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Statistical Analysis of Factors Influencing Stress and Resilience in High School Students in Visakhapatnam Region

Tedlapu Narayana Rao[1], Dr. Uppu Venkata Subbarao[2], Prof.S.Rajani[3]
[1]*Research Scholar, Gayatri Vidya Parishad college for degree and PG Courses(A),Visakhaptnam, India*
[2]*Department of Basic Sciences, N.S Raju Institute of Technology, Autonomous, (Visakhapatnam) India*
[3]*Principal,Gayatri Vidya Parishad college for degree and PG Courses(A),Visakhaptnam, India*

Abstract: ***This paper investigates the factors influencing stress and resilience among high school students. We employed a binary logistic regression model to assess the relationship between independent variables (academic workload, family support, extracurricular activities, peer relationships, etc.) and dependent variables (stress and resilience). A diverse sample of 85 high school students (grades 10-12) from various schools in the region of Visakhapatnam was collected by using stratified random sampling. In this sample, using the proportional allocation technique, 37 are from grade 10, and 48 are from grade 11 and 12. Data was collected through a questionnaire, and binary logistic regression was fitted using the statistical software package SPSS and gave valid conclusions and recommendations.***

Keywords: Stress, resilience, high school students, binary logistic regression

I. LITERATURE REVIEW

Stress and resilience in high school students are significant areas of study in psychology and education, given their profound implications for academic performance, mental health, and overall well-being. This literature review synthesizes key findings from various studies on stress and resilience, focusing on the experiences of high school students.

Selye (1956) laid the foundation for the modern understanding stress as a physiological response to various stressors. High school students encounter a range of stressors, from academic demands to personal challenges, making Selye's work relevant in this context. Billings and Moos (1981) examined the role of coping responses and social resources in mitigating the stress of life events. This perspective underscores the importance of the social support network in enhancing resilience among high school students. Lazarus and Folkman (1984) proposed the influential stress-coping model, emphasizing the role of cognitive appraisal in individuals' responses to stress. This model underscores the subjective nature of stress and the importance of coping strategies, which are relevant in understanding high school students' experiences. Rutter (1987) offered a framework for understanding psychosocial resilience and protective mechanisms, emphasizing the importance of social resources in fostering resilience in high-stress environments. Seiffge-Krenke (2000) explored causal links between stressful events, coping styles, and adolescent symptomatology. Understanding how high school students respond to stressors can illuminate the factors influencing their resilience. Masten (2001) introduced the concept of "ordinary magic," highlighting the resilience processes in development. Resilience, she argued, is a common phenomenon in the face of adversity, and understanding these processes is crucial for supporting high school students in overcoming challenges. Compas et al. (2001) conducted extensive research on coping with stress during childhood and adolescence, providing insights into the role of coping strategies in young individuals' stress experiences. Fergus and Zimmerman (2005) presented a comprehensive framework for understanding adolescent resilience. This model addresses the interaction between individual assets, social contexts, and external supports in promoting resilience during adolescence. Alim et al. (2008) delved into resilience within high-risk populations, emphasizing the importance of culturally sensitive approaches to resilience. This perspective is particularly relevant when studying diverse high school student populations.

In summary, the literature provides a rich and diverse body of knowledge about stress and resilience in the context of high school students. High school is a critical period where the interplay of academic, social, and personal factors shapes students' stress experiences and resilience. This literature review forms the foundation for our research, where we aim to investigate the specific factors influencing stress and resilience in high school students and contribute to the understanding of how best to support them in this crucial phase of development.

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II. OBJECTIVES OF THE STUDY

*1)*To identify the key factors contributing to stress among high school students.
*2)*To determine the factors that enhance resilience in high school students.
*3)*Assess the interplay of various factors in influencing stress and resilience.
*4)*Understand the potential gender and grade-level differences in stress and resilience.

III. METHODOLOGY OF THE STUDY

1) *Method of data collection:* The data used in this study was collected from primary sources. The primary data was collected from a questionnaire, which the students filled out, and secondary data was compiled from various schools in Visakhapatnam to calculate the sample size from the population.
2) *Sampling Techniques:* In this study, we used stratified random sampling to study the different grade level students and also to get more precise estimators that represent the whole population results. The procedure was performed by dividing the students into "10th" and "11&12th" grades by the characteristics and, first, the population into "10th" and "11&12th" grade strata, and one sample was selected from each of the strata by using simple random sampling.
3) *Sample Size Determination:* We conducted a pilot survey and took ten students from the population. Three were from grade 10, and 7 were from grade11& 12 (based on the responses to the questionnaire) and calculated the sample size using the formula.$n_0 = \frac{\sum_{i=1}^{2} w_i p_i q_i}{V}$ If $\frac{n_0}{N}$< 5% we take $n_0 = n$ other wise $n = \frac{n_0}{1+\frac{n_0}{N}}$ (William Cochran) N_1=7,N_2=3 and $W_1 = \frac{7}{10}$=0.7,$W_2 = \frac{3}{10}$=0.3 V = $(d/z_{\alpha/2})^2$= $(0.1/1.96)^2$ =0.0026 where d is the marginal error

So $n_0 = \frac{0.7*(0.5)(0.5)+0.3*(0.5)(0.5)}{0.0026}$ = 96.Then Where$\frac{n_0}{N}$< 5%, $n_0 = n$, here 0.13352 is not less than 0.05 If $\frac{n_0}{N}$ > 5% here 0.13352 then $n_1 = n = \frac{96}{1+0.13352}$ = **85** The sample size in each stratum is calculated by using proportional allocation.

N_1= population of grade 10 =150

N_2= population of grade 11&12 =200

$n_h = \frac{n*Nh}{N}$ (General formula for sample size determination) then $n_1 = \frac{(85*150)}{350} = 36.42 = 37$(grade 10). $n_2 = \frac{(85*200)}{350} = 48.57 = 48$(Grade 11&12).

4) *Variables of the Study:*

Dependent variable: Students stress and resilience of High school students.
Independent Variables: Academic Work load, Family support, Peer relationships, extracurricular activities, coping strategies, Parental expectations, self-esteem, sleep patterns.

5) *Logistic Regression Model:*

It is a procedure for finding the mathematical function that best describes the relationship between dependent and one or more independent variables. It also often the response is not a numerical value. Instead, the response is simply a designation of one or two possible outcomes, although the response may be accumulated to provide the number of failures. The binary nature of the response remains the odd ratio (OR), which measures how much greater or less the odds are for subjects possessing the risk factor to experience a particular outcome.

Model formulation:

$\text{Ln}\ (P_i / 1-P_i) = \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \ldots\ldots\beta_k x_{ki}$

$P_i / 1-P_i = \exp^{(\beta_0+\beta_1 X_{1i}+\beta_2 x_{2i}+\ldots..\beta_k x_{ki})}$

Where

- P is the probability of success
- 1-P is Probability of failure
- B_0 is constant term

- X_i are independent variable

The ratio of the probability of failure P/1-P is the odd ratio of success. Binary logistic regression is ideal when the dependent variable is categorical and binary, which is the case with stress and resilience. High school students either experience stress or do not, and similarly, they either exhibit resilience or they do not. Binary logistic regression models the probability of falling into one of these two categories based on the values of the independent variables.

IV. RESULTS AND DISCUSSION

Statistical Hypothesis:

For the dependent variable stress:

Null Hypothesis (H0): There is no statistically significant relationship between academic workload and stress in high school students

Null Hypothesis (H0): There is no statistically significant relationship between family support and stress in high school students

Null Hypothesis (H0): There is no statistically significant relationship between peer relationships and stress in high school students

Null Hypothesis (H0): There is no statistically significant relationship between participation in extracurricular activities and stress in high school students

Null Hypothesis (H0): There is no statistically significant relationship between coping strategies and stress in high school students.

Null Hypothesis (H0): There is no statistically significant relationship between parental expectations and stress in high school students.

Null Hypothesis (H0): There is no statistically significant relationship between self-esteem and stress in high school students.

Null Hypothesis (H0): There is no statistically significant relationship between sleep patterns and stress in high school students.

For the dependent variable **resilience**:

Null Hypothesis (H0): There is no statistically significant relationship between academic workload and resilience in high school students

Null Hypothesis (H0): There is no statistically significant relationship between family support and resilience in high school students

Null Hypothesis (H0): There is no statistically significant relationship between peer relationships and resilience in high school students

Null Hypothesis (H0): There is no statistically significant relationship between participation in extracurricular activities and resilience in high school students

Null Hypothesis (H0): There is no statistically significant relationship between coping strategies and resilience in high school students.

Null Hypothesis (H0): There is no statistically significant relationship between parental expectations and resilience in high school students.

Null Hypothesis (H0): There is no statistically significant relationship between self-esteem and resilience in high school students.

Null Hypothesis (H0): There is no statistically significant relationship between sleep patterns and resilience in high school students.

The following tables show the outputs of the data analysis done by SPSS.

Logistic Regression

Block 0: Beginning Block

Classification Table[a,b]

Observed			Predicted		
			RESILIENCE		Percentage Correct
			MODERATE	SLIGHTLY	
Step 0	RESILIENCE	MODERATE	72	0	100.0
		SLIGHTLY	13	0	.0
	Overall Percentage				84.7

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Table(i) Significance values of independent variables with dependent variable Resilience[a]

			Score	df	Sig.
Step 0	Variables	AGE	6.947	4	.139
		AGE(1)	5.736	1	.017
		AGE(2)	1.453	1	.228
		AGE(3)	1.003	1	.317
		AGE(4)	.091	1	.763
		AW(1)	1.377	1	.021
		FS	6.395	2	.042
		FS(1)	4.418	1	.036
		FS(2)	1.166	1	.280
		PR	85.000	3	.000
		PR(1)	85.000	1	.000
		PR(2)	4.123	1	.042
		PR(3)	3.026	1	.082
		EA(1)	1.377	1	.241
		CS(1)	11.276	1	.001
		PE(1)	.370	1	.543
		SE	71.620	2	.000
		SE(1)	71.620	1	.000
		SE(2)	61.389	1	.000
		SP	49.878	2	.000
		SP(1)	19.910	1	.000
		SP(2)	3.837	1	.050

Table-(ii)

Case Processing Summary

Unweighted Cases[a]		N	Percent
Selected Cases	Included in Analysis	85	100.0
	Missing Cases	0	.0
	Total	85	100.0
Unselected Cases		0	.0
Total		85	100.0

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Table(iii)
Dependent Variable Encoding

Original Value	Internal Value
ALWAYS	0
OFTEN	1

Table-(IV)

Block 0: Beginning Block
Classification Table[a,b]

Observed			Predicted		
			STRESS		
			ALWAYS	OFTEN	Percentage Correct
Step 0	STRESS	ALWAYS	83	0	100.0
		OFTEN	2	0	.0
		Overall Percentage			97.6

Table-(V)

Significance values of independent variables with dependent variable Stress

			Score	df	Sig.
Step 0	Variables	AGE	3.072	4	.546
		AGE(1)	.550	1	.458
		AGE(2)	1.152	1	.283
		AGE(3)	1.117	1	.291
		AGE(4)	1.152	1	.283
		AW(1)	.184	1	.048
		FS	26.968	2	.000
		FS(1)	.590	1	.443
		FS(2)	26.968	1	.000
		PR	7.624	3	.054
		PR(1)	.370	1	.543
		PR(2)	7.624	1	.006
		PR(3)	.404	1	.525
		EA(1)	.184	1	.668
		CS(1)	2.788	1	.095
		PE(1)	.049	1	.824
		SE	.512	2	.774

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	SE(1)	.439	1	.508
	SE(2)	.512	1	.474
	SP	8.193	2	.017
	SP(1)	2.657	1	.103
	SP(2)	8.193	1	.004

Table-(IV)

V. INTERPRETATION

In the above tables, the independent variables mentioned as Academic work load-AW, Family support-FC, peer relations-PC, Extra-curricular activities-EA, coping strategies-CP, peer relations-PR, self-esteem, Sleeping patterns –SP.From table-(II) for the independent variable Family support p value is0.042<0.05 we reject the null hypothesis at 5% Level, the independent variable peer relations p value is0 < 0.05 we reject the null hypothesis H0 at 5% Level, the independent variable coping strategies p value is0.01 < 0.05 we reject the null hypothesis H0 at 5% Level, the independent variable sleep patterns p value is0.00 < 0.05 we reject the null hypothesis at 5% Level So the independent variables Family support, peer relations, coping strategies and sleep patterns are significant with the dependent variable resilience. From Table-(IV), for the independent variable Academic workload p value is0.021<0.05, we reject the null hypothesis at 5% Level. The independent variable Family support p value is0 < 0.05, we reject the null hypothesis H0 at 5% Level; the independent variable Sleep patterns p value is0.017 < 0.05, we reject the null hypothesis at 5% Level, So the independent variable academic workload, Family support and sleep patterns are significant with the dependent variable stress.

VI. CONCLUSIONS

In this study investigating the factors influencing stress in high school students, the binary logistic regression analysis has revealed that the independent variables "Academic Workload," "Family Support," and "Sleeping Patterns" are statistically significant predictors of stress. It also revealed that the independent variables "Family Support," "Peer Relationships," "Coping Strategies," and "Sleeping Patterns" are statistically significant predictors of resilience. We found that certain factors significantly influence both stress and resilience. Academic workload was a significant predictor of stress, highlighting the need for balanced workloads. Family support and peer relationships were associated with higher resilience, emphasizing the pivotal role of strong social connections. Coping strategies were essential for resilience, underlining the importance of effective coping mechanisms. Healthy sleep patterns were linked to lower stress and higher resilience, emphasizing the significance of quality sleep. These findings provide valuable insights for educators, parents, and policymakers to support students' well-being. Balancing workloads, promoting supportive social environments, and teaching effective coping and sleep management strategies are key to enhancing stress resilience among high school students.

VII. RECOMMENDATIONS

High schools should prioritize a balanced workload, ensuring students can handle academic demands, which can contribute to stress.

1) Implement comprehensive programs to teach students effective coping strategies for managing stress and building resilience.
2) Create awareness about the importance of healthy sleep patterns and provide resources for students to improve their sleep habits.
3) Foster supportive family relationships and positive peer interactions to bolster resilience among students.
4) Incorporate well-being and mental health education into the curriculum to empower students with the skills needed to navigate stress and enhance resilience.

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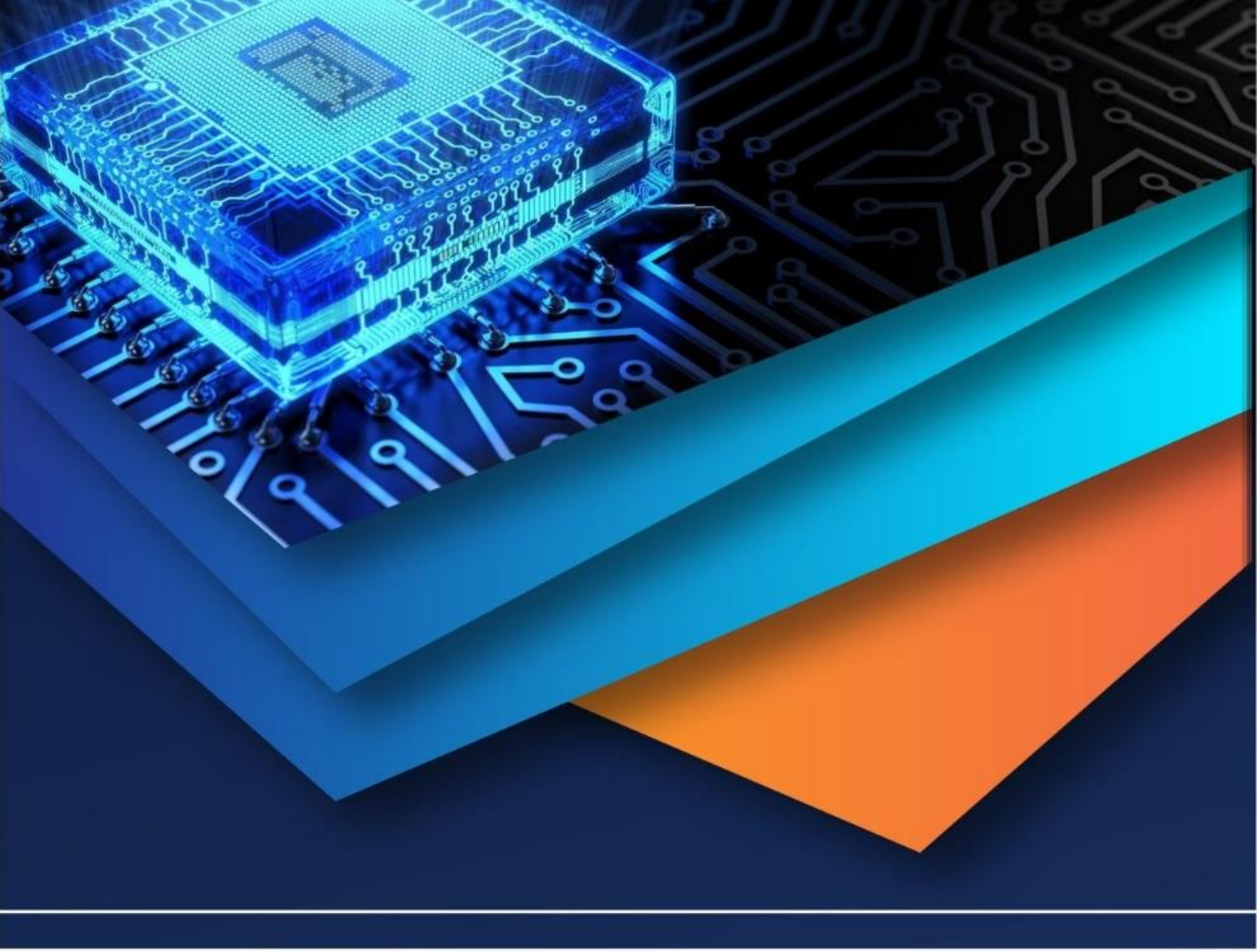
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