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Original Research Article

Educational Attainment and Self-Rated Health among Middle-Aged and Older Adults in the United States: The Mediating Role of Depressive Symptoms

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Abstract: The relationship between educational attainment and self-rated health among middle-aged and older adults in the United States was studied to determine whether depressive symptoms mediate the pathway. Cross-sectional data from the Health and Retirement Study (N = 9,900) were analyzed using hierarchical multiple linear regression. Control variables include age, gender, and race. Bivariate correlations showed that higher educational attainment was associated with improved self-rated health ($r = .336$, $p < .001$) and fewer depressive symptoms ($r = -.143$, $p < .001$). Conducted multivariate analyses denoted a significant direct effect of education on self-rated health ($B = 0.122$, $p < .001$). The inclusion of the mediator significantly reduced the predictive power of depressive symptoms for reduced self-rated health ($B = -0.421$, $p < .001$), while the direct effect of education decreased to ($B = 0.111$), an indication of partial mediation. Continued gender- and race-based health disparities were observed in the fully adjusted model ($R^2 = .173$, $F(4, 9895) = 517.04$, $p < .001$). These findings suggest that late-life mental health functions as a vital structural mechanism connecting socioeconomic factors to physical health perceptions, proposing that public health policies should integrate geriatric mental health interventions into their care system.

Keywords: Educational Attainment, Depressive Symptoms, Self-Rated Health, Mediation Analysis, Health and Retirement Study (HRS).

INTRODUCTION

Currently, approximately 62 million middle-aged and older adults live in the United States (U.S.), accounting for almost 20% of the total population (Schaeffer, 2024). This number is projected to increase to 84 million by 2054, amounting to a quarter of the total U.S. population. Therefore, underlining the need to understand the factors that influence their health and well-being, especially with the multiple physical, social, and psychological health challenges they face.

Educational attainment has been consistently recognized as one of the most important social determinants of health (CDC, 2024). Globally and in the United States, higher educational levels have been associated with lower mortality rates, fewer health problems, and improved overall well-being (Nouraei Motlagh *et al*., 2022; Chen & Hu, 2018; Zajacova & Lawrence, 2018) across diverse populations. Previous studies have demonstrated that educational status significantly influences both objective health conditions and subjective perceptions of health, including self-rated health, particularly among middle-aged and older adults (Solé-Auró & Gumà, 2022; Maniscalco *et al*., 2020; Alcañiz & Solé-Auró, 2018; Sarti & Espinola, 2018).

In the United States, the educational attainment of the aging population serves as a critical structural indicator of social class, influencing an individual's life-course trajectory (Kivimaki *et al*., 2020). While historical data indicate that overall physical health declines with age, there is an obvious disparity in how this decline is experienced across different educational classes. Individuals with higher educational attainment consistently demonstrate better health profiles, whereas those with lower levels of education experience a disproportionate burden of physical illness and disability (Zajacova & Lawrence, 2018).

Earlier studies reported a direct association between education and health outcomes (CDC, 2024; Lee

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et al., 2023), but the underlying psychological mechanisms driving this pathway remain poorly understood. Late-life psychological distress, particularly depressive symptoms, is very much influenced by socio-structural positioning and remains a crucial factor in poor physical health perceptions (Xi *et al*., 2025). Understanding the degree to which mental health indicators mediate the relationship between structural advantages and physical health outcomes is important for designing targeted public health interventions.

Educational Attainment and Self-Rated Health

The theoretical foundation linking socio-educational basis to long-term well-being is anchored in Fundamental Cause Theory (Link & Phelan, 1995). The framework posits that education often shapes health-related behaviors by enhancing individuals' understanding of health risks, promoting healthier lifestyles, and exhibiting health management capacities. On the contrary, individuals with limited formal education are challenged with an accumulation of structural stressors and limited resources that diminish their physical health status over time.

Education may influence health through several interconnected pathways. Individuals with higher educational attainment are more likely to have higher health literacy, greater access to healthcare resources, higher income, and improved coping strategies for stress and adverse health conditions (Svendsen *et al*., 2020; Niemeyer *et al*., 2019). Higher levels of education are also associated with living in a well-built neighborhood with healthier conditions, access to nutritious foods, and increased use of preventive healthcare services (Garth, 2021; Gorski *et al*., 2022).

Earlier research suggests that education may be particularly crucial for mental health outcomes, including lower risks of depression, anxiety, substance abuse, and other psychological disorders (Cohen *et al*., 2020). Sarti and Espinola (2018) state that education and occupational status significantly influence mental and physical health outcomes of adults in the U.S., with the impacts of education more evident among lower socioeconomic groups.

Depression is one of the most common mental health conditions affecting middle-aged and older adults and has been associated with physical health, functional limitations, lower quality of life, and increased mortality risk (Cai *et al*., 2023). Socioeconomic factors, including educational attainment, are strongly associated with the risk of developing depression (Wiwatkunupakarn *et al*., 2021; Kivimäki *et al*., 2020). According to a recent report by the Centers for Disease Control (CDC), it indicated that 14.2% of middle-aged and older adults in the United States have been diagnosed with depression (Lee *et al*., 2023). Beyond its effect on individual well-being, depression also contributes to huge financial losses and social burdens (Bloom *et al*., 2012).

Previous studies have independently examined the relationships among education, depression, and health outcomes (Zenebe *et al*., 2021), but just a few have explored depression as a mediating pathway connecting educational attainment to self-rated health among middle-aged and older adults in the United States. Adjei *et al*., (2017), using data from multiple countries, including the United States, found that educational attainment was consistently associated with better self-rated health among men and women across diverse settings. Self-rated health (SRH) is widely recognized as a reliable indicator of overall health status, functional ability, morbidity, and mortality among middle-aged and older adults (Maniscalco *et al*., 2020). Despite advances in healthcare and medicine, disparities in SRH among middle-aged and older adults persist (CDC, 2024).

Therefore, this paper analyzes the relationship between educational attainment and SRH, with depression mediating among middle-aged and older adults in the United States using data from the Health and Retirement Study (HRS, 1992–2022) to understand the mechanism. Specifically, the study investigates: (1) whether educational attainment is associated with self-rated health among middle-aged and older adults, and (2) whether depression mediates the relationship between educational attainment and self-rated health. This study examines these relationships to provide a better understanding of the social and psychological determinants of health among middle-aged and older adults and may help inform policies and interventions aimed at promoting healthy aging in an increasingly older society.

RESEARCH HYPOTHESES

Hypothesis 1: Higher educational attainment will be associated with better self-rated health among middle-aged and older adults.

Hypothesis 2: Higher educational attainment will be associated with lower levels of depressive symptoms.

Hypothesis 3: Depressive symptoms will mediate the relationship between educational attainment and self-rated health.

Experimental Section

Data Source and Study Design

This study used secondary data from the Health and Retirement Study (HRS), a nationally representative longitudinal survey of adults aged 50 years and older in the United States. The present study used a quantitative, cross-sectional analytical design, focusing on a sub-sample of wave 1 of the HRS, to examine the relationships among educational attainment, depressive symptoms, and self-rated health among middle-aged and older adults.

Study Population

The study sample consisted of middle-aged and older adults (50 years and older) from the HRS dataset with available data on educational attainment, depressive symptoms, and self-rated health. Listwise deletion was automatically employed during multivariate modeling, meaning that participants with missing responses to any key study variables or covariates were excluded from the final model. The final analytical sample comprised N = 9,900 respondents.

Measures

Independent Variable

Educational Attainment: Educational attainment was measured as respondents' total years of formal education, ranging from 0 to 17. The variable was treated as a continuous measure, consistent with previous epidemiological research which examined the link between socio-educational background and health outcomes in later life (Solé-Auró & Gumà, 2022).

Mediating Variable

Depressive Symptoms: Depressive symptoms were assessed using a four-category frequency-based item from the HRS Depression Assessment Scale (Rev_Dep). Response categories measured symptom frequency on a 1- to 4-scale. The variable was reverse-coded so that higher values represented greater depressive symptom frequency (1 = none, 2 =

sometimes, 3 = most of the time, 4 = almost or all the time) for better results interpretation. Although ordinal, it was treated as a continuous Likert-type variable in the core regression models.

Dependent Variable

Self-Rated Health:

SRH (SEF_RATE_CODED) was assessed using a five-point scale consisting of poor, fair, good, very good, and excellent health. The variable was reverse-coded so that higher scores represented better subjective physical health (Poor = 1, Excellent = 5). Following standard statistical guidelines for behavioral research, this 5-point ordinal scale was treated as a continuous metric variable in the regression models.

Control Variables:

Many demographic variables were included as covariates. Age was measured in years and treated as a continuous variable. Gender was dummy-coded dichotomously as Sex (Female = 0, Male = 1). Race was dummy-coded using the primary HRS classifications collapsed into two groups, with Black participants as the baseline reference category (Black = 0, White = 1).

Statistical Analysis

All statistical analyses were conducted using IBM Statistical Package for the Social Sciences (SPSS) Version 31.0 (IBM Corp., Armonk, NY, USA). Descriptive statistics, including frequencies, percentages, means, and standard deviations, were calculated to summarize the sample demographics and the distributions of the key variable. Pearson correlation analyses were conducted to examine bivariate relationships among educational attainment, depressive symptoms, and self-rated health preceding multivariate model testing.

To test the main hypotheses, a hierarchical multiple linear regression was conducted across sequential blocks to predict self-rated health. To test the mediating effect of depressive symptoms (Hypothesis 3), the direct, indirect, and total effects were evaluated within this linear framework, matching the parameters of Hayes (2022) PROCESS macro (Model 4). The significance of the indirect path was evaluated at $p < .05$. The conceptual structure of this mediation framework is illustrated in Figure 1 below.

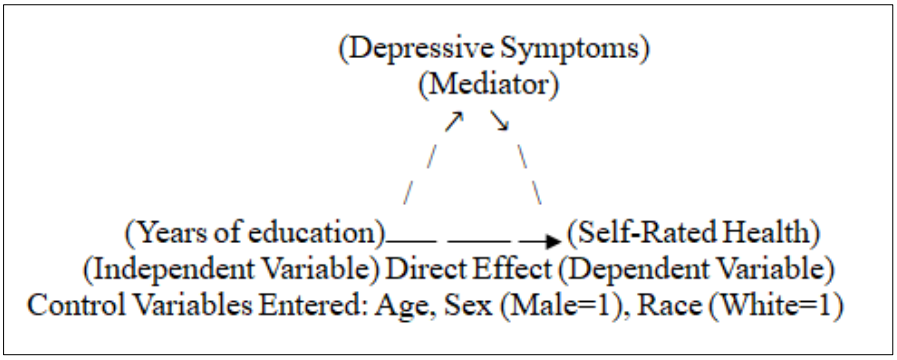

Figure 1: Conceptual Mediation Framework of Education on Self-Rated Health

Ethical Considerations

The HRS dataset contains publicly available, de-identified secondary data. Therefore, this study did not involve direct participant contact or the collection of identifiable personal information. All analyses were conducted in accordance with ethical standards for secondary data analysis and the protection of participant confidentiality.

RESULTS

Descriptive Statistical Analysis

Descriptive statistics and frequency analysis were conducted to examine the relationships between educational attainment, depressive symptoms, and SRH among middle-aged and older adults, using data from the Health and Retirement Study (HRS).

Demographic and Categorical Variable Distributions

Frequency distributions were performed for the sample's categorical control variables (sex and race) as well as the dependent variable (self-rated health), which was treated as a continuous variable for the purposes of this analysis. Listwise subsampling produced valid analytical sample sizes ranging from 9,900 to 10,279 across values.

For the control variables, the sex of respondents was perfectly balanced within the valid sample (N = 10,279), with 5,114 female participants (49.8%) and 5,165 male participants (50.2%). Sex was dummy-coded with females as the reference group (Female = 0, Male = 1). The racial composition of the valid sub-sample (N = 10,148) was predominantly White (N = 8,439, 83.2%), with Black participants as the remaining 16.8% (N = 1,709). Race was dummy-coded as Black (0) and White (1), with Black participants as the reference category.

Dependent Variable Distribution

The dependent variable, SRH (SEF_RATE_CODED), had a valid sample of 9,900 respondents. The data demonstrated a negatively skewed distribution, indicating that the majority of middle-aged and older adults in this sample rated their health favorably. Specifically, 23.2% (N = 2,293) of the respondents rated their health as 'Excellent', 28.8% (N = 2,848) as 'Very good', and 28.4% (N = 2,809) as 'Good', giving a total of 80.4% of the valid sample. On the other hand, a smaller proportion of the sample reported barely favorable health statuses, with 13.0% (N = 1,287) reporting 'Fair' health and 6.7% (N = 663) reporting 'Poor' health.

Table 1.

Demographic and Health Characteristics of the Study Sample

Variable	Frequency (n)	Valid Percent (%)
Sex (N = 10,279)		
Female (Reference)	5,114	49.8
Male	5,165	50.2
Race (N = 10,148)		
Black (Reference)	1,709	16.8
White	8,439	83.2
Self-Rated Health (N = 9,900)		
Poor	663	6.7
Fair	1,287	13.0
Good	2,809	28.4
Very good	2,848	28.8
Excellent	2,293	23.2

Note. Percentages are calculated based on valid responses per variable, excluding missing system data.

Descriptive statistics were calculated for all continuous variables, including the independent variable (Years of Education), the mediator variable (Depressive Symptoms), and the continuous control variable (Age in Years). The results are as detailed in the text below.

Sample Size and Listwise Deletion

The individual sample sizes for the variables, as shown in Table 1 above, range from 9,900 to 10,279. Because a multivariate model (such as regression/mediation) will be conducted as part of this analysis, SPSS deletes missing values using 'Listwise Deletion', meaning a participant is included only if they have complete data across all variables in the model. This helps clean up the model. Below are the interpretations of the variables from the descriptive analysis:

Years of Education (EDU_YEARS):

The independent variable has a valid sample of 10,135 individuals. The mean for educational attainment is 12.07 (SD = 3.26), indicating that the average participant completed high school. The variables ranged from 0 years (no formal schooling) to 17 years (postgraduate education). The skewness value (-0.889) indicates slight left skew, suggesting that more participants cluster at higher education levels.

Age in Years (AGE IN YEARS):

The continuous control variable has a valid sample of 10,279 individuals with a mean age of 55.16 years (SD = 6.15) in the sample. The age distribution captures middle-aged and older adults.

Depressive Symptoms (Rev_Dep):

The mediator variable has a valid sample of 9,900 individuals. The sample reports a low average level of depressive symptoms, with a mean score of 1.33 (SD = 0.62) on a scale ranging from 1 to 4. The distribution is highly positively skewed (Skewness = 2.155), which is common among community-dwelling older populations used as samples in studies, where many respondents report few or no clinical symptoms.

Self-Rated Health (SEF_RATE_CODED):

Consistent with the frequency table, treating this variable as a continuous variable gives a mean score of 3.49 (SD = 1.17) on a 1-to-5 scale, positioning the average participant between 'Good' (3) and 'Very good' (4) health.

Table 2.

Descriptive Statistics for Continuous and Coded Variables (N = 9,900)

Variable	Mean	SD	Min	Max	Skewness
Years of Education	12.07	3.26	0	17	-0.889
Age in Years	55.16	6.15	23	85	-0.186
Depressive Symptoms (Rev_Dep)	1.33	0.62	1	4	2.155
Self-Rated Health	3.49	1.17	1	5	-0.403
Sex (Male = 1)	0.50	0.50	0	1	-0.010
Race (White = 1)	0.83	0.37	0	1	-1.772

Note. N reflects the final listwise analytical sample size. SD = Standard Deviation.

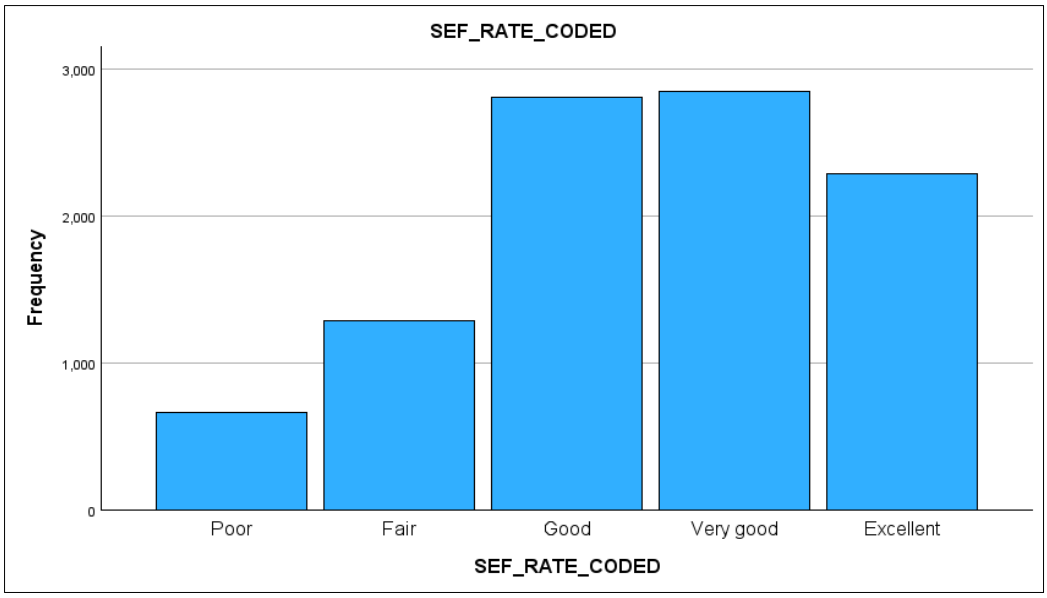

Figure 2: Frequency Distribution of Self-Rated Health among the Older Adult Group

In order to visualize the distribution of the dependent variable, a bar chart of SRH (SEF_RATE_CODED) was generated (see Figure 2). The distribution is negatively skewed (to the left), indicating that a substantial majority of middle-aged and older adults in the sample perceived and rated their health status positively. The 'Good' and 'Very good' categories represent the highest modal frequencies (almost bimodal), with each capturing nearly 3,000 respondents, followed closely by the 'Excellent' health category. Conversely, the frequencies wane significantly for lower perceived health scores, with 'Fair' and 'Poor' health containing the smallest proportions of the sample. This distribution pattern justifies treating the variable as a continuous measure in subsequent regression models, as the skewness falls within acceptable parameters for ordinary least squares (OLS) estimations.

Bivariate Correlation

Multicollinearity and Covariate Examination

A bivariate Pearson correlation analysis was conducted to examine the preliminary linear relationships among the key variables (Years of Education, Depressive Symptoms, and Self-Rated Health) and covariates (Age, Sex, and Race) (see Table 3). An in-depth observation of the correlation coefficients across all variable pairs revealed no signs of multicollinearity, as all coefficients fell well below the conservative critical threshold of ($r = .80$). The strongest correlation among the predictors occurred between Age and Sex ($r = .338$, $p < .001$), which is statistically acceptable, confirming that the dataset contains sufficient independent variance for multivariate modeling. Looking at the main paths, Years of Education and Self-Rated Health shared a significant positive correlation ($r = .336$, $p < .001$), while Education and Depressive Symptoms shared a significant negative correlation ($r = -.143$, $p < .001$). Finally, Depressive Symptoms and Self-Rated Health exhibited a significant moderate negative correlation ($r = -.266$, $p < .001$). These patterns of coefficients satisfy all necessary bivariate statistical requirements to proceed with the formal mediation analysis. For the control variables, Sex (0 = Female, 1 = Male), being male is significantly but weakly associated with fewer depressive symptoms ($r = -.092$, $p < .001$) and slightly lower self-rated health scores ($r = -.050$, $p < .001$) at the bivariate level. Race (0

= Black, 1 = White), White participants exhibited a significant positive correlation with years of education (r = .152, p < .001) and self-rated health (r = .139, p < .001), and a weak negative correlation with depressive symptoms (r = -.054, p < .001) compared to Black participants.

Table 3.

Intercorrelations Among Main Study Variables and Covariates (N = 9,900)

Variable	1	2	3	4	5
1.Years of Education	-				
2.Depressive Symptoms	-.143***	-			
3.Self-Rated Health	.336***	-.266***	-		
4.Age (Years)	-.099***	-.045***	-.127***	-	
5.Sex (Male = 1)	-.014	-.092***	-.050***	.338***	-
6.Race (White = 1)	.152***	-.054***	.139***	.032**	-.005

Note. N reflects the listwise analytical sample size. Sex is coded as 0 = Female, 1 = Male.

Race is coded as 0 = Black, 1 = White.

**p < .01. ***p < .001 (2-tailed).

Preliminary Hypothesis Validation

The bivariate correlations provide strong preliminary support for the underlying theoretical framework and meet all statistical prerequisites for a formal mediation analysis:

Hypothesis 1 Support:

Years of Education (EDU_YEARS) and SRH (SEF_RATE_CODED) share a statistically significant, moderate positive linear correlation (r = .336, p < .001). This confirms that higher educational attainment is significantly associated with better perceived health status in this sample of middle-aged and older adults.

Hypothesis 2 Support:

Years of Education and Depressive Symptoms (Rev_Dep) demonstrate a statistically significant, weak-to-moderate negative correlation (r = -.143, p < .001). This indicates that individuals with higher educational attainment tend to report fewer depressive symptoms.

Mediation Path Requirement:

Depressive Symptoms and Self-Rated Health exhibit a statistically significant, moderate negative correlation (r = -.266, p < .001). This confirms that higher levels of depressive symptoms are largely associated with poorer self-rated health, satisfying the essential criterion that the mediator possibly significantly correlates with the dependent variable.

Models Analysis

A hierarchical multiple regression analysis was conducted to test whether educational attainment is associated with self-rated health among middle-aged and older adults, and whether depressive symptoms partially mediate this relationship after controlling for demographic covariates (see Table 4). In Model 1, Years of Education showed a significant positive direct effect on self-rated health (B = 0.122, β = 0.336, t = 35.53, p < .001), supporting Hypothesis 1. In Model 2, the introduction of the mediator, Depressive Symptoms, highlighted a significant negative association with health (B = -0.421, β = -0.222, t = -23.90, p < .001). Simultaneously, the unstandardized coefficient for education decreased to (B = 0.111) (t = 32.76, p < .001), indicating a pattern of partial mediation that supports Hypothesis 3.

The final fully adjusted model (Model 4) accounted for demographic controls. Education (B = 0.106, p < .001) and depressive symptoms (B = -0.429, p < .001) remained the main predictors. Among the covariates, sex was significantly associated with the outcome, with male respondents reporting lower self-rated health than female respondents (B = -0.159, p < .001). Additionally, racial background was a significant predictor; White participants reported significantly higher self-rated health than Black participants (B = 0.262, p < .001).

Table 4.

Hierarchical Regression Analysis Predicting Self-Rated Health (N = 9,900)

Predictor Variable	Model 1	Model 2	Model 3	Model 4
Constant	2.006	2.707	2.811	2.637
	(.043)***	(.051)***	(.053)***	(.056)***
Years of Education	0.122	0.111	0.110	0.106
	(.003)***	(.003)***	(.003)***	(.003)***
Depressive Symptoms		-0.421	-0.434	-0.429
		(.018)***	(.018)***	(.018)***
Sex (Male = 1)			-.160	-0.159
			(.022)***	(.022)***
Race (White = 1)				0.262
				(.029)***
Model Fit Statistics				
Total R^2	.113	.162	.166	.173
Adjusted R^2	.113	.162	.166	.173
F Value	1262.435***	953.176***	657.260***	517.044***
Regression df, Error df	1,9898	2,9897	3,9896	4,9895
R^2 Change	.113	.048	.005	.007
F- Change Value	1262.435***	571.192***	55.021***	80.549***

Note. Unstandardized coefficients, Standard errors in parentheses; df = Degrees of Freedom

***p < .001.

Model Variances

To assess the predictive framework's overall explanatory power, model variance was monitored across four successive hierarchical blocks (see Table 4). Model 1, containing only the independent variable (Years of Education), explained 11.3% of the variance in self-rated health ($R^2 = 0.113$, Adjusted $R^2 = 0.113$, F (1, 9898) = 1262.44, p < .001). In Model 2, the introduction of the mediator (Depressive Symptoms) resulted in a statistically significant increase in variance explained ($\Delta R^2 = 0.048$, ΔF (2, 9897) = 571.19, p < .001), bringing the total variance explained to 16.2% ($R^2 = .162$, Adjusted $R^2 = .161$). The inclusion of demographic covariates in subsequent blocks yielded modest but statistically significant incremental improvements. The addition of sex in Model 3 explained an additional 0.5% of the variance ($\Delta R^2 = 0.005$, ΔF (3, 9896) = 55.02, p < .001), bringing the total variance explained by this model 3 to 16.6% ($R^2 = .166$, Adjusted $R^2 = .166$). Finally, the inclusion of racial background in Model 4 explained an additional 0.7% of variance ($\Delta R^2 = 0.007$, ΔF (4, 9895) = 80.55, p < .001). The complete multivariate construct accounts for 17.3% of the total variance in self-rated health among middle-aged and older adults ($R^2 = 0.173$, Adjusted $R^2 = 0.173$). The hierarchical regression analysis demonstrates a statistically significant improvement in variance explained at every step of the model construction.

ANOVA Model

The ANOVA table tests the overall statistical significance of each model step. It determines if the combination of predictors significantly predicts self-rated health better than a baseline mean model.

An evaluation of the overall analysis of variance (ANOVA) parameters confirmed that all four hierarchical model iterations significantly predicted self-rated health among middle-aged and older adults. Model 1, testing solely the impact of Years of Education, yielded a robust overall fit to the observed data (F (1, 9898) = 1262.44, p < .001). The addition of the

hypothesized mediator (Depressive Symptoms) in Model 2 maintained a highly significant overall model (F (2, 9897) = 953.18, p < .001). This total significance was sustained through the addition of demographic controls, in Model 3 (F(3, 9896) = 657.26, p < .001) and the final all-inclusive variable model, Model 4 (F(4, 9895) = 517.04, p < .001), demonstrating that the collection of independent, mediating, and covariate variables accounts for a non-random proportion of the variance in self-rated health scores.

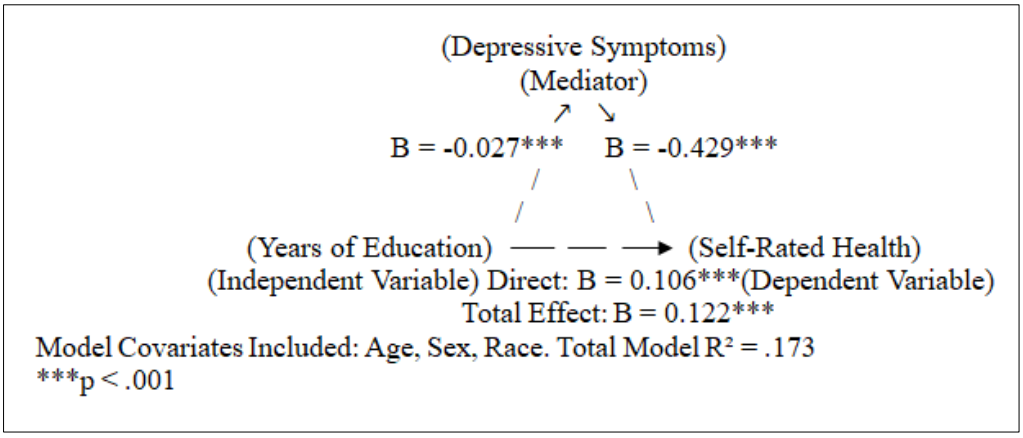

Figure 3: Statistical Path Diagram of the Fully Adjusted Mediation Model

As displayed in the statistical path diagram (see Figure 3), all paths within the mediation framework were highly statistically significant. Years of Education exerted a significant negative effect on the mediator, Depressive Symptoms (B = -0.027, p < .001), confirming that higher educational attainment is associated with reduced psychological issues. In parallel, Depressive Symptoms exerted a powerful negative effect on the final outcome, Self-Rated Health (B = -0.429, p < .001). When accounting for the mediator and demographic covariates, the direct effect of education on self-rated health remained significant (B = 0.106, p < .001). The decrease from the total effect (B = 0.122) to the direct effect (B = 0.106) statistically confirms the hypothesized partial mediation pathway.

DISCUSSION

The primary objective of this study was to evaluate the relationship between educational attainment and self-rated health (SRH) among middle-aged and older adults in the United States, and to investigate whether depressive symptoms mediate this pathway. The results of the hierarchical multiple regression analyses provide strong empirical support for all three hypotheses.

Interpretation of Main Findings

The finding that higher educational attainment directly predicts better self-rated health (Hypothesis 1) aligns with age-long sociological frameworks regarding social classification. Education represents a foundational component of socioeconomic status that basically structures an individual's lifetime access to substantive and healthcare resources. This positive relationship between education and subjective health ratings among older populations is reported in recent empirical literature (Siddiq *et al*., 2023). For example, Bijani *et al*., (2024) observed similar directional patterns in older populations, showing that individuals with higher educational attainment consistently report better self-assessments of their physical well-being.

Importantly, the introduction of depressive symptoms as a mediator in the statistical analysis in Model 2 demonstrated that psychological distress functions as a clear structural pathway through which education exerts its influence on perceived physical health (Hypothesis 3). When depressive symptoms were included in the model, the unstandardized regression coefficient for education decreased from (B = 0.122) to (B = 0.111), indicating a pattern of partial mediation. This statistical mechanism may have occurred because individuals with limited formal education are exposed to a lifetime pile-up of stressors and socio-environmental vulnerabilities that increase their susceptibility to late-life depressive states (Díaz de León-Castañeda *et al*., 2025). This pathway is in line with Huang *et al*., (2025), who found that depressive symptoms deeply disrupt an individual's subjective cognitive assessments of their bio-physical status. Additionally, recent cross-national longitudinal data from Leng *et al*., (2025) stated a strong bidirectional link between physical health perceptions and depressive conditions in older adults, accentuating that subjective health assessments serve as a critical intervening mechanism connecting social structures to mental health outcomes (Kondirolli & Sunder, 2022).

Examination of Covariates

The inclusion of demographic control variables in the final fully adjusted model (Model 4) revealed persistent inequalities that extend beyond formal education (CDC, 2024). Gender recoded as sex was significantly associated with health perceptions, with male respondents reporting lower overall self-rated health than female respondents (B = -0.159, p < .001). This contradicts some conventional historical patterns

but reflects nuanced modern demographic shifts within the aging U.S. population (America's Health Rankings, 2023).

Also, race emerged as a highly robust independent predictor; White participants reported significantly higher self-rated health scores than Black participants ($B = 0.262$, $p < .001$), holding education and depression constant. This finding highlights the reality of structural and systemic healthcare disparities (CDC, 2024). As Assari (2019) argues, educational attainment alone does not yield equal health returns across different racial categories. Structural disadvantages, unequal resource distribution, and distinct clinical treatment biases often prevent minority older adults from fully converting their educational capital into equivalent physical and psychological health gains in their later years.

In summary, the hierarchical regression analysis yielded definitive conclusions regarding the study's primary objectives. Hypothesis 1 was fully supported; higher educational attainment is significantly associated with better self-rated health among middle-aged and older adults ($B = 0.122$, $p < .001$). Hypothesis 2 was preliminarily supported by a bivariate analysis, which showed that higher education is associated with lower depressive symptom levels ($r = -0.143$, $p < .001$). Finally, Hypothesis 3 was supported through a pattern of partial mediation. When depressive symptoms were introduced in Model 2, the variable significantly predicted poorer self-rated health ($B = -0.421$, $p < .001$), while the direct effect of education decreased from ($B = 0.122$) to ($B = 0.111$). This change confirms that depressive symptoms function as a primary structural pathway through which education influences physical health perceptions in later life, even after controlling for sex and race ($F (4, 9895) = 517.044$, $p < .001$).

Practical and Policy Implications

From a public health and clinical policy perspective, these findings indicate that interventions to improve senior well-being cannot focus solely on physical pathologies. This is because depressive symptoms carry the highest singular weight in the final model ($B = -0.429$); therefore, untreated mental health conditions represent a main driver of poor health perception among older adults. Public health policies should prioritize integrated mental health screening within primary care frameworks, targeting socioeconomically disadvantaged older populations who lack protective educational buffers.

Limitations and Future Directions

While this study utilizes a highly representative, large-scale dataset from the Health and Retirement Study (HRS), several limitations must be acknowledged. First, the cross-sectional analytical approach applied to this wave 1 prevents the definitive inference of temporal causality. While theory (Fundamental Cause Theory) suggests that education precedes depression, which subsequently shapes health perception, this cannot be established by this statistical analysis; other statistical analytical techniques, such as the longitudinal structural equation model, can be performed to confirm the true chronological order. Second, self-rated health is inherently subjective. Future studies should complement this variable with objective biomarkers (such as allostatic load or chronic disease counts) to confirm if the observed mediation pathways hold true against clinical diagnoses. Finally, the causal order among education, depression, and self-rated health cannot be fully established by this statistical analysis alone; further analysis is needed to establish the causal sequence.

CONCLUSION

This study utilized data from the Health and Retirement Study (HRS) to examine the complex interplay between educational attainment, depressive symptoms, and self-rated health among middle-aged and older adults in the United States. The empirical findings provide definitive support for the study's primary hypotheses, showing that higher educational attainment is associated with superior self-rated health and that late-life depressive symptoms function as a critical psychological mediator within this pathway. Specifically, the results confirm a partial mediation model: while education maintains a strong, independent direct effect on health perceptions, a meaningful portion of its protective influence operates by reducing psychological distress and depressive symptoms, which otherwise severely decrease an older individual's subjective health status. Furthermore, the persistent significance of racial and sex-based disparities within the fully adjusted model stresses that structural inequalities remain embedded in the aging experience, independent of socio-educational resources.

Finally, these findings carry vital implications for public health policy and clinical practice, suggesting that interventions aimed at promoting healthy aging cannot treat mental and physical health in isolation. As depressive symptoms emerged as the most potent negative predictor of health perception in the final model, clinical frameworks must prioritize integrated psychiatric screenings and mental healthcare resources for socioeconomically disadvantaged older adults. Future research should build upon these findings by using longitudinal structural equation modeling and incorporating objective biological health indicators. This will help fully map how lifelong socio-structural advantages are translated into physical and psychological resilience in later life.

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Conflict of Interest

The author(s) declare that this work was conducted with no financial interest or agreement to or with any party that could cause any conflict of interest.

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