

Resilience and Adaptability in Students Psychological Insights for Future-Ready Education

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ABSTRACT:

Psychological resiliency and adaptability are important skills that students need to navigate academic challenges and become resilient to shifting learning contexts. The current study focused on psychological, behavioural, academic and demographic variables that impact students' adaptive functioning and future readiness. An open-source mental health dataset of 500 students, aged 17–24 years was utilized with a quantitative cross-sectional design. Analysed variables were stress level, anxiety score, depression score, duration of sleep, physical activity, GPA, sentiment score, age, gender and mental health status. Descriptive statistics, Pearson correlation analysis and ordinal logistic regression were used and the level of significance was set at $p < 0.05$. The outcome revealed that mental health was positively and significantly correlated with depression ($r = 0.556$), anxiety ($r = 0.381$) and stress ($r = 0.258$). Depression was also the most significant independent predictor of an increase in the coded mental-health-status category, followed by anxiety and stress, in regression analyses. Other variables such as sleep duration, physical activity, academic performance, sentiment, age and gender were not significantly associated in the adjusted model. The results show that psychological distress is more related to students adaptive functioning than to behavioural or demographic characteristics. Educational institutions should thus reinforce psychological screening, counselling, stress management, socio-emotional learning, and building resilience. The indirect assessment of resiliency and adaptability should be avoided in future longitudinal studies because it is not reliable

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and valid.

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1. Introduction

As the world of education has become more complex, being resilient and adaptable is becoming a key skill for the students of the 21st century. Technological developments, digital transformation, globalization and unforeseen events like the pandemic have influenced the way students are learning, communicating, and preparing for future careers. Schools are therefore expected to develop not only academic skills but also psychological skills to deal with uncertainty and perpetual change. Resilient students are able to bounce back from academic failure and adaptable students are capable of adjusting to new learning places and changing learning demands (Agasisti and Soncin 2021; Aucejo et al. 2020). With the rapid shift to online learning, the need for psychological adaptability, emotional stability, effective coping mechanisms, and a sense of well-being in adapting to online learning and staying engaged in schooling became even more apparent (Besser, Flett, and Zeigler-Hill 2022).

Psychological resilience is a person's ability to bounce back from negative events, adapt to stress and continue to function positively in the face of difficulties. Adaptability, on the other hand, is the capacity to adjust thoughts, behaviours and feelings to fit new situations and new learning environments. While these constructs are different, they are closely interrelated and together play a role in students' academic achievement, emotional health and lifelong learning. The present psychological theories focus on growth mindset, behavioral flexibility, emotional control and positive character traits as factors that encourage resilient and adaptive behaviors from learners (Duckworth and Gross 2020; Dweck and Yeager 2019; Lavy 2020). Similarly, resilience has been defined as a psychological strength that consists of multiple factors, allowing people to remain motivated, manage stress, and overcome education-related obstacles (Hartmann et al. 2020).

Previous studies have consistently established that resilience benefits students' academic outcomes, emotional health and endurance when facing difficulties in educational settings. Academic resilience improves academic performance both directly and indirectly, such as through family cohesion and self-esteem, as well as having a positive impact on the supportive environment (Karim et al. 2026). Growth mindset interventions further enhance resilience by fostering adaptive coping with academic challenges and ongoing learning and development (King, Li, and Wang 2026). In the context of COVID-19 pandemic, it was determined that University students' resilience and coping strategies were associated with the reduction of stress, fear and psychological distress (Morales-Rodríguez 2021). The research on adaptability also indicates that students who adapted well to sudden changes in their schooling environment had more positive learning outcomes and less stress (Besser et al. 2022). Moreover, good teaching examples including feedback and learner engagement facilitate adaptive learning and cognitive development (Zhu et al. 2022). In addition to education, psychological flexibility has been associated with vocational identity and career development, highlighting the long-term value of flexibility (Davila 2022).

While there is a large and expanding literature on resilience and adaptability, there are still a number of important scientific gaps. Though these constructs have been studied separately, there is a lack of studies that have analysed them in the context of the contribution that they make to future-ready education, except for the COVID-19 pandemic (Collie 2021). In addition, research on either academic outcomes or mental health has often overlooked the importance of psychological resilience, adaptability, and future preparedness within a comprehensive framework. Grit, growth mindset, and resilience have been studied extensively, but empirical studies that integrate

the three psychological factors to predict students' preparedness to face future educational and professional issues are scarce (Credé, Tynan, and Harms 2017; Hartmann et al. 2020). There is, therefore, a need for research that studies several psychological factors related to resilience and adaptability of students, based on evidence (Newsom et al. 2026).

The present study aimed to explore the psychological traits that impact student's resilience and adaptability in future-ready education. To be specific, the study is designed to measure the level of resilience among the students, to measure the adaptability in the learning environment and to examine the relationship between the level of resilience and the students' adaptability in the learning environment and also to find the psychological factors in future-ready education. The study aims to offer empirical evidence that help in designing interventions and programmes to build the resilience of students at the educational level and achieve their psychological well-being, adaptive capacity, and long-term learning success. The results also inform the development of resilience focused school curriculum that encourages similar practices, as recently seen in Higher Education curricula to boost learners' resilience for future academic and career challenges.

2. Materials and Methods

2.1 Research Design

The design of this study is quantitative cross sectional which examines the psychological and behavioural factors affecting student resilience and adaptability. Secondary analysis of an open-source student mental health dataset was performed. The design allowed for the examination of relationships between psychological distress, lifestyle behaviour, academic performance and mental health at a single time point.

2.2 Dataset and Participants

The dataset comprised 500 student records encompassing demographic, academic, psychological, behavioural and mental health variables. The key factors included age, gender,

GPA, stress, anxiety, depression, hours of sleep, steps taken per day, sentiment score, mood description, daily reflections, and mental health status. Records with valid data for the principle variables of the study were selected. Observations that had invalid or inconsistent values, and duplicate entries, and records with substantial amounts of missing values were omitted. Anonymization and public availability of the dataset means that no personally identifiable data has been used (Ziya 2025).

2.3 Study Variables

The main predictor variables were stress level, anxiety score, depression score, sleep hours, steps per day, GPA, and sentiment score. Demographic control variables included age and gender. Mental health status was used as the primary outcome variable. The supporting variables for emotional adjustment were analyzed: mood description and the sentiment score. Resilience and adaptability scales were not included in the dataset, so these were measured indirectly. Reduced psychological distress, improved sleep quality, increased physical activity, positive sentiment, and improved mental health status were considered signs of greater resilience and adaptability. Future readiness was defined by the student's ability to deal with emotions, maintain healthy behavior and academic functioning in diverse educational settings.

2.4 Data Pre-processing

Duplicate records, missing values, invalid values and extreme outliers were checked in the dataset. Categorical missing data were replaced with the most common category (if applicable) and mean or median imputation was used when there was a small amount of missing data. All categorical variables were coded numerically (gender, mood description, mental health status). All continuous variables were analyzed by means of histograms, skewness, kurtosis and the Shapiro–Wilk test. If stress, anxiety and depression scores were aggregated to a psychological distress score, then Cronbach's alpha was computed. The variable daily reflections was cleaned for interpretation and the sentiment score available was used for quantitative analysis.

2.5 Statistical Analysis

Descriptive statistics were used to describe the characteristics of the participants and the variables in the study. Categorical variables were presented as frequencies and percentages, and continuous variables were presented as means, standard deviations, minimum and maximum values. Pearson correlation was applied for normally distributed variables and Spearman correlation for variables that did not meet the criteria for normality. Independent-samples *t*-tests were used to test for differences in psychological outcomes between the two genders and one-way ANOVA was used when more than two categories were compared.

Multiple regression analysis was used to determine the predictors for mental health status or sentiment score. Predictors included stress, anxiety, depression, hours of sleep, number of steps taken daily, GPA, age and gender. Linear regression was replaced by categorical mental health status and used categories logistic regression or multinomial logistic regression.

Statistical significance was defined as a *p*-value <0.05 and 95% confidence intervals were presented when appropriate.

3. Results

3.1 Participant Characteristics

There were 500 students analyzed. There were no missing values or duplicate records found. The age of the participants ranged from 17 to 24 years with an average of 20.37 years.

There were almost an equal number of boys and girls with 169 girls and 168 boys, and 163 students who did not define themselves as either a girl or a boy. The most common mental-health-status category, identified by 68.2% of the sample, was mental-health-status category 2. Table 1 summarizes the demographic characteristics and mental health status of the study participants.

Table 1. Demographic and mental-health characteristics of participants

Characteristic	Category/Statistic	Frequency or Mean	Percentage or SD
Age, years	Mean $\pm$ SD	20.37	2.27
Age range	Minimum–maximum	17–24	—
Gender	Female	169	33.8%
	Male	168	33.6%
	Other	163	32.6%
Mental health status	Category 0	22	4.4%
	Category 1	137	27.4%
	Category 2	341	68.2%

The three gender groups were nearly equally represented, showing that this data set was not very skewed towards any one gender category, as seen in Figure 1.

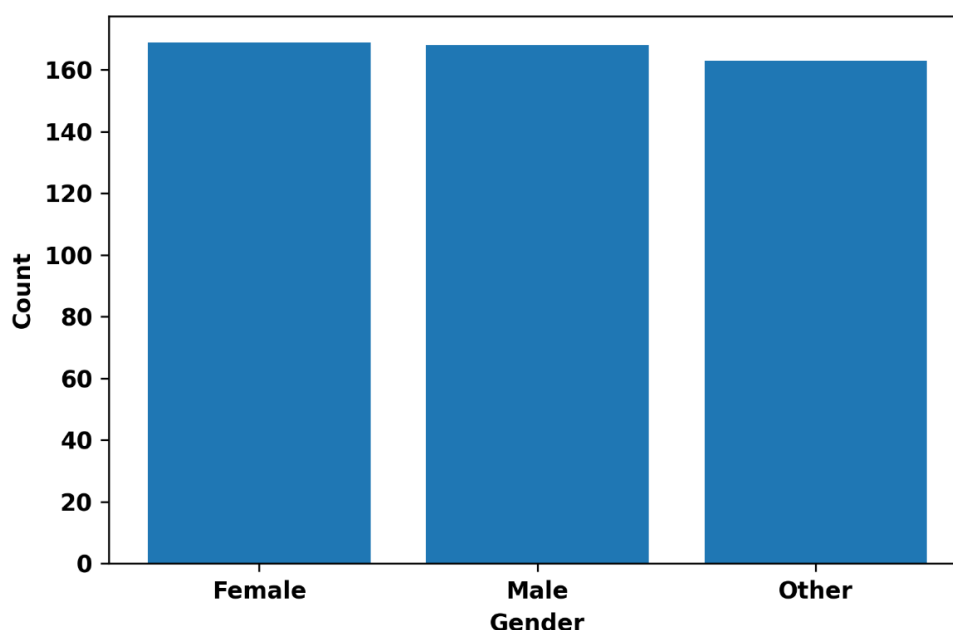


Figure 1. Distribution of participants according to gender

3.2 Descriptive Statistics

The relative norms of the main psychological, behavioural and academic variables after normalization are shown in Figure 2. The results have shown that on average, in the range provided in the dataset, there is moderate level of stress, anxiety and depression.

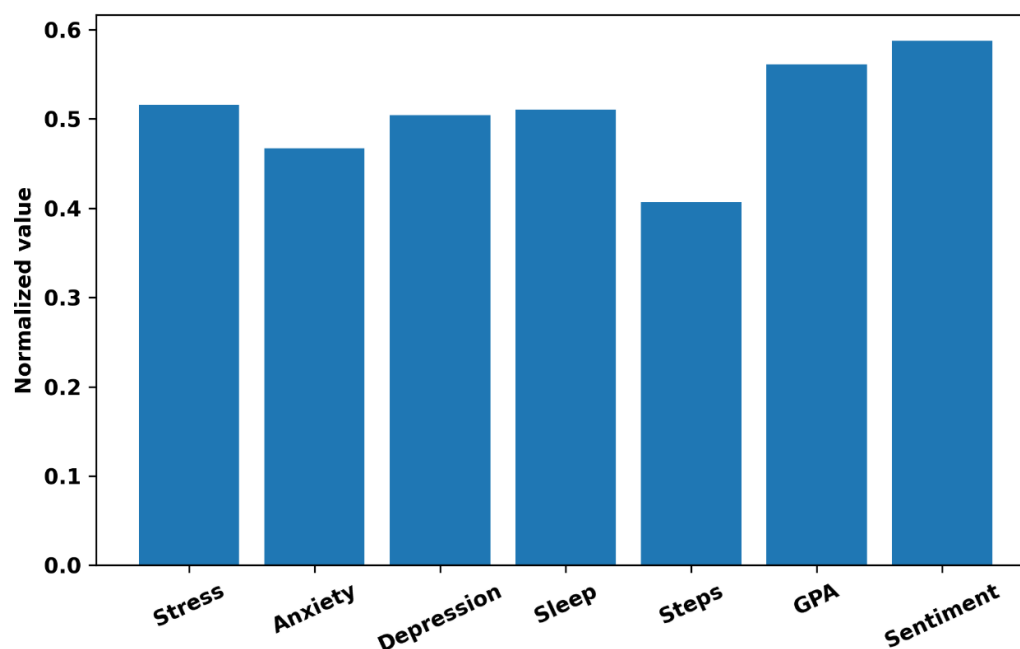


Figure 2. Normalized mean levels of the principal study variables

Descriptive statistics of the continuous variables in the study are shown in Table 2. The mean stress level was 3.06 with a range of 1 to 5. The mean score for anxiety was 9.81 and the mean score for depression was 13.62. The average sleep time was 6.06 hours, and the average number of steps per day was 6,067. The mean GPA was 2.81 and the mean sentiment score was positive but somewhat low at 0.19.

Table 2. Descriptive statistics of the principal study variables

Variable	Mean	Standard deviation	Minimum	Maximum
Age	20.37	2.27	17.00	24.00
GPA	2.81	0.51	1.29	4.00
Stress level	3.06	1.43	1.00	5.00
Anxiety score	9.81	6.35	0.00	21.00
Depression score	13.62	8.32	0.00	27.00
Sleep hours	6.06	1.52	3.00	9.00
Steps per day	6,067.01	1,974.22	2,000.00	12,000.00
Sentiment score	0.19	0.37	-0.86	0.92

These results reveal significant differences in levels of anxiety, depression, length of sleep, exercise, and emotional sentiment, suggesting that the students differed psychologically and behaviorally in meaningful ways.

3.3 Correlation Between Study Variables

Pearson correlation analysis was undertaken to see if there was any relationship between the psychological, behaviour, academic and mental-

health variables. The mental-health-status coding was positively correlated most with depression score, next with anxiety score and then stress level. GPA showed weak positive correlation with mental-health status and there was no significant correlation with sleep hours and sentiment score. Table 3 presents the Pearson correlation coefficients among the principal study variables to examine their relationships.

Table 3. Pearson correlations among the principal study variables

Variable	Stress	Anxiety	Depression	Sleep	GPA	Sentiment	Mental health status
Stress level	1.000	0.001	-0.006	-0.041	0.042	-0.012	0.258** *
Anxiety score	0.001	1.000	0.071	-0.030	0.060	0.037	0.381** *
Depression score	-0.006	0.071	1.000	-0.027	0.001	-0.024	0.556** *
Sleep hours	-0.041	-0.030	-0.027	1.000	-0.028	0.022	-0.036
GPA	0.042	0.060	0.001	-0.028	1.000	-0.048	0.080
Sentiment score	-0.012	0.037	-0.024	0.022	-0.048	1.000	0.012
Mental health status	0.258***	0.381***	0.556***	-0.036	0.080	0.012	1.000

*Note. **p < 0.001.

Depression score had a good positive correlation with the coded mental-health-status category ($r = 0.556$, $p < 0.001$). A moderate positive correlation was found with the anxiety score ($r = 0.381$, $p < 0.001$) and a weak positive correlation was found with the stress level ($r = 0.258$, $p < 0.001$). All other relationships with mental-health

status were small and statistically trivial.

The correlation matrix is shown graphically in Figure 3. The above darker association between depression and mental-health status is reflective of the fact that depression was the psychological variable that was most closely linked to the outcome.

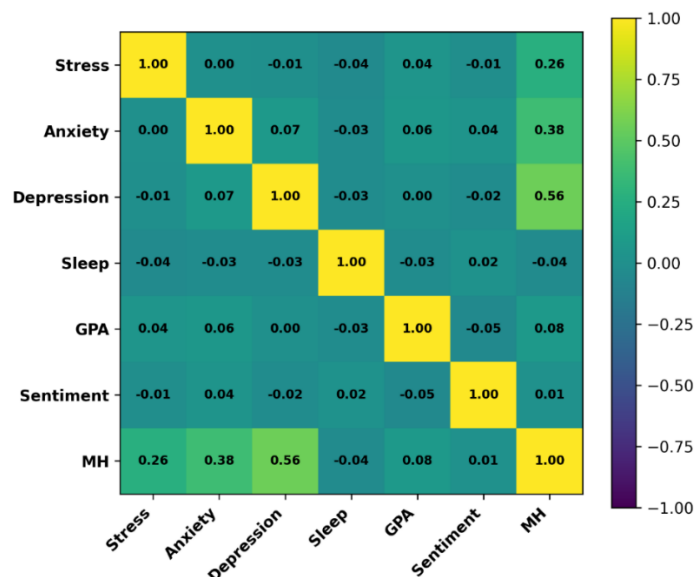


Figure 3. Correlation matrix of the principal study variables

3.4 Regression Analysis

The standardized odds ratios from the ordinal logistic regression model are shown in Figure 4. The ORs for depression, anxiety and stress were

much greater than 1, while the other predictors had a CI that contained the null value.

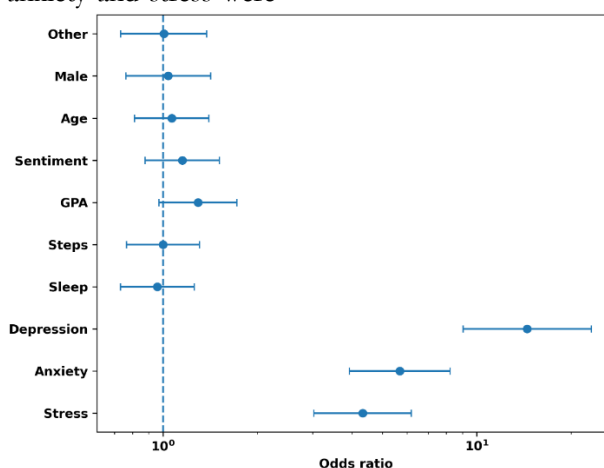


Figure 4. Standardized ordinal logistic regression odds ratios for mental-health status

Mental-health status had three ordered numerical categories and thus an ordinal logistic regression analysis was done. All continuous predictors were standardized before being added, so that the odds ratios refer to the effect of a 1 standard deviation

increment in each predictor. Gender was coded with female students as the reference group. Table 4 presents the results of the ordinal logistic regression analysis identifying the significant predictors of students' mental health status.

Table 4. Ordinal logistic regression predicting a higher mental-health-status category

Predictor	B	Odds ratio	95% CI for odds ratio	p-value
Stress level	1.465	4.327	3.028–6.185	<0.001
Anxiety score	1.737	5.681	3.926–8.222	<0.001
Depression score	2.673	14.480	9.048–23.173	<0.001
Sleep hours	−0.041	0.960	0.732–1.260	0.769
Steps per day	0.001	1.001	0.766–1.308	0.996
GPA	0.257	1.293	0.973–1.719	0.077
Sentiment score	0.142	1.152	0.878–1.512	0.306
Age	0.065	1.067	0.812–1.402	0.642
Male gender	0.039	1.039	0.762–1.418	0.807
Other gender	0.006	1.006	0.734–1.379	0.969

Note. Female gender was used as the reference category. Odds ratios for continuous variables represent a one-standard-deviation increase.

Among the independent factors, depression was the most powerful in predicting a change towards a more positive mental-health-status coded subscale. For every 1 standard deviation increase in depression score, about 14.48 times higher odds of being in a higher category. Anxiety nearly doubled the risk by a factor of 5.68 and stress nearly tripled the risk by a factor of 4.33. Adjusted for the psychological predictors, sleep duration, physical activity, GPA, sentiment, age, and gender were not statistically significant.

3.5 Interpretation of Findings

Results showed that the coded mental-health outcome was related more strongly to psychological distress than were demographic, academic, or lifestyle factors. Depression was found to be the most influential variable followed by anxiety and stress. Students who have higher emotional and psychological problems subsequently have lower levels of coping ability for academic and environmental problems. Regarding the study title, the lower scores for depression, anxiety, and stress considered indirect evidence of higher psychological resilience and adaptability. But, there were no validated resilience, adaptability or future-readiness scales. Thus, at the present time, the results should be

considered as indicators of the status of psychological factors related to adaptive functioning and not as the direct measurement of resilience and readiness.

No independent association of sleep hours, physical activity, GPA, sentiment, age, and gender with mental-health status was found in the adjusted model. This means that variables of psychological distress were more significant than the existing behavioural and demographic variables in this data set. The overall results showed the relevance of institutional counselling, early psychological screening, stress-management programmes and emotional-support interventions in creating psychologically resilient and adaptable students for future-ready educational contexts.

4. Discussion

Psychological and behavioural aspects of student resilience and adaptability were explored from an open mental health data set. Demographic and behavioural variables were less predictive of mental health status compared to depression, anxiety, and stress. Overall, psychological wellbeing was a key factor in the students' capacity to cope with academic demands and the importance of being resilient and adaptable to future education and work settings (Co-operation and Development 2021; World Economic Forum 2020).

There were strong relationships between

resilience and emotional stability and academic functioning. Those with less psychological distress exhibited greater coping and adjustment. This is in line with studies which have found that resilience is associated with persistence, motivation and better academic outcomes (Robbins, Kaye, and Catling 2018; Wang et al. 2026). Self-regulation also promotes resilience as it can enable students to effectively regulate their emotions and learning behaviours (Panadero 2017).

The world is changing in terms of technology and work, and adaptability is an imperative in the modern education context. While not directly measured, there is evidence that improvements in psychological wellbeing aid students adaptability to academic demands. This resonates with the international focus on socio-emotional learning, lifelong learning and adaptive thinking skills for preparedness (Co-operation and Development 2021). This is further supported by motivation and engagement, as well as supportive learning environments, which further enhance adaptability (Hagenauer, Lazarides, and Järvenoja 2023).

Depression, anxiety and stress were the most influential psychological variables affecting the mental health status of students. Greater psychological distress was correlated with less emotional functioning, which was an indicator of decreased ability to manage academic stress. In contrast, the independent effects of behavioural factors were relatively small after accounting for psychological distress. This aligns with the evidence that resilience is more a psychological and emotional phenomenon than merely behavioural (Yeager et al. 2022). Recent developments in artificial intelligence have also shown its promise in more precisely identifying psychological profiles associated with resilience, which in turn can facilitate early intervention efforts in educational environments (Xu et al. 2026).

Overall, the findings from this study align with the current literature on the link between resilience and psychological well-being and student success. Emotional stability and coping skills play important roles in resilience in higher

education and supportive teaching/learning environment is important for resilience of university students (Robbins et al. 2018; Wong 2025). Likewise, Salmela-Aro and Upadaya (2020) determined that SE skills decrease school burnout and boost engagement (Salmela-Aro and Upadaya 2020). The current analysis, however, did not find a significant independent contribution of daily PA after controlling psychological variables, consistent with what Alawie et al. (2025) reported (Alawie, Dupéré, and Olivier 2025). Peer interactions and sociocultural contexts also have been identified as factors to consider in student engagement, but were not present in the current data set (Wong 2025).

The results highlight the need for the psychological wellbeing of students to be considered in educational planning and student support services. Schools and colleges must focus on resilience-enhancing programs, mental health education, emotional learning and counselling for students to enhance adaptive capability. Teacher readiness, as well as supportive instructional practices, are also critical for creating psychologically safe learning environments, in which resilience can flourish (Scherer et al. 2021). This is in line with international education systems which call for social, emotional and adaptive skills to be nurtured in addition to academic attainment (Co-operation and Development 2021).

Regular psychological screening should be carried out in educational institutions for early detection of stress, anxiety and depression. There is a need for universities to support coping by increasing counselling, resilience training, self-regulated learning and emotional support. Encouraging positive peer relationships, positive teacher relationships, and learning environments can also enhance engagement, resilience, and long-term success (Panadero 2017). These actions contribute to the students' readiness for future learning and work requirements.

This study was particularly strong in using a relatively large open-source student data set which contained multiple psychological,

behavioural and academic and demographic variables and these enabled comprehensive statistical analysis. However, there are a number of drawbacks that need to be recognized. The cross-sectional design limits conclusions about causality and the data did not contain validated instruments of resilience, adaptability, and future readiness. Thus, these were understood indirectly, via mental health and psychological indicators. Future studies should include standardized scales of resilience and adaptability, longitudinal designs, and extended education variables in order to offer a better picture of psychological readiness for future-ready education.

5. Conclusion

This study explored psychological and behavioural correlates of resilience and adaptability among students to gain an understanding of their contribution to the future-ready education journey. The results indicated that there were comparatively greater associations between psychological distress (depression, anxiety, stress) and students' mental health status compared to their demographic characteristics and behavioural factors. The findings suggest that psychological well-being is an essential part of students' coping strategies and adaptation to educational contexts. While the data set was not

directly focused on measures of resilience or adaptability, students' mental health was assessed and their emotional functioning and related psychological indicators were useful for providing meaningful evidence of students' adaptive capacity. Results indicate that interventions that alleviate psychological distress and foster emotional wellness promote resilience, adaptability, and readiness for future academic and career challenges. Therefore, education systems must embed mental health promotion, resilience-building programmes, counselling services and socio-emotional learning in their support systems for students. The study adds to the body of evidence in the literature on the importance of psychological well-being for the development of future-ready learners. The cross-sectional nature of the study design, however, and the lack of uniform measures of resilience and adaptability make causal interpretation difficult. Longitudinal designs and psychometric instruments using psychopathological scales should be used in future studies to explore the concept of resilience, adaptability, and readiness for the future in greater depth. These investigations yield more convincing evidence for developing educational strategies to promote students' long-term personal, academic and professional achievement.

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