loss of social networks. The past few years suggest that older adults exhibit a great deal of emotional flexibility and stability when facing these challenges. Charles and Carstensen (2024) pointed out that changes in motivational priorities and the selective regulation of emotional experiences affect emotional functioning in late adulthood. Likewise, Ong et al. (2024) found psychological resilience and adaptive emotional processes as factors that contribute to well-being in older adults, especially when facing stressful challenges in life. A cognitive-resource-emotional-adaptation relationship can therefore be understood in terms of people's ability to understand and appraise their situation, control their responses, and choose coping strategies based on specific situations. Furthermore, Jeste et al. (2024) pointed out that the positive psychological traits and adaptability are also critical attributes of healthy aging, with successful adaptation not only being a lack of disease but also the capacity to function psychologically. “In sum, the literature offers a theoretical foundation for exploring the link between cognitive reserve and emotional adaptation among older adults, highlighting how this could be a fruitful lens for empirical studies”.

H1: There is a significant relationship between cognitive reserve and emotional adaptation among older adults.

Theme 2: Cognitive Reserve as a Predictor of Depression

“Considering cognitive reserve as a possible protective factor against depressive symptoms in old age has gained growing interest”. The central idea is that people who have higher cognitive reserve have more resources, such as cognitive, educational, occupational and activities, that can help them cope better with age-related problems and experience less psychological distress. This relationship has been supported by recent longitudinal evidence. In a population-based cohort study, Mårtensson et al. (2025) concluded that more cognitive reserve was related to reduced risk of depressive symptoms in old age. Specifically, both the measures of cognitive reserve based on residual cognitive function and cognitive reserve based on activity were protective, and cognitive reserve based on activity was also associated with decreased risk for diagnosed depression in the larger cohort. Likewise, Albuquerque et al. (2025) found evidence that cognitive reserve was protective against depressive symptoms in late life, but investigated the relationship of cognitive reserve with late-life depression. Their results confirm the need to take into account accumulated cognitive and life experiences in psychological outcomes in older people.

“Additionally, the relationship between cognitive reserve and depression is important due to the potential for influence between cognitive functioning and depression during aging, which can affect one another. Frau et al. (2025) assessed the interaction between cognitive reserve and depression on executive functioning in elderly adults leveraging 10-year longitudinal data from the Wisconsin Registry for Alzheimer's Prevention, which highlights the need to take both cognitive reserve and depressive symptoms into account when understanding cognitive aging”. More recent evidence from Khalaila (2025/2026) also indicated that cognitive reserve – specifically, education and involvement in cognitive activity – could modify the link between depression and cognitive performance in adults aged 50 years and older. Futhermore, Gu, Y et al. (2026) reported that when cognitive reserve and cognitive domains were correlated in middle-aged and elderly Chinese individuals, depressive symptoms were identified as a potential psychological pathway between the two. Overall, the literature in recent years has made a case for studying the cognitive reserve as a predictor of depression and suggested that the association may be affected by the definition and measurement of cognitive reserve.

H2: Cognitive reserve has a significant effect on depression among older adults.

Theme 3: Emotional Adaptation as a Predictor of Depression

Emotional adaptation and emotional regulation are significant psychological processes in later life, as older adults are often faced with changes in health, social relationship, independence, and life roles (Gu, Y., et.al., 2026). Thus, understanding, tolerating, or controlling emotional experiences could potentially impact susceptibility to depressive symptoms. Recent studies have shown some differences in emotion-regulation processes between older adults with and without depression. The older nursing-home residents with depression were found to use some emotion-regulation strategies differently from the non-depressed older adults, with a focus on adjustment and toleration (Nagel et al., 2024). The results suggest that emotional regulation processes are important for understanding depressive experiences in older adulthood and that older adults' emotional regulation may be linked to their psychological functioning. Likewise, in a randomized controlled trial (RCT), depressed older adults were randomized to a mindfulness and stress reduction intervention which led to changes in emotion regulation, as well as changes in depression and sleep-related outcomes (Javadzade et al., 2024). The results support the empirical evidence of emotional regulation – depressive symptom relationship in older adults.

Emotional adaptation-depression relationship also can be explained by the distinction in emotions relevant information processing and in the regulation of negative experiences. “Kampman et al. (2024) looked at the association between depression and emotion-regulation strategy use and age-related attentional positivity, and found that both depression and emotion-regulation strategy use influenced emotional processing throughout adulthood”. This implies emotional adaptation is not an inherent trait of ageing, but depends on individual differences in emotional processing and emotional control strategies. Moreover, during the process of aging, emotion-regulation tactics will be effective to various extents and in different circumstances; flexibility in emotion-regulation is important during aging, as Isaacowitz and Wolfe (2024) noted. Collectively, the results indicate that emotional adaptation problems may be related to higher depression symptomology while more successful emotional regulation may be linked to psychological well-being. Thus, the study of emotional adaptation as a predictor of depressive symptoms in older adults offers a suitable empirical extension of the previous research and can be used to achieve the third objective of the present study.

H3: Emotional adaptation has a significant effect on depression among older adults.

2. Research Objectives

Objective 1: “To examine the relationship between cognitive reserve and emotional adaptation among older adults’.

Objective 2: “To determine the effect of cognitive reserve on depression among older adults”.

Objective 3: “To examine the effect of emotional adaptation on depression among older adults”.

3. Research Methodology

The present study will use Empirical research design with quantitative approach and Cross sectional research design because the present study wants to examine the relationship between Cognitive Reserve and Emotional Adaptation and to determine the influence of Cognitive Reserve and Emotional Adaptation on Depression at one time among older adults. A sample of 200 geriatric patients who fit the criteria for inclusion in the study and who can respond to the study questionnaire will be used. Purposive sampling technique will be used to select the respondents so that the respondents obtained will be the required sample for the study. Structured questionnaires for CR, Emotional Adaptation, Depression scales and demographic data were used to gather primary data. All "Study variables" will be measured with appropriate standardized/structured scales with Likert scale of 5 points (Strongly Disagree = 1, Strongly Agree = 5) as appropriate. SPSS will be used to collect and code data and analysed. Descriptive data such as frequency, percentages, mean and standard deviation will be used to describe the major areas of the study variables and the demographic characteristics of the respondents. The internal consistency and reliability of the measurement scales will be determined using Cronbach's alpha statistic. Pearson correlation analysis will be used to assess the relationship between Cognitive Reserve and Emotional Adaptation as per Objective 1 and Hypothesis H1: There is a significant relationship between cognitive reserve and emotional adaptation among the older adults. In Objective 2, and Hypothesis 2, the task is to check for significance in the simple linear regression model of the Independent Variable (Cognitive Reserve) and Dependent Variable (Depression). Similarly, to test the significance of prediction of Emotional Adaptation on Depression in the same

way, in Objective 3 and in Hypothesis H3 simple linear regression analysis will be applied where Emotional Adaptation will be the independent variable and Depression the dependent variable. The regression analyses will provide the values of R, R^2, adjusted R^2, ANOVA/F statistic, regression coefficient (β), t value and p value that will enable the evaluation of the predictive effect of independent variables. The significance level of 5% ($p < 0.05$) will be used for all hypotheses. The methodology will hence give empirical evidence on the relationship between Cognitive Reserve and Emotional Adaptation and the predictive role of Cognitive Reserve and Emotional Adaptation in Depression of older adults.

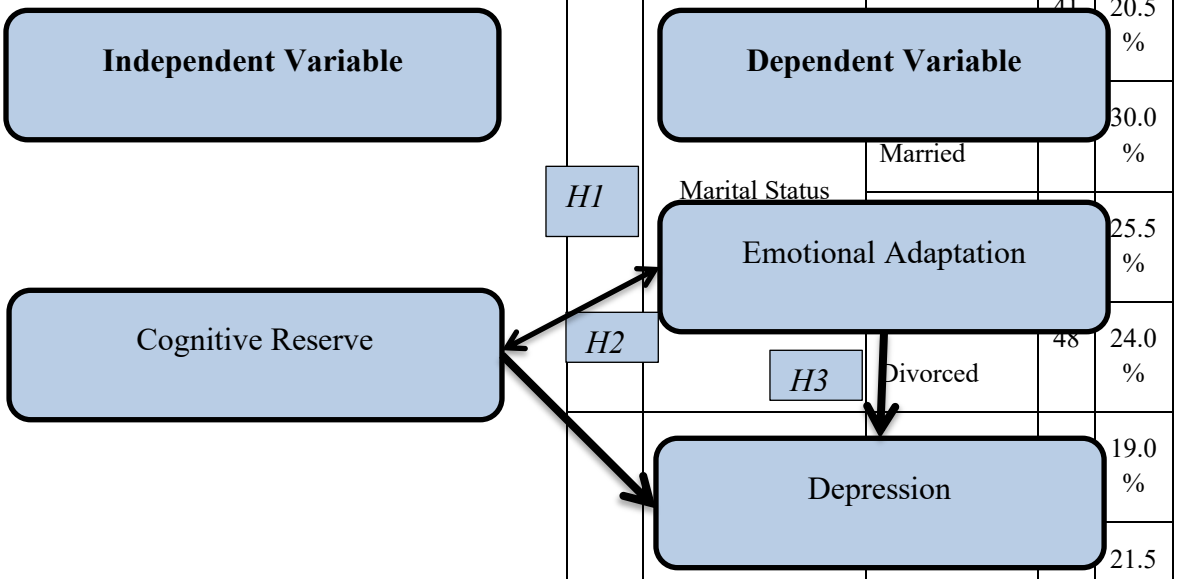


Figure 4: Conceptual Framework

Source: Author Own Collaboration

4. Results and Interpretation

Table 1: Demographic Characterstictis

S.NO.	Demographic Characterstictis		N	%
1	Gender	Male	111	55.5 %
		Female	89	44.5 %
2	Age Group	65–69 years	47	23.5 %
		70–74 years	36	18.0 %
		60–64 years	43	21.5 %
		75–79 years	40	20.0 %
		80 years and above	34	17.0 %
3	Marital Status		41	20.5 %
		Married		30.0 %
				25.5 %
		Divorced	48	24.0 %
4	Educational Qualification			19.0 %
		Secondary		21.5 %
		Higher Secondary	40	20.0 %
		Graduate	43	21.5 %
		Postgraduate	36	18.0 %
5	Occupational Status	Employed	63	31.5 %
		Retired	56	28.0 %

		Self-employed	49	24.5 %
		Other	32	16.0 %
6	Participation in Cognitive Activities	Rarely	40	20.0 %
		Occasionally	38	19.0 %
		Sometimes	33	16.5 %
		Frequently	37	18.5 %
		Very frequently	52	26.0 %
7	Place of Residence	Rural	68	34.0 %
		Semi-urban	60	30.0 %
		Urban	72	36.0 %

The demographic data for the 200 older adults who took part in this study are shown in Table 1. In terms of gender, there were more male respondents (111 – 55.5%) than female (89 – 44.5%). The age group with the highest proportion of the respondents was 65-69 years with 23.5% (47) of the respondents, followed by 60-64 with 21.5% (43) of the respondents, 75-79 with 20.0% (40) of the respondents, 70-74 with 18.0% (36) of the respondents and 80 years and over with 17.0% (34) of the respondents. Regarding marital status, 60 respondents (30.0%) were married, 51 (25.5%) were widowed, 48 (24.0%) were divorced, and 41 (20.5%) were unmarried. It was observed that 40 respondents (20.0%) had higher secondary education; 38 (19.0%) had primary education; 43 (21.5%) had secondary education; 36 (18.0%) had post graduate education; and 43 (21.5%) were graduates. 63 respondents (31.5%) were employed, 56 (28.0%) were retired, 49 (24.5%) were self-employed and 32 (16.0%) were in other occupational categories. Regarding cognitive activities, 52 respondents (26.0%) participated very frequently, 40 (20.0%) rarely, 38 (19.0%) occasionally, 37 (18.5%) frequently and 33 (16.5%) sometimes. Thirdly, in terms of place of residence, 36.0% were urban, 30.0% semi-urban and 34.0% rural. Overall, the demographic distribution suggests that there was a mix of older adults with different age, marital, educational, occupational, cognitive-activity participation, and residential status, which provided demographic diversity to explore cognitive reserve, emotional adaptation and depression in older adults.

H1: There is a significant relationship between cognitive reserve and emotional adaptation among older adults.

Table 2: Descriptive Statistics

Descriptive Statistics			
	Mean	Std. Deviation	N
Cognitive Reserve	17.7950	4.01417	200
Emotional Adaptation	16.1500	3.47243	200

Descriptive statistics for the 200 older adults included in the study for Cognitive Reserve and Emotional Adaptation are presented in Table 2. The results reveal that the mean score of Cognitive Reserve is 17.7950 with a standard deviation of 4.01417, suggesting that the cognitive reserve scores for the respondents were relatively high, with moderate variation around the average score. The mean score of Emotional Adaptation was 16.1500 with a standard deviation of 3.47243, indicating a relatively low variation in emotional adaptation scores compared with the cognitive reserve and the average score of emotional adaptation for the respondents. Both variables were measured for all 200 respondents (N = 200), so the descriptive data can serve as an overall picture of the distribution of the two main variables studied. The results define the baseline parameters of Cognitive Reserve and Emotional Adaptation before exploring their relationship by Pearson correlation analysis and a correlation with Depression by further regression analysis.

Table 3: Correlations

Correlations			
		Cognitive Reserve	Emotional Adaptation
Cognitive Reserve	Pearson Correlation	1	.176*
	Sig. (2-tailed)		.012
	Sum of Squares and Cross-products	3206.595	489.150
	Covariance	16.114	2.458
	N	200	200
Emotional Adaptation	Pearson Correlation	.176*	1
	Sig. (2-tailed)	.012	
	Sum of Squares and Cross-products	489.150	2399.500
	Covariance	2.458	12.058
	N	200	200
*. Correlation is significant at the 0.05 level (2-tailed).			

Table 3 shows the Pearson correlation analysis for the associations between Cognitive Reserve and Emotional Adaptation for the 200 older adults. "The results show a positive and statistically significant relationship between Cognitive Reserve and Emotional Adaptation ($r = 0.176$; $p = 0.012$). The p-value is less than the level of significance of 0.05, the relationship is therefore statistically significant at the 5% level". A positive correlation shows that the respondents' scores on Cognitive Reserve are going to be correlated with the respondents' scores on Emotional Adaptation. The value of the correlation coefficient ($r = 0.176$) however does show that the correlation is not strong. Analysis is based on $N = 200$ respondents. Hence, the results are supporting H1 which suggests that there is a significant relationship between cognitive reserve and emotional adaptation among older adults. In the present sample, the correlation between cognitive reserve and emotional adaptation appears to be positive, however, the relatively small correlation suggests that other factors may also play a role in emotional adaptation.

H2: Cognitive reserve has a significant effect on depression among older adults.

Table 4: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.259[a]	.067	.062	3.90090
a. Predictors: (Constant), Cognitive Reserve				

The model summary for regression analysis of the effect of Cognitive Reserve on Depression in older adults is shown in Table 4. It is seen from the results that the value of R is 0.259, which is a positive association between Cognitive Reserve and the predicted value of Depression in the regression model. The R square value of 0.067 means the respondents' Depression can be accounted for by 6.7% of the variance in Cognitive Reserve. The Adjusted R Square value of 0.062 indicates that, once the model has been adjusted, about 6.2% of the Depression is accounted for by Cognitive Reserve. The standard error of the estimate is 3.90090, which is the average amount that the observed Depression scores deviated from the Depression scores predicted by the regression. In general, the model suggests that the percentage of variance in Depression explained by Cognitive Reserve is relatively low. The issue of the statistical significance of the predictive effect and of the direction of the effect as well should be confirmed from the ANOVA and Coefficients tables before finalizing the decision of H2: Cognitive Reserve has a significant effect on Depression among older adults.

Table 5: ANOVA[a]

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	215.906	1	215.906	14.188	.000[b]
	Residual	3012.974	198	15.217		
	Total	3228.880	199			
a. Dependent Variable: Depression						
b. Predictors: (Constant), Cognitive Reserve						

Table 5 shows the ANOVA results for the regression model looking at the relationship between Cognitive Reserve and Depression in older adults. The results show that the regression model is statistically significant, with an F-value of 14.188 and a significance value of $p < 0.001$. Because the p-value is less than the 0.05 level of significance, the regression model was able to provide a statistically significant relationship between Cognitive Reserve and variation in Depression for the respondents. The sum of squares regression is 215.906, the sum of squares residuals is 3012.974, and the sum of squares total is 3228.880. The model has 1 degree of freedom for regression and 198 degrees of freedom for residuals, based on the total sample of 200 respondents. The overall regression model is therefore statistically significant and the result supports H2 which states that there is a significant effect of Cognitive Reserve for Depression in older adults. The size and direction of this effect should be judged by the Coefficients table, in particular the unstandardized and standardized beta coefficients.

Table 6: Coefficients[a]

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	12.042	1.257		9.584	.000
	Cognitive Reserve	.259	.069	.259	3.767	.000
a. Dependent Variable: Depression						

The regression coefficients for the study of the impact of Cognitive Reserve on Depression in older adults are shown in Table 6. "These results show that, there is a positive statistically significant effect of Cognitive Reserve on Depression ($B = 0.259$; $\beta = 0.259$). The standard error of the coefficient is 0.069 and the t value obtained is 3.767 with a significance value of $p < 0.001$. The p value is below the 0.05 level of significance, indicating that Cognitive Reserve is a significant predictor of the Depression in the current sample". A positive coefficient means that in this set of data, the higher the Cognitive Reserve, the higher the expected Depression score. A regression equation can be written as Depression = 12.042 + 0.259(Cognitive Reserve); this means that when the Cognitive Reserve score increases by one unit, the Depression score is estimated to increase by 0.259 units. When there is no Cognitive Reserve at all, the constant value is 12.042, the depression score that is predicted. Thus, the results support H2 and conclude that there was evidence of a significant relationship between Cognitive Reserve and Depression in older adults.

H3: Emotional adaptation has a significant effect on depression among older adults.

Table 7: Model Summary

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.355[a]	.126	.122	3.77519
a. Predictors: (Constant), Emotional Adaptation				

Table 7 is the summary of the model used for examination of the effect of Emotional Adaptation on Depression among older adults. The results indicate that the regression model has a positive relationship between Emotional Adaptation and Depression as reflected by the correlation coefficient (R) of 0.355. The model shows that 12.6% of the depression variance among the respondents is explained by the R Square value and 12.2% of the variance is not explained after adjusting the model with the Adjusted R Square value. The Standard Error of the Estimate equals 3.77519, which is the average error between the observed scores of Depression and the depression scores predicted by the regression. The results suggest that in general, Emotional Adaptation is a measurable contributor to the variance in Depression, but the statistical significance (and directionality) of the predictive effect should be verified from the ANOVA and Coefficients tables.

Table 8: ANOVA[a]

ANOVA[a]						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	406.976	1	406.976	28.556	.000[b]
	Residual	2821.904	198	14.252		
	Total	3228.880	199			
a. Dependent Variable: Depression						
b. Predictors: (Constant), Emotional Adaptation						

The ANOVA results for the regression model for the influence of Emotional Adaptation on Depression for older adults are shown in Table 8. The results showed that the regression model is statistically significant with an F-value of 28.556 and p value < .001 [Sig. = .000]. The sum of squares of the regression equals 406.976 and the sum of squares of the residuals equals 2821.904 with 1 and 198 degrees of freedom respectively. The significance value is less than 0.05, the null hypothesis proposing that the regression model is not significant in explaining the variation in Depression can be rejected. So, the model shows that Emotional Adaptation is a significant predictor of Depression in the older adults in the study. The findings support the statistical conclusions of H3 which claims that Emotional Adaptation has significant influence on Depression among older adults. The direction and magnitude of this effect should be interpreted from the corresponding Coefficients table.

Table 9: Coefficients[a]

Coefficients[a]						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	10.009	1.273		7.863	.000
	Emotional Adaptation	.412	.077	.355	5.344	.000
a. Dependent Variable: Depression						

The regression coefficients for older adults to study the effects of Emotional Adaptation on Depression are shown in Table 9. The results indicate statistically significant positive effect of Emotional Adaptation with B = 0.412 and β = 0.355 on Depression. The standard error of the coefficient is 0.077 and the t value obtained is 5.344 and the significance value is $p < 0.001$. The p value is less than the level of significance 0.05, so Emotional Adaptation can be regarded as significant predictor for Depression in the sample. If the coefficient is positive, this indicates in this data set that the higher the score on the Emotional Adaptation scale, the higher the score on the Depression scale. Thus, the regression equation is Depression = 10.009 + 0.412 (Emotional Adaptation) which means that for every unit increase in Emotional Adaptation, the depression score is expected to increase by 0.412 units. The constant value (10.009) represents the Depression score that is predicted when the Emotional Adaptation score is zero. The results therefore support the statistical

significance of H3 which states that Emotional Adaptation has a significant effect on the Depression of older adults.

5. Discussion

The current research investigated the association between Cognitive Reserve, Emotional Adaptation and Depression in 200 older adults. The mean Cognitive Reserve score was 17.7950 (SD = 4.01417), while Emotional Adaptation had a mean of 16.1500 (SD = 3.47243). Pearson correlation revealed that the data of Cognitive Reserve and Emotional Adaptation had a positive and weak correlation ($r = 0.176$, $p = 0.012$), therefore supporting H1. This indicates that there was a slight positive association between higher Cognitive Reserve and higher Emotional Adaptation. Nocera et al. (2023) found that education, occupation, social activities, and life habits are important dimensions of cognitive reserve, and Kaur et al. (2023) reported that cognitive reserve is responsible for differences in cognitive functioning between older individuals. The results obtained here can be seen in a wider perspective than the relationship found in the present study.

The regression analysis with Cognitive Reserve and Depression yielded $R = 0.259$ and $R^2 = 0.067$, meaning that Cognitive Reserve accounted for 6.7% of the variance in Depression. The model was statistically significant, $F(1,198) = 14.188$, $p < 0.001$, and Cognitive Reserve significantly predicted Depression ($B = 0.259$, $\beta = 0.259$, $t = 3.767$, $p < 0.001$), supporting H2. Interestingly, the positive coefficient suggests that in this sample, higher levels of Cognitive Reserve were related to higher predicted Depression scores. This contrasts with other research reporting negative relationships between cognitive reserve and depressive symptoms. Geng et al. (2024) found correlations between cognitive reserve score, depression, sleep quality, and cognitive function; Liu et al. (2023) found correlations between education (as a measure of cognitive reserve) and functional ability. These discrepancies may, in part, be attributed to variations in measurement, sample characteristics, research design, and so on.

There was also a very significant relationship between Emotional Adaptation and Depression. The regression model obtained $R=0.355$ and $R^2=0.126$ which means that Emotional Adaptation accounted for 12.6% of the variance in Depression. The model was significant, $F(1,198) = 28.556$, $p < 0.001$, and Emotional Adaptation significantly predicted Depression ($B = 0.412$, $\beta = 0.355$, $t = 5.344$, $p < 0.001$), supporting H3. A positive coefficient signifies that there was a positive relationship between the variables in the present sample; that is, higher Emotional Adaptation scores were correlated with higher predicted Depression scores. Care needs to be taken when interpreting this finding, as the directionality may vary according to how the Emotional Adaptation measure is operationalized and scored. Nagel et al. (2024) found differences between emotion-regulation processes among depressed and non-depressed older adults, and Growney et al. (2025) demonstrated that emotion-regulation success differed with regard to cognitive status and emotion-regulation strategies.

The positive relationship between Emotional Adaptation and Depression may be related to the complexity of coping and emotional adjustment in later life. Aging might be associated with more active involvement in emotional regulation and coping processes for older adults who are struggling with more psychological issues. Studies have demonstrated that resilience, coping can impact depressive symptoms, especially when stressful situations are present. An older adult study also found links between social isolation, emotional regulation, and depression. The results suggest that emotional adaptation needs to be considered a multidimensional concept and not necessarily equate higher scores with reduced depression.

In general, the following three hypotheses were confirmed with the present sample. Cognitive Reserve was significantly related to Emotional Adaptation and both factors were significantly related to Depression. Other cognitive, emotional, social, behavioural and contextual factors may also play a role in Depression, as they explained only 6.7% and 12.6% of the variance in Depression for Cognitive Reserve and Emotional Adaptation, respectively. The results should be considered as correlation relationships and not causal relationships, due to the cross-sectional and purposive sampling methodology. Longitudinal studies with larger and more representative samples could further explore the contributions of social engagement, coping, physical health, sleep and cognitive activity to depression in older adults.

6. Conclusion

The results of this study suggest that the three factors (Cognitive Reserve, Emotional Adaptation, and psychological outcomes) are significantly associated in older people. The data showed that H1 was supported as there was a significant positive but weak correlation between Cognitive Reserve and Emotional Adaptation ($r = 0.176$, $p = 0.012$) in 200

respondents. Additionally, the results showed that there was a significant effect of Cognitive Reserve for Depression, with the regression model explaining 6.7% of the variance in Depression ($R^2 = 0.067$) and statistically significant ($F(1,198) = 14.188$, $p < 0.001$). The higher the scores on the CR, the higher were the scores on the Depression for the coefficient ($B = 0.259$, $t = 3.767$) and the beta ($B = 0.259$, $t = 3.767$) and both were statistically significant ($p < 0.001$). Therefore, the presence of H2 was confirmed; however, it might be influenced by the measurement procedure as well as other psychological and social characteristics of the respondents.

Similarly, H3 was supported and Emotional Adaptation was significantly predicted by Depression. The model explained 12.6% of the variance in Depression ($R^2 = 0.126$) and was statistically significant ($F(1,198) = 28.556$, $p < 0.001$). Emotional Adaptation exhibited a strong positive relationship ($B = 0.412$, $\beta = 0.355$, $t = 5.344$, $p<0.001$) indicating that the higher the score obtained on the Emotional Adaptation items, the more likely the score obtained on the Depression items was to be high in the present sample. Overall, all the hypotheses were supported and significant relationships between the three cognitive, emotional, and depressive factors were suggested. The relatively low variance of both regression models, however, suggests that other factors such as those related to the cognitive, emotional, social, behavioural and contextual aspects of older adults may also be linked to Depression.

7. Limitations of the Study

The study has some limitations that should be taken into account when interpreting the results. First, the study used a cross-sectional research design, where all the variables were measured at one point in time and therefore cannot be used to draw long-term causal links between the three variables – Cognitive Reserve, Emotional Adaptation and Depression. Second, the sample was small ($n = 200$) and was selected using purposive sampling, which may make it difficult to generalize the results to the broader population of older adults. Third, the study used self-report information obtained from the questionnaire, which could be affected by the perceptions, judgments, recall, or by the responses of the respondents. The study also mainly addressed the topics of Cognitive Reserve, Emotional Adaptation, and Depression and other factors like physical health, social support, loneliness, sleep, socioeconomic status, lifestyle, and cognitive functioning could have some impact on psychological outcomes in late-life. Lastly, the models accounted for 6.7% and 12.6% of the variance in Depression, respectively, highlighting the fact that there is considerable variance in Depression that cannot be explained by the present study's factors.

8. Implication of the Study

The findings have important implications for understanding the psychological experiences of older adults. The strong correlation between Cognitive Reserve and Emotional Adaptation indicates that a combined approach to cognitive and emotional dimensions should be used when looking at adjustment in later life. The findings also suggest a high association between Cognitive Reserve and Emotional Adaptation and Depression and underscore the need to evaluate cognitive and emotional traits in addition to psychological well-being. Assessment practices in this area, therefore, can also be expanded to include a wider range of assessment practices that involve cognitive engagement, emotional functioning, coping, social participation and psychological well-being, rather than just depression. The results could also serve as a guide to the creation of programs to promote ongoing cognitive stimulation and emotional adaptation in the elderly. The limitations of a cross-sectional study however, mean that these implications must be interpreted as associations, not as causal relationships.

9. Future Research Directions

Future research can extend the present study by using larger and more geographically diverse samples and probability-based sampling techniques to improve the generalizability of findings. Longitudinal studies could explore the changes in the variables of Cognitive Reserve and Emotional Adaptation over time, as well as if a change in one variable is linked with a change in the other variable, Depression. Other factors that can be considered for future studies are social engagement, social support, loneliness, coping style, physical health, sleep quality, lifestyle, socioeconomic status, cognitive activity, and cognitive functions related to dementia. In the present study, the researchers investigated the simple relationships and predictive effects of the variables, which meant that future studies could use multiple regression, mediation, moderation, and/or PLS-SEM to investigate more complex relationships between the variables used in this study based on cognitive, emotional, and psychological variables. Comparative analyses between age groups, residential, educational, and urban–rural populations can also help elucidate the factors of Cognitive Reserve, Emotional Adaptation and Depression in later life. Lastly,

intervention-based research should examine if psychological well-being is associated with the implementation of programmes that promote cognitive engagement, emotional regulation, coping and social participation among older people.

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