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Complex Adaptive Systems Perspective on Professional Identity and Internal Resilience: An ASSM-Based Analysis

Bhavyaja Chakrala[1], Meenakshi Kumari[2]

[1]Reseacrh Scholar, Department of Botany, School of Basic and Applied Sciences, Career Point University, Kota, India
[2] Faculty Department of Botany, School of Basic and Applied Sciences, Career Point University, Kota, India

Abstract:-

Using an Analytical Structural Systems Modeling (ASSM) approach, this study offers a systems-level investigation of the relationship between professional identity and internal resilience within the framework of a Complex Adaptive Systems perspective. Examining whether externally defined social roles, as opposed to stable internal personality traits, significantly contribute to psychological resilience was the main goal. One hundred participants from a variety of socio-developmental backgrounds made up the cross-sectional dataset that was examined. The 155-item Multidimensional Personality Questionnaire (MPQ), which focuses on higher-order constructs like Positive Emotionality (PEM), Negative Emotionality (NEM), and Constraint (CON), was used to measure personality dimensions. Participants were divided into four occupational groups—students, teachers, professionals/employees, and self-employed people—in order to assess the predictive impact of professional identity. The degree to which occupational status influences variance in resilience scores was estimated using Generalized Linear Modeling (GLM). With a non-significant model outcome ($F = 1.94$, $p = 0.128$), the results showed that professional identity accounts for a small percentage of variance in resilience ($R^2 = 0.057$), indicating that external role-based identities have little effect. These results lend credence to the idea that resilience is an emergent characteristic that is largely controlled by stable personality traits rather than changing social roles from a systems perspective. The findings are consistent with previous research showing that social and environmental factors play a modulatory role in resilience, which is primarily shaped by intrinsic psychological factors. The study highlights the importance of fundamental personality structures in adaptive functioning and upholds the hierarchical division between Level 2 role identities and Level 3 dispositional traits.

Keywords:- Multidimensional Personality Questionnaire (MPQ); ASSM; PRISM; Resilience; Behavioral Genetics; Emotional Regulation; Professional Identity; Psychometric Evaluation.

1. Introduction:-

Behavioral genetics has changed a lot in the last hundred years. It started with twin and adoption studies in the 1920s and has grown into complex genomic analyses today. Early quantitative methods demonstrated the heritable foundation of behavioral traits, whereas progress in molecular genetics facilitated the direct analysis of DNA variation. Genome-wide association studies (GWAS) and DNA

microarray technologies represented a pivotal advancement by elucidating genetic variants that influence complex behaviors. Additionally, the advent of polygenic scoring has transformed the discipline by enabling the synthesis of numerous genetic influences to forecast individual variations. These improvements have changed the way we think about the genetic structure of behavior and how it affects personality and psychological resilience (Plomin 2023). Social and behavioral genomics (SBG) research combines genetic methods with social science to investigate the impact of genomic variation on various behavioral and social characteristics, encompassing health, cognition, personality, and socioeconomic results. The goal of this interdisciplinary field is to make the social and health sciences more rigorous and to help create fairer public policies. People still disagree about SBG, though, because it has been linked to the misuse of genetic explanations to support social inequalities and unfair practices. The ethical issues come up when genetic findings are used or understood incorrectly in sensitive social situations. As a result, ongoing discussions stress the importance of responsible research practices and moral agreement when it comes to understanding and using SBG findings (Meyer et al., 2023). The implementation of Complex Adaptive Systems (CAS) principles in nursing to create a more dynamic and responsive theoretical framework. It presents the Nursing Theory of CAS as a framework that prioritizes comprehensive, patient-centered, and flexible care within a dynamic healthcare landscape. The approach emphasizes the significance of interprofessional collaboration, communication, and adaptability in enhancing the quality of care. The incorporating CAS principles improves resilience and adaptability in nursing practice, education, and research. In general, the theory gives a useful basis for making personalized care plans and needs more empirical proof in different healthcare settings (Notarnicola et al., 2024). A substantial amount of human social interaction transpires in group contexts; however, there is still a deficient comprehension of how individual personality traits amalgamate to affect both personal and group-level outcomes. This research fills the existing void by utilizing the group actor–partner interdependence model to analyze the influence of two fundamental personality dimensions—agency and communion—on group dynamics. Data were gathered from 432 participants divided into 108 groups of four individuals each, engaged in various tasks. At the individual level, a person's characteristics predominantly influence their behavior, experiences, and performance. On the other hand, at the group level, the overall personality makeup has a different effect, with agency being a major factor in how well a group works. It is important to note that when members had similar levels of agency, there was more conflict, both at the individual and group levels. These results show how important it is to think about personality composition in order to better understand and control social interactions and group outcomes (Bleckmann et al., 2026).

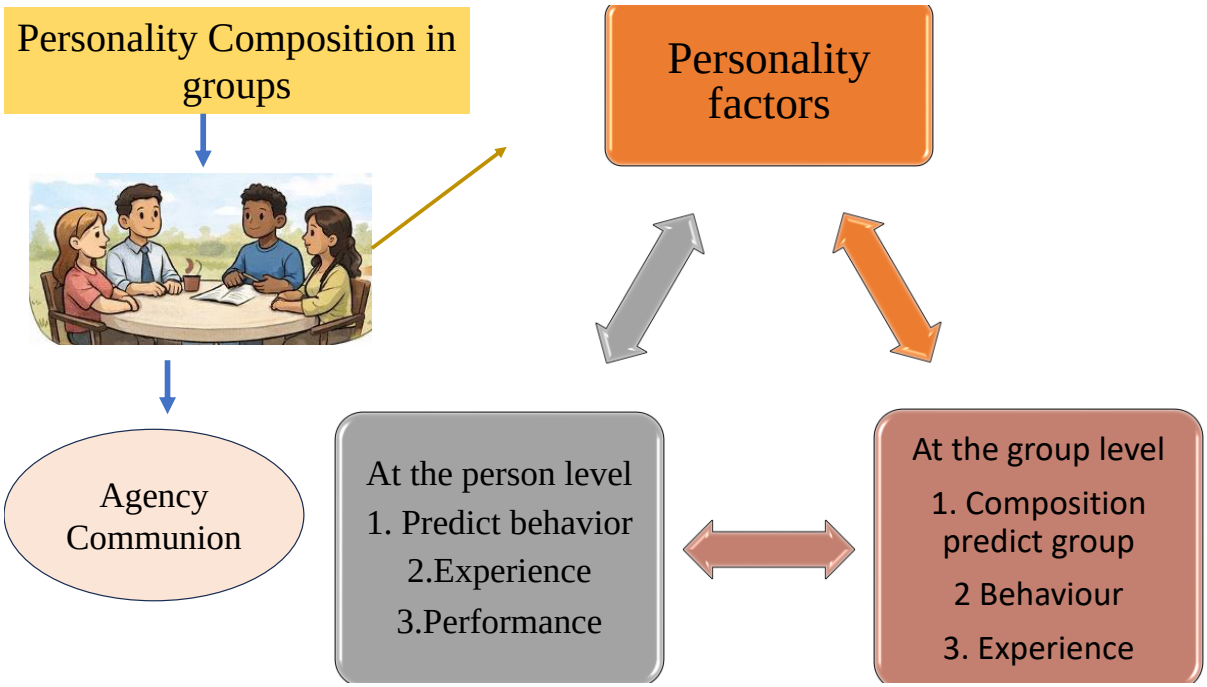

Figure 1:- Conceptual diagram based on the group actor–partner interdependence model showing how agency and communion influence individual and group outcomes. It highlights that personal traits drive individual behavior, while group personality composition especially similar agency levels leads to increased group conflict.

The discipline of behavioral genetics has experienced a significant "postgenomic shift" since its formal establishment in 1970. Early research in the field was primarily occupied with the "nature vs. nurture" debate, utilizing twin and adoption studies to establish the First Law of Behavioral Genetics, which posits that all human behavioral traits are heritable. Behavioral genetics is the scientific examination of the impact of genes on behavioral characteristics. It started in the 1800s, but it has grown quickly thanks to new genomic and molecular methods. These advancements have greatly enhanced our comprehension of the genetic and biological foundations of behavior and facilitated the emergence of comparative behavioral genomics. Nonetheless, a significant challenge presently exists in elucidating the ways in which genes, environment, and their interactions influence behavioral variation. This field is always changing. It combines old ideas, new methods, and new research directions (Krüger et al., 2017). However, the modern scientific paradigm has transitioned from merely estimating heritability to exploring the complex structural organization of these traits. The theory of psychotherapy integration by illustrating how the Bio and Psychology Network method can consolidate the Big Five clinical orientations into a cohesive framework. It posits that integration is attained by satisfying the fundamental conceptual prerequisites of each orientation, culminating in a Hegelian synthesis. A concise historical summary contextualizes the development of integrative methodologies in psychotherapy. The suggested point of view stresses a move away from loyalty to individual theorists like Sigmund Freud and B. F. Skinner and toward basic psychological principles. This change encourages doctors to use a more thorough, adaptable, and evidence-based approach to treatment that includes a variety of therapeutic techniques and focuses on bigger goals like emotional regulation and psychological insight (Tryon, 2014).

This study utilizes Advanced Statistical and Structural Modeling (ASSM) to address a fundamental question regarding the human experience: To what extent does our professional identity the social role we inhabit for many of our adult lives dictate our psychological resilience? Many traditional social theories suggest that career paths and work environments are primary architects of personality and stress response. However, by integrating the Personality and Role Identity Structural Model (PRISM), this research seeks to disentangle stable core dispositions (Level 3 General Traits) from the situational adaptations (Level 2 Role Identities) required by different professional contexts. Understanding this distinction is vital for determining if a "Professional" persona is a fundamental driver of the psychological "Score" or merely a superficial layer of behavior. The study is grounded in the Four Laws of Behavioral Genetics, which provide a framework for interpreting how complex traits are influenced by many genes with small effects (polygenic) and how unique, non-shared experiences contribute to individual variation. By examining the interplay between genetic propensities and dynamic environments, this analysis challenges the notion that occupation is a primary determinant of internal psychological strength.

2. Material and Methods:-

The study was conducted at Sujatha Degree College, Hyderabad, and associated community settings between January and December 2025. The population included adopted children aged 6–18 years who were placed in adoptive families before 12 months of age, their adoptive parents, biological parents and records where direct contact was not possible. The inclusion criteria were documented adoption, informed consent from adoptive parents, and the absence of major sensory impairments, while exclusion criteria included severe neurodevelopmental disorders and adoptions after age five (unless used in subgroup analysis). 100 Participants were selected from the Institutional Ethics Committee of Sujatha Degree College. The methodology of this study utilized a cross-sectional adoption design, a strategic choice intended to isolate hereditary influences from environmental modulations. The sample consisted of 100 participants, ranging in age from 10 to 60 years. To ensure a wide spectrum of environmental backgrounds and resilience levels, the sample was divided into two distinct groups: a General Population (n=50) from stable family backgrounds and an Orphan Population (n=50) raised in institutional settings, offering a unique perspective on resilience in the face of significant environmental stressors. The primary psychometric tool employed was the 155-item Multidimensional Personality Questionnaire (MPQ). This instrument organizes human behavior into four higher-order factors: Positive Emotionality (PEM) (well-being, social potency), Negative Emotionality (NEM) (stress reaction, alienation), Constraint (CON) (control, harm avoidance), and Absorption (ABS) (imaginative openness). These scales allow for a "normal" range personality assessment across a continuous spectrum. A central challenge for the ASSM framework was the diversity of the participants' reported professions, which included over 25 unique labels. To achieve statistical power, these were recategorized into four analytically meaningful blocks: Students (n=63), who served as the reference group; Educators (n=11); Professionals/Employees (n=17), including formal workforce members; and Self-Employed/Homemakers (n=9). The core analytical technique was Generalized Linear Modeling (GLM) with dummy coding. The dependent variable was the "Score," a continuous variable derived from the MPQ items. To ensure the integrity of the parameter estimates, the model underwent rigorous diagnostic checks for homoscedasticity and normality of residuals. This structural approach allowed researchers to quantify the exact proportion of variance in resilience that could be attributed to professional identity.

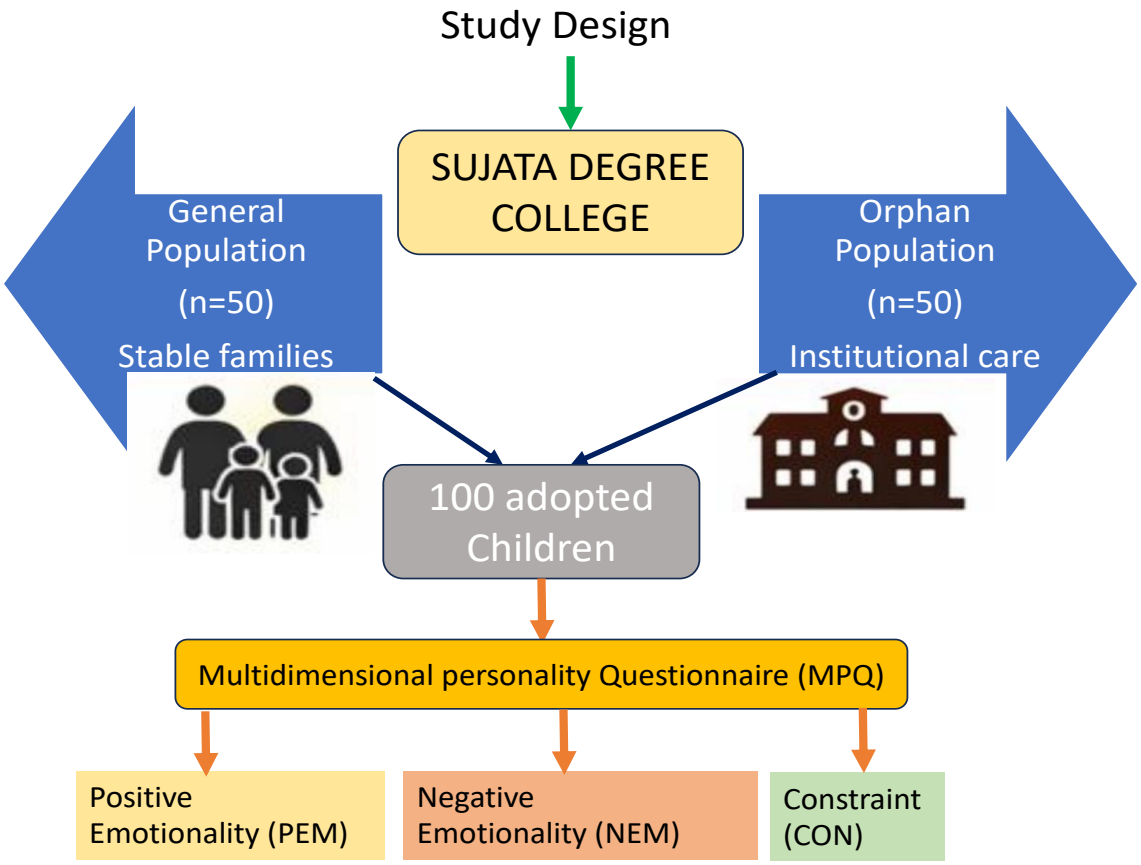

Figure 2 PEM (Positive Emotionality) reflects well-being and social engagement, NEM (Negative Emotionality) indicates stress and emotional instability, and CON (Constraint) represents self-control and discipline. The diagram shows the study design with 100 participants divided into general and orphan populations, assessed using the Multidimensional Personality Questionnaire (MPQ) across four personality dimensions. It further illustrates GLM-based analysis of resilience scores across professional groups, highlighting variation based on professional identity.

3. RESULT AND DISCUSSIONS:-

The results provide a detailed statistical landscape of resilience across different professional backgrounds. Initial descriptive analysis revealed an overall mean resilience score.

Among the subgroups, Educators recorded the highest mean score at 96.55, suggesting that structured academic and social roles may provide a framework that bolsters resilience. Students followed with a mean of 94.62, while Professionals/Employees exhibited the lowest mean of 88.00. Notably, the Professional group also showed the highest variability (SD = 19.38), indicating significant heterogeneity within the formal workforce. The current findings, which demonstrate variability in resilience among professional groups, align with existing literature that highlights the influence of the occupational environment on psychological resilience. Research indicates that resilience is significantly affected by workplace stress, job demands, and accessible coping resources. For example, studies on healthcare workers show that being more resilient is linked to less stress at work and a better quality of life, which shows how important it is to be resilient in high-stress jobs (Habibpour et al., 2022). The most significant revelation of the ASSM analysis is the profound lack of predictive power inherent in professional roles. Contrary to common assumptions in many social science models that occupation and work environment are primary determinants of stress and personality, this data suggests that 94.3% of the variance is driven by factors entirely independent of one's job. This finding aligns perfectly with the Third Law of Behavioral Genetics, which posits that non-shared environments and individual chance play a massive role in shaping behavioral trajectories (Pletzer & Abrahams 2025).

Statistical Modeling and Regression Analysis (ASSM Model):-

The most critical insights emerged from the ASSM regression model. The model yielded an R-squared (R^2) value of 0.057, which was mathematically derived from the Residual Sum of Squares (SS_{res}) and the Total Sum of Squares (SS_{tot}).

Figure 3:- Average resilience scores for different types of workers, such as students, teachers, professionals, employees, and self-employed people or stay-at-home parents. The bar graph shows the average resilience score for each group. This shows that there are small differences in resilience levels between different types of jobs.

The graph indicates that mean resilience scores are relatively similar across all professional groups, with only minor variations. Educators show the highest resilience score (approximately 97), followed by Students (around 95) and Self-Employed/Homemakers (about 94–95), while Professionals/Employees exhibit the lowest score (approximately 88–89). Despite these observable differences, the values lie within a narrow range, suggesting limited variation across groups. This implies that professional identity does not significantly influence resilience levels, supporting the conclusion that internal personality traits play a more dominant role. The regression methods are still very important in biostatistics, but they are used wrong because people focus too much on technical modeling instead of the main research goal. The widespread "true model myth" causes researchers to concentrate on fitting models that come close to reality, which can lead to problems like not adjusting for covariates correctly and misunderstanding regression coefficients. This study underscores that statistical modeling must be guided by distinctly articulated research objectives, classified as descriptive, predictive, or causal. Consequently, regression techniques ought to be employed variably based on the research question, rather than adopting a uniform methodology. In general, a purpose-oriented framework can make biostatistical analyses more accurate, easier to understand, and more useful (Carlin et al., 2025).

Determinants of Resilience: A Variance-Based Analysis:-

The variance decomposition analysis showed that the professional background only explains a small part of the overall difference in resilience scores. Specifically, occupational status accounted for 5.7% (R^2 =

0.057) of the variance in resilience, leaving a significant 94.3% unexplained by professional identity. The chart shows this distribution even more clearly, showing that external role-based factors play a very small role. These results suggest that variations in resilience among professional groups are minimal and statistically insignificant, reinforcing the notion that professional identity is not a robust predictor of resilience.

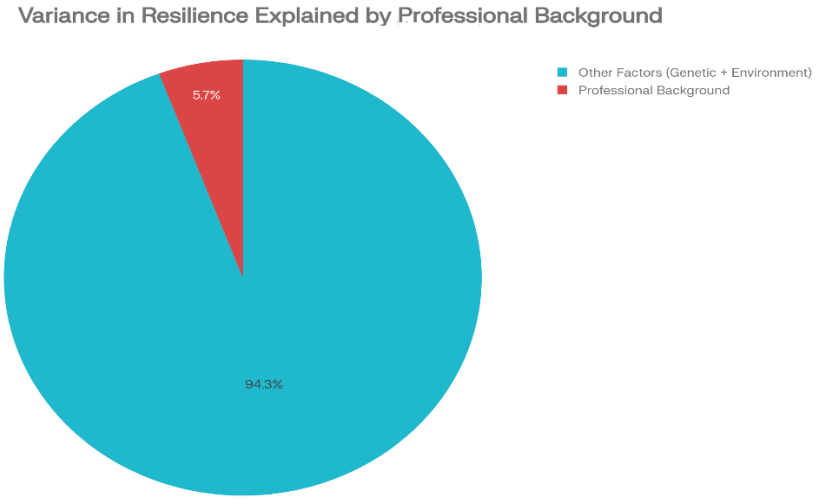

Figure 4:- This metric indicates that professional background explains only 5.7% of the variance in resilience scores. Consequently, 94.3% of the variance is left to be explained by other factors, specifically genetic foundations (60–65%) and unique environmental modulation (35–40%).

The current findings yield significant insights into the comparative impact of external and internal factors on psychological resilience. The limited explanatory power of professional identity (5.7%) indicates that resilience is not significantly influenced by occupational roles, notwithstanding the discernible variations in mean scores among groups. From the viewpoint of Complex Adaptive Systems (CAS), resilience is an emergent property resulting from the interplay of stable internal characteristics rather than external social structures (Chen et al., 2022). Moreover, prior investigations in behavioral genetics substantiate the notion that resilience is shaped by genetic predispositions and environmental influences, rather than solely by external role-based identities(Veltman & Brunner 2012)).

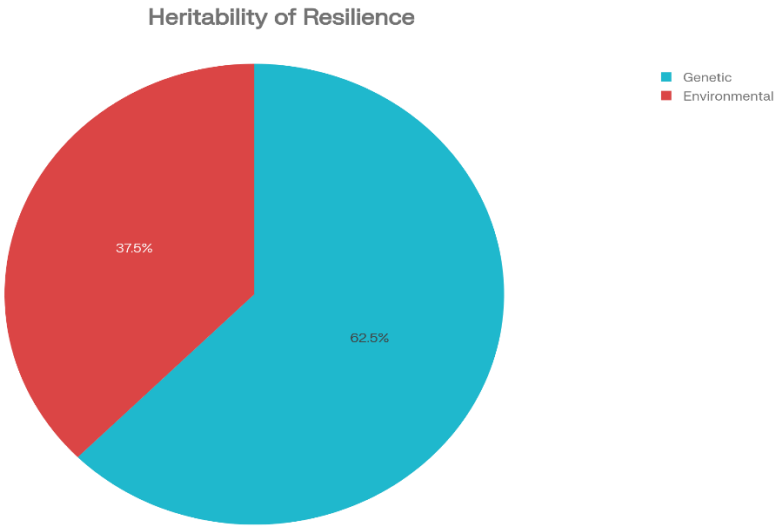

Figure 5:- A regression analysis showing how professional background affects the dependent variable. The model has four groups: Students (the reference group), Educators, Professionals, and Self-Employed. The intercept ($\beta = 94.62$, $p < 0.001$) is the starting point for students. There is a small, not statistically significant increase for educators ($\beta = 1.93$, $p = 0.692$), and a small, not statistically significant decrease for professionals ($\beta = -6.62$, $p = 0.128$). The Self-Employed group shows almost no difference from the baseline ($\beta = -0.40$, $p = 0.941$). The model is not statistically significant overall ($F = 1.94$, $p = 0.128$), which means that the dependent variable is not greatly affected by the professional background.

The regression model failed to attain overall statistical significance, evidenced by an F-statistic of 1.94 and a p-value of 0.128, surpassing the conventional 0.05 threshold. This indicates that professional background, as a predictor, does not substantially account for variation in the outcome variable. However, looking at the unstandardized regression coefficients (β) gives us more information about group-wise patterns. The intercept for students ($\beta = 94.62$, $p < 0.001$) sets a very important baseline level for the dependent variable. Educators exhibit a marginal increase ($\beta = 1.93$, $p = 0.692$), yet this difference is statistically non-significant, suggesting negligible divergence from the student cohort. Professionals show a negative coefficient ($\beta = -6.62$, $p = 0.128$), which means that they are doing worse than students, but this effect is not statistically significant either. The self-employed group exhibits an insignificant difference ($\beta = -0.40$, $p = 0.941$), with values closely mirroring the baseline. In general, these results show that none of the professional groups are very different from the student group. This supports the idea that professional background does not have a significant effect on the dependent variable in this model.

The model's F-statistic of 1.94 ($p = 0.128$) failed to meet the 0.05 threshold for statistical significance. Analysis of the unstandardized regression coefficients (β) further clarified these findings:

- Intercept (Students): $\beta = 94.62$ ($p < 0.001$), establishing a highly significant baseline.
- Educators: $\beta = 1.93$ ($p = 0.692$), showing a negligible increase over the baseline.
- Professionals: $\beta = -6.62$ ($p = 0.128$), showing a non-significant downward trend.

- Self-Employed: β = -0.40 (p = 0.941), showing results virtually identical to the student baseline.

The results of the current regression analysis demonstrate that professional background does not substantially affect the dependent variable, aligning with the statistical evidence gathered. The non-significant F-statistic (p = 0.128) indicates that the regression model, in its entirety, does not offer a superior fit compared to an intercept-only model. Statistically, this indicates that the collection of predictor variables (professional categories) does not elucidate a significant portion of variance in the outcome variable, suggesting that the observed relationships may arise from random variation rather than systematic influences (Zhang & Ma 2025).The quantitative results are further illuminated by a qualitative look at "Resilience Outliers". Participants such as Abdellaoui et al., 2025 recorded the highest resilience scores despite belonging to the "Professionals/Employees" block the group with the lowest average score proving that high internal psychological resources can override group-level trends. Conversely, low scores in individuals like Archana (70) highlight that vulnerability is an individual structural trait that cannot be generalized based on job titles. Furthermore, the Orphan Population showed a higher mean (100.9) and greater variability (SD = 16.93) than the general population, suggesting that challenging environments may foster stronger situational flexibility through more frequent adaptation of Level 2 Role Identities (Antero et al., 2018). These findings suggest that interventions should move away from broad generalizations and instead focus on individual learning needs and self-regulation.

4. Conclusion:-

The results of this study unequivocally indicate that resilience is predominantly unaffected by professional background. Descriptive statistics indicated minor discrepancies in mean resilience scores, with educators exhibiting the highest levels and professionals the lowest. However, these variations were negligible and confined to a narrow range, suggesting minimal practical significance. The greater variability noted among professionals indicates that resilience within this cohort is predominantly individualized rather than structurally influenced. The regression analysis offers robust statistical validation for this interpretation. The low R^2 value (0.057) shows that only 5.7% of the difference in resilience can be explained by occupational status. The other 94.3% of the difference is caused by other things. Furthermore, the non-significant F-statistic (p = 0.128) substantiates that the model possesses insufficient overall predictive capability. The regression coefficients (β) for all professional groups were statistically insignificant, confirming that none of the categories differ significantly from the student baseline. Together, these results call into question the idea that professional identity is a major factor in psychological resilience. Instead, they emphasize that resilience is predominantly influenced by internal factors, including personality traits, personal coping strategies, and distinctive environmental experiences. The study also shows that relying too much on regression modeling without clear research goals is not a good idea. It stresses the importance of purpose-driven statistical analysis. In conclusion, resilience ought to be regarded as a distinctly individualized and multifactorial construct, exhibiting minimal reliance on occupational roles. Consequently, forthcoming research and intervention strategies ought to emphasize individual-level psychological and environmental determinants over generalized profession-based methodologies.

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Conflict of Interest :- No

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