ISSN 1840-4855
e-ISSN 2233-0046

Original scientific article
http://dx.doi.org/10.70102/afts.2025.1834.877

AN ECOLOGICAL FRAMEWORK OF STUDENT RESILIENCE IN THE POST-PANDEMIC CONTEXT

Bobby Pudukaden[1*], Dr.A. Martin Jayaraj[2]

[1]Research scholar, Department of Management, Karpagam Academy of Higher Education, Coimbatore, Tamil Nadu, India. e-mail: bobbypaul22873@gmail.com, orcid: https://orcid.org/0009-0009-9386-4089*
[2]Professor, Department of Management, Karpagam Academy of Higher Education, Coimbatore, Tamil Nadu, India. e-mail: martin.a@kahedu.edu.in, orcid: https://orcid.org/0000-0003-4288-3174

Received: September 24, 2025; Revised: October 31, 2025; Accepted: December 04, 2025; Published: December 30, 2025

SUMMARY

The paper examines the impact of online communities, learning environment, family harmony, and health habits, and their effects on student resilience and work-life balance in post-pandemic Kerala. It also studies the mediation effect of resilience between these factors and academic adaptability, as well as well-being. A mixed-method sequential design was used. The quantitative data were sampled through 5-point Likert structured surveys on 510 students (15-17 years) in 229 schools of Thrissur District under higher secondary stratified by gender, place, and school type. Online engagement, learning environment, family harmony, and health habits were used as independent variables, resilience (Connor-Davidson Resilience Scale), and work-life balance (SWLB) were used as dependent variables. The analysis of data was done using descriptive statistics, exploratory factor analysis (EFA), Pearson correlation, multiple regression, and structural equation modeling (SEM). Semi-structured interviews were used to collect qualitative information that helps to put survey findings into perspective. There were moderate and significant positive relationships between online communities, learning, family, and health ($r = 0.607$ -0.691, $p < 0.001$). Learning ($r = 0.723$), online communities ($r = 0.714$), health habits ($r = 0.694$), and family harmony ($r = 0.643$) had a strong correlation with resilience. There was a moderate correlation between work-life balance and online engagement ($r = 0.397$), learning ($r = 0.375$), health ($r = 0.314$), and family ($r = 0.310$). SEM established the good fit of the model in all the hypothesized relationships (CFI > 0.98, RMSEA < 0.025, SRMR < 0.03), which confirms the postulated four-factor resilience framework. There are many multidimensional outcomes of student resilience and work-life balance, which depend on the synergistic effect of digital engagement, learning environment, family support, and health habits. Holistic interventions of these domains can be used to boost adaptive and well-being in post-pandemic education settings.

Key words: *student resilience, online communities, learning environment, family harmony, health habits, work-life balance, and post-pandemic education.*

INTRODUCTION

Overview of Pandemic Challenges for Students

The COVID-19 outbreak had a significant negative effect on the lives of students and introduced a set of complex issues that affected their academic, social, and emotional health. The sudden transition to distance education caused inequity because learners who lacked access to reliable internet or computers could no longer engage, increasing the so-called digital divide. Low-income and non-rural and disadvantaged students were severely disadvantaged by the absence of stable internet access and digital devices, which has been described as learning loss. This was not only an issue of access, as the studies within the Indian setting prove, but the quality of remote pedagogy also did not engage students in many cases [1]. Learning pressure was also increased because of disorganized schedules, lack of teacher communication, and lack of knowledge about assessments, with some students citing increased stress and burnout. The result of the extended physical distancing and social isolation corroded the bonds with peers, which brought about loneliness and a lack of motivation [2]. At the same time, family stress levels were on the rise because families were facing economic turmoil, health-related concerns, and substandard living conditions, putting hardship on the parent-child relationships. Anxiety and depression, among other mental health problems, shot up all over the world, with adolescents being especially susceptible to them because of disturbed developmental markers. A meta-analysis by [3] established that a quarter of the youth showed clinically significant symptoms of depression in the pandemic. To add to all these problems, decreased access to school-based mental health services left most students without much-needed care. At the same time, there is a considerable body of evidence on a steep decrease in mental health, such as longitudinal research, as [4] does. In this study, social isolation, academic uncertainty, continuous screen exposure, and absence of support systems on campus are among the elements that have propelled the level of anxiety, depression, and loneliness among students of all ages. The health-related practice, including sleep and physical activity, also worsened, which negatively affected resilience [5]. The research indicates the cascade effect. Psychosocial stress and digital barriers had a direct effect on the academic performance and engagement. Not only formal learning but also critical co-curricular and social development were interrupted by the pandemic, and a multifaceted recovery plan that not only covers educational bridging but also increased mental health help in educational institutions worldwide is necessary. All these stressors together highlighted the necessity to implement holistic interventions that consider educational, family, and psychosocial levels in order to protect student wellbeing during crisis situations.

Definition of Resilience in an Educational Context

Resilience in education is the dynamic ability of students to adjust, recuperate, and continue with academic and emotional comfort in the face of such disruptions as learning settings, socio-economic challenges, or personal crises. It is a *compound of individual* (e.g., self-efficacy, growth mindset) and *social support systems* (e.g., peer networks, teacher-student relationships) and *institutional resources* (e.g., offered counseling, equal learning tools) factors that interact in a way that promotes perseverance and positive outcomes [6][7]. Resilience is based on developmental psychology and is not the lack of vulnerability but rather a process that is shaped by protective factors that reduce risks. As an example, the Ordinary Magic model by Masten highlights that resilience is based on daily adaptive mechanisms, including effective problem solving and comfortable relationships, and not extraordinary characteristics [6]. The resilience in a pandemic can be achieved by the possibility of students overcoming the challenges of remote learning, maintaining motivation during isolation, and utilizing family or community support to mitigate the effects of stressors. Notably, the concept of resilience is situational; inequities across a system (e.g., digital access disparities) may impede its implementation, which is why inclusive policies are required. The recent research points out that strong students tend to develop *academic buoyancy* in the short-term and long-term adaptivity, which are essential in times of crisis [8]. Therefore, educational resilience is a multidimensional construct that develops out of interactions between personal agency and external supports as a means by which learners can succeed despite adversity. Student resilience in modern research on educational theories is viewed as a dynamic and changeable ability, and not an intrinsic personal factor of learners, that allows them to overcome and adapt to socio-emotional and academic difficulties.

Statement of Problem

To achieve effective post-pandemic recovery, it is important to determine the interaction of online communities, learning settings, family compatibility, and health practices to enhance student resilience. Nonetheless, the effect of individual and synergistic impacts of these factors on resilience and academic adaptability is not quantified, and the mediating role of work-life balance has not been studied. These knowledge gaps are obstructions to the design of evidence-based interventions. This paper seeks to examine these associations in order to promote focused, resilient student adaptation support mechanisms in modern education.

Research Objectives

- To explore how the interplay of online communities, learning environment, family harmony, and health habits collectively contributes to students' resilience in the post-pandemic context.
- To assess the individual and comparative impact of each factor (online communities, learning environment, family harmony, health habits) on students' self-reported resilience and academic adaptability.
- To examine how students' post-pandemic work-life balance mediates or is influenced by their engagement with resilience-enhancing factors (online communities, learning environment, family harmony, health habits).

Hypothesis

H1: There is a significant and robust interrelationship among the four factors of resilience, such as online, learning environment, family harmony, and health habits, such that their combined presence forms a cohesive framework. This model exhibits a high degree of mutual reinforcement with every factor directly and positively impacting the other, and this explains a considerable amount of variance in student resilience in the post-pandemic situation.

H2: Student resilience is positively related to online communities, learning environment, family harmony, and health habits, each individually.

H3: The work-life balance of student's post-pandemic is based on their interactions with resilience-building factors (online communities, learning environment, harmony in the family, and health habits), and the work-life balance enhances the overall resilience of the students.

Significance

The value of this research is that it offers a novel, systems-oriented approach to the student resilience concept, of paramount importance to reconfigure the post-pandemic education in India. It is based on the research conducted in such institutions as Harvard, which assumes that resilience is the byproduct of interacting adaptive systems, establishing this paper as a step toward overcoming individual approaches. The focus of the study is on the mutual interaction of four significant factors: digital efficacy, the learning environment, family harmony, and health habits. This is not merely an academic exercise; it addresses a pressing national need. The drastic digital divide and family stresses revealed by the pandemic, which are supported by research findings of IIT Bombay, show that when one of the factors, including the stressful home environment, is broken, the performance of the others, including online learning, will go down the drain. This research empowers the interventions by holistically showing the relationship between these pillars and offers an empirical basis for the same. It also claims that the policy of education should be aimed at both training teachers to incorporate inclusive digital pedagogy and parenting to create harmonious homes, and the inclusion of health in the curriculum. This is a combined strategy that needs to make a systemic weakness a strategic advantage and create a really resilient educational ecosystem that can be the future of education in India.

This study focuses on online communities, learning environment, family harmony, and health habits in Kerala, where stressful academic competition and post-pandemic shifts to hybrid education have

worsened the situation, which is needed because of critical gaps in building resilience and work-life balance in students. In Kerala, the education system is driven by technology, so online communities are essential to provide peer support and collaborative learning, but the digital divide still exists in the rural and marginalized regions, impacting equitable access. Kerala is a collectivistic culture that has traditionally attained family harmony. It has cushioned academic stress, but has been strained by economic and health crises associated with the pandemic. Sleep and nutrition are health behaviors that are influenced by random online routines and have a direct effect on cognitive ability and emotional stability. Moreover, the fact that Kerala is shifting to blended learning spaces, which do not always have infrastructure, only worsens the burnout, which weakens the work-life balance. The study will provide practical policy implications that should be implemented by policymakers to enhance digital inclusivity, family counseling initiatives, and wellness in schools. To the students, it finds viable means of balancing academics and self-care to enable them to succeed in the high-pressure environment of the Kerala education system without being forced to leave school. This study is critical in developing resilient and balanced learners in a post-pandemic world.

Key Contributions of the Study

- The paper suggests an integrated model of student resilience, which entails online communities, educational setting, family harmony, and health behaviors.
- It empirically studies the relationship between these factors and how they work together to impact post-pandemic student resilience.
- The study proposes work-life balance as an intermediate variable that determines resilience and academic flexibility.
- It offers a contextualized understanding of the post-pandemic education in Kerala, and the implications of this understanding on policy and institutional practice are evident.

The present paper is structured in a way that it will systematically review the aspects of factors that determine student resilience and work-life balance in the post-pandemic education environment. Section 1 (Introduction) describes pandemic-related challenges to students and conceptualizes resilience in education, presents the research problem, research objectives, hypotheses, and provides an overview of the meaningful contributions of the study. Section 2 (Literature Review) critically summarizes previous literature regarding online communities, learning settings, family harmony, and health habits, and provides the most important gaps, which justify the current study. Section 3 (Methodology) describes the sequential mixed-method research strategy, the characteristics of the participants, the variables, and data collection procedures and tools, as well as the ethical issues. Section 4 (Data Analysis) shows the descriptive statistics, correlation analysis, regression output, and structural equation modelling outcome. Section 5 (Discussion) explains the findings in the scope of the current theories and empirical evidence, and then it is supplemented by practical implications. Section 6 (Conclusion) is the synthesis of the main findings, limitations, and Section 7 (Future Study) indicates the course of future research.

LITERATURE REVIEW

Online Communities

The post-pandemic literature places the online community as the most important external resilience support resource that will complement formal education. Research indicates that applications like Discord, Reddit, and WhatsApp serve as online third spaces, which facilitate collaborative learning, quick academic aid, and peer-related emotional management [9][10]. Although these settings help to improve a sense of belonging and academic confidence, the risks of distraction and boundary erosion are also mentioned and require moderation of engagement [11]. In Kerala, the use of WhatsApp-based academic networks is also indicative of high levels of digital literacy and existing underlying infrastructural inequities, and these intermediary factors moderate the resilience benefits of being online.

Taken together, the literature proposes that online communities can only be resilient when they are characterized by equal access and balanced usage.

Learning Environment

Recent studies extend the learning context of the physical classrooms to include psychosocial safety, pedagogical practices, and institutional flexibility. Relational trust and psychological safety environments have proven to be of great benefit as buffers to post-pandemic stress and adaptive coping [12]. Anxiety is also minimized with trauma-driven and adaptable classroom layouts, which also promote cognitive interest. The hybrid learning models exhibit better resilience results compared to the fully remote systems because of the systematic flexibility and teacher-student contact. Nonetheless, these advantages are undermined by inequalities in access to digital tools and unequal communication, especially among marginalized students in Kerala. Therefore, resilience is not determined by the modality of learning only, but by the quality of the support that is ingrained in it.

Family Harmony

Familial harmony is one of the resilience systems at the post-pandemic level. The longitudinal and meta-analytic studies attest to the fact that predictive routines, emotional validation, and effective conflict repair lead to self-regulation and academic persistence [13]. These protective processes, however, are destabilized by economic instability, which increases role overload and student stress. In collectivist-based Kerala, family support takes center place, but employment gaps in rural-urban and post-pandemic areas put an overload on traditional coping systems. According to the literature, family harmony can only enhance resilience with the help of wider socioeconomic stability.

Health Habits

The emerging resilience research on the post-pandemic period recognizes health behaviors as biological facilitators of academic adaptation. Cognitive control, emotional regulation, and learning ability are direct results of sleep regularity, physical activity, nutrition, and stress management [14]. The interruptions of these habits are related to exhaustion, stress, and burnout, especially in students who have to combine hybrid education with family life. These results highlight the understanding that the concept of resilience is not purely psychological but rather placed in a biopsychosocial context where physical wellbeing is connected to academic performance.

Gaps Identified

Although a fair amount of research is available, the current studies mostly investigate online engagement, learning environments, family dynamics, and health habits separately. This disjointed manner ignores their interactive impacts in the post-pandemic real-world scenarios. The available empirical literature on the combined effect of these factors on student resilience and work-life balance is limited, especially in the context of the culturally particular and digitally disparaging environment of Kerala. To fill this gap, an analytical framework that spans across domains is needed [15].

METHODOLOGY

Research Design

This research design is based on a sequential mixed-methods research design to investigate the interdependent variables of student resilience and work-life balance in the post-pandemic educational setting in the state of Kerala. The quantitative part utilized a structured survey with 5-point Likert scale questions, which had been given to a stratified sample of students in different institutional environments. The online community engagement, quality of learning environment, family harmony, and health habits as four important predictors were investigated in terms of their overall impact on the results of resilience. In order to improve analytical rigor on top of Structural Equation Modeling (SEM), quantitative data were analyzed using a multi-stage statistical model that involved descriptive statistics, reliability

analysis, exploratory factor analysis (EFA), Pearson correlation analysis, and multiple regression analysis before the estimation using SEM. These steps have substantiated construct validity, evaluated direct correlations, and specified the model specification. SEM was then used to test interrelationships and mediation in complex interactions through an integrated resilience system. The qualitative stage entailed semi-structured interviews of a purposely chosen sample of respondents in the survey to get lived experiences and contextual details, especially in terms of academic stress and access to digital devices. The triangulation approach was methodological in nature and reinforced the research by applying quantitative patterns, which explain what happens with qualitative data, which sheds light on how and why these processes take place. This combined methodology guarantees empirically strong and contextually based results, which provide practical information that can be utilized to enhance the support system of students in the post-pandemic educational environment in Kerala [16].

Participants

The sample population is 15 to 17-year-old 11^{th} and 12^{th}-grade students of 229 higher secondary schools in Thrissur District (urban/rural) with a gender balance (girls/boys). The sample size comprised 510 participants, of whom the convenience sampling approach was used, and there was stratification in terms of location and gender to increase representativeness. The Kaiser-Meyer-Olkin Measure of Sampling Adequacy (0.923) was statistically used to determine the size of samples, and the Bartlett test of Sphericity ($\chi 2 = 2878.53$, $p<0.001$) was significant to confirm the appropriateness of data to factor analysis. This model explained 55.78% of the total variance, which means that the mentioned factors (e.g., ONLINE, LEARning, FAMILY, HEALTH) jointly create more than half of the variability of the dependent variable [17]. The degree of post-stratification weighting was made to correct the possible biases and adjust the sample to the demographics of Kerala. The schools will be sampled based on their socioeconomic levels because data collection focuses on schools at different levels in order to capture a wide range of experiences regarding resilience and work-life balance processes.

Variables

Online communities (frequency of participation, social support), learning environment (learning structure, access to resources), family harmony (communication, resolution of conflicts), and health habits (sleep, exercise, nutrition) are independent variables measured using a 5-point Likert scale. Exploratory factor analysis (EFA) derived these factors, ensuring construct validity and reliability (Cronbach's $\alpha > 0.70$). Also, EFA was conducted within the structural equation modeling (SEM) framework, and all factor loadings ranged from 0.58 to 0.70 for their respective factors. These loadings denote moderate to high levels of relationship between the measured variables and the latent constructs that they validate, which implies that the measured variables are meaningful variables of the factors they measure [18]. Student resilience (adaptability, stress management) and work-life balance (time management, reduced burnout) are dependent variables, which are operationalized using validated scales: resilience through the Connor-Davidson Resilience Scale (CD-RISC) and work-life balance through the Student Work-Life Balance Scale (SWLB). Dependent variable, work-life balance employs 5-point scales, with factor loadings from 0.59 to 0.68, confirming the items' reliability and adequacy in measuring the latent factor. This framework ensures robust, multidimensional assessment of post-pandemic student wellbeing [19].

Figure 1 presents the conceptual framework illustrating the relationships among online community engagement, learning environment quality, family harmony, and health habits as key predictors of student resilience. Student resilience is depicted as a central mediating factor influencing work–life balance in Kerala's post-pandemic educational context, reflecting the study's sequential mixed-methods approach integrating quantitative analysis and qualitative insights.

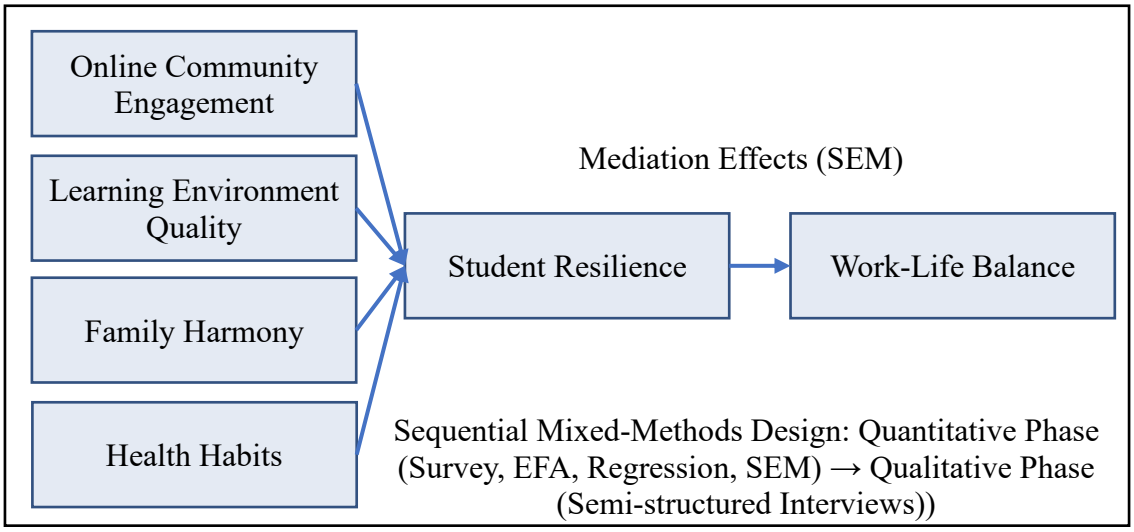

Figure 1. Conceptual framework of the study

Data Collection Tools

The researcher adopts a mixed-method design that involves both structured questionnaires (5-point Likert scale of quantitative data) and semi-structured interviews/focus group discussions (to gain qualitative data) [20]. The information is gathered through surveys using Google Forms (efficiently reaching the target audience, real-time analytics) and face-to-face/online interviews. The SPSS 25 (descriptive statistics, regression) and AMOS 21.0 (structural equation modeling) quantitative analyses are applied to evaluate the relationships between variables. The questionnaire was refined on a pilot study of 30 students to make sure it was clear, reliable, and culturally appropriate. This is a dual strategy that balances scale (sample survey with depth interviews) in order to capture the trends that define resilience and work-life balance at a larger scale and the contextual accounts on resilience and work-life balance in the post-pandemic educational environment in Kerala [21].

Ethical Considerations

This research was conducted with strict ethical considerations, where the priority was given to the confidentiality, autonomy, and informed consent of the participants. The involvement was voluntary, and the participants were entitled to drop out at any time without being punished. All data collection tools were made anonymous by not mentioning personally identifiable information (e.g., names, student IDs). Informed consent was obtained by giving the respondents a written explanation of the purpose of the study, procedures, and their rights. These measures were to help reduce risks whilst maximizing trust and transparency, which is essential to extract honest answers to artifact equitable, student-driven interventions.

DATA ANALYSIS

Descriptive Statistics

A total of 510 students (15-17 years; mean = 16.2, SD = 0.8) aged 11 and 12 in urban (52%) and rural (48%) higher secondary schools in Thrissur District, Kerala were involved in the study. The gender ratio was equal (51% girls, 49% boys). Representation of the diversity of socioeconomic factors was made possible by convenience sampling; stratified by geographical location and gender, 65% of the interviewees were students of government schools, and 35% of all were students of private institutions. The levels of resilience (M = 16.08/20, SD = 1.70) and work-life balance issues (M = 3.82/5, SD = 0.68) indicated moderate rates. Online communities (α = 0.728), learning environment (α = 0.71), family harmony (α = 0.71), and health habits (α = 0.77) are independent variables obtained through Exploratory Factor Analysis (EFA). The factor model underlying EFA is expressed as:

$$X = \Lambda F + \varepsilon \qquad (1)$$

In equation (1), X is the observed variable vector, Λ denotes factor loadings, F represents latent factors, and ε is the error term.

Internal consistency was assessed using Cronbach's alpha, computed as:

$$\alpha = \frac{k}{k-1}\left(1 - \frac{\sum \sigma_i^2}{\sigma_T^2}\right) \qquad (2)$$

In equation (2), k is the number of items, represents item variance, and denotes total variance.

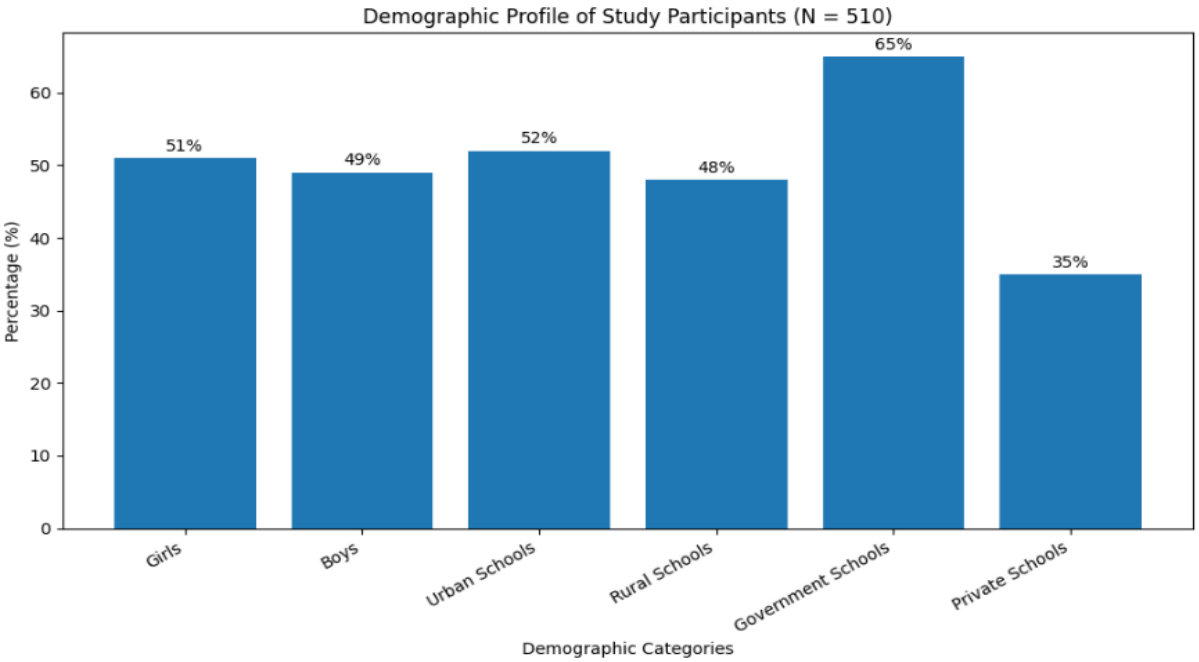

Figure 2. Demographic profile of study participants by gender, school location, and type of institution (N = 510)

The bar chart in Figure 2 shows how the 510 study participants were distributed in terms of demographics. The sample is evenly spread in terms of gender (51% girls, 49% boys) and almost equally in terms of both urban (52%) and rural (48%) schools. More students were recruited in the government schools (65%) than in the private institutions (35%), which shows that there was a wider spread of participation by the government education sector.

Key Findings by Factor

The correlation coefficient was measured using Pearson because it is applicable to studying bivariate associations, and it is given by:

$$r = \frac{\sum(X - \bar{X})(Y - \bar{Y})}{\sqrt{\sum(X - \bar{X})^2 \sum(Y - \bar{Y})^2}} \qquad (3)$$

In equation (3), X and Y signify the measured values of two variables, where $\bar{X}$ and $\bar{Y}$ are their means. The value of r is unitless and can take the value of either -1 or +1, which reflects the strength and direction of the linear relationship.

It can be seen that the correlation between the variables ONLINE, LEARNING, FAMILY, and HEALTH has moderate and strong positive relationships ($P<0.001$), with coefficients of 0.607 to 0.691. ONLINE and FAMILY (0.691) have the highest correlation, which indicates that the choices of people who are

active online can be closely intertwined with the processes or interactions with their family. On the same note, ONLINE has significant relationships with LEARNING (0.644) and HEALTH (0.610), suggesting that digital activity, education, and health-related actions could be synergized. There is also a rather strong relationship between FAMILY and HEALTH (0.681), which can be understood as the support of family and wellbeing. The relationship between LEARNING and FAMILY (0.615) as well as their HEALTH (0.607) provides yet another confirmation of the overlapping effects of education involvement, family setting, and health behaviors. Although these correlations indicate that there is an important relationship, it cannot be inferred that it is caused, and there are contextual factors (e.g., socioeconomic status, cultural norms) that mediate such associations.

The correlation matrix suggests that there are positive and statistically significant ($p < 0.01$) correlations between RESILIENCE and all other variables (ONLINE, LEARNING, FAMILY, HEALTH), having Pearson coefficients that lie between 0.643 and 0.723. The highest correlation is between RESILIENCE and LEARNING (0.723), then ONLINE (0.714) and HEALTH (0.694), and FAMILY, a little weaker, yet a strong relationship is observed (0.643). All the correlations are very high and founded on a significant sample size (N = 510), supporting/0258/0258 the credibility of the results. This implies that the more resilient the individuals are, the more they are likely to report involvement in online activities, learning orientations, health practices, and supportive family dynamics. The significance of LEARNING and ONLINE as the primary correlates suggests that intellectual involvement and digital flexibility are closely related to resilience. These findings demonstrate resilience as a multidimensional construct that is affected by various areas and provide a basis for how to develop an intervention that can address education, digital literacy, health behaviors, and family systems to strengthen resilience.

The correlation matrix shows statistically significant, positive associations ($p < 0.05$) between WORK LIFE and a the variables ONLINE (0.397), LEARNING (0.375), FAMILY (0.310), and HEALTH (0.314), based on a consistent sample size ($N = 510$). Each of the correlations is moderate in strength, with ONLINE being the most strongly correlated with WORK LIFE, and then LEARNING, HEALTH, and FAMILY. Although the correlations are statistically significant ($p = 0.000$ with all pairs) and their effect sizes are moderate, indicating that these variables only contribute a part to the variance in WORK LIFE, it indicates the complexity of the factors affecting work-life balance. The results suggest that increased involvement in online activities, learning activities, health behaviors, and family relations could be consistent with the perceived work-life harmony.

Statistical Analysis

Before SEM estimation, the direct predictive effects of ONLINE, LEARNING, FAMILY, and HEALTH on RESILIENCE and WORK-LIFE BALANCE were evaluated with the help of the multiple regression analysis. The regression model can be given as:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \varepsilon \qquad (4)$$

In equation (4), Y is the dependent variable (RESILIENCE or WORK-LIFE BALANCE), X_1 - X_4 are defined as ONLINE, LEARNING, FAMILY, and HEALTH, respectively, and e stands for the error term. The regression results informed the specification of structural paths in subsequent SEM models.

Structural Equation Modeling integrates measurement and structural components and is represented as:

$$\eta = B\eta + \Gamma\xi + \zeta \qquad (5)$$

In equation (5), η denotes endogenous latent variables, ξ represents exogenous variables, B and Γ are coefficient matrices, and ζ is the disturbance term.

MODEL 1

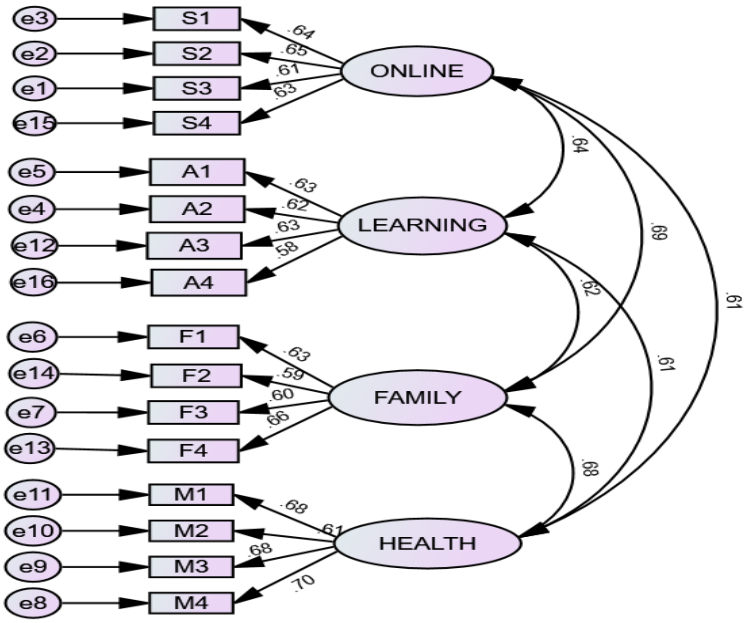

Figure 3: Structural equation model (model 1) examining relationships among online activities, learning, family, and health

The CMIN/DF value (1.299) is way below the conservative value of 3, which implies that the parsimony is very high and the model is not that complex which is seen in Figure 3. Both the CFI and SRMR (0.986 and 0.029, respectively) are larger than the excellent range (CFI>0.95, SRMR<0.05), indicating that the relationships tested as hypotheses between ONLINE, LEARNING, FAMILY, and HEALTH are very close to the observed values. Other indices like RMSEA (0.024), NFI (0.942), and GFI (0.970) also indicate the soundness of the model as they are all much higher than their respective levels of acceptability. The TLI, IFI, and PNFI scores are also within the recommended ranges, and this supports the validity of the model. These findings imply that the postulated relationships between the factors are statistically fully supported, and the model can be used to present a reliable reflection of the underlying structure of the data. Nevertheless, the fit indices only confirm the coherence of the model, but not causality and the possibility of omitted variables. All in all, Model 1 offers a good starting point to the process of interpreting the relationship between these factors and their consequences to theory and practice in the domain under investigation.

MODEL 2

Model 2 shows a good statistical fit, hence proving to be strong in understanding the association between the variables (ONLINE, LEARNING, FAMILY, HEALTH) and RESILIENCE depicted by Figure 4. CMIN/DF (1.256), CFI (0.991), and SRMR (0.028) key fit indices are above the excellent criteria of the fit, which implies that the hypothesized model fits the data well. The RMSEA (0.022) and NFI (0.959) also indicate the reliability of the model, and these values are much lower than the very good and good ranges of 0.022 and 0.959, respectively. The rest of the indices (TLI = 0.989, IFI = 0.991, GFI = 0.969, PNFI = 0.775) are also below the acceptable levels of model complexity and high parsimony. These findings confirm the hypothesized correlations of the factors and resilience to be significant and substantiated. Although the fit of the model is outstanding, it does not create causality that resilience may have an impact on such factors, or they might mutually reinforce each other. On the whole, Model 2 has a solid framework on how online interaction, learning, family, and health interactively relate to resilience, which is useful in theory and practice.

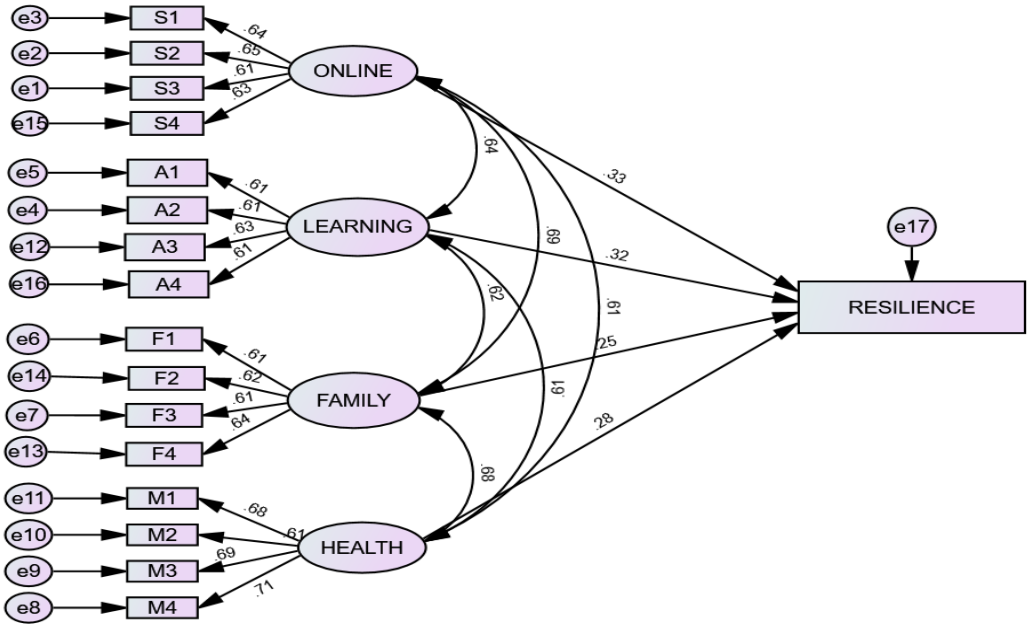

Figure 4: Structural equation model (model 2) linking online engagement, learning, family, and health to resilience

MODEL 3

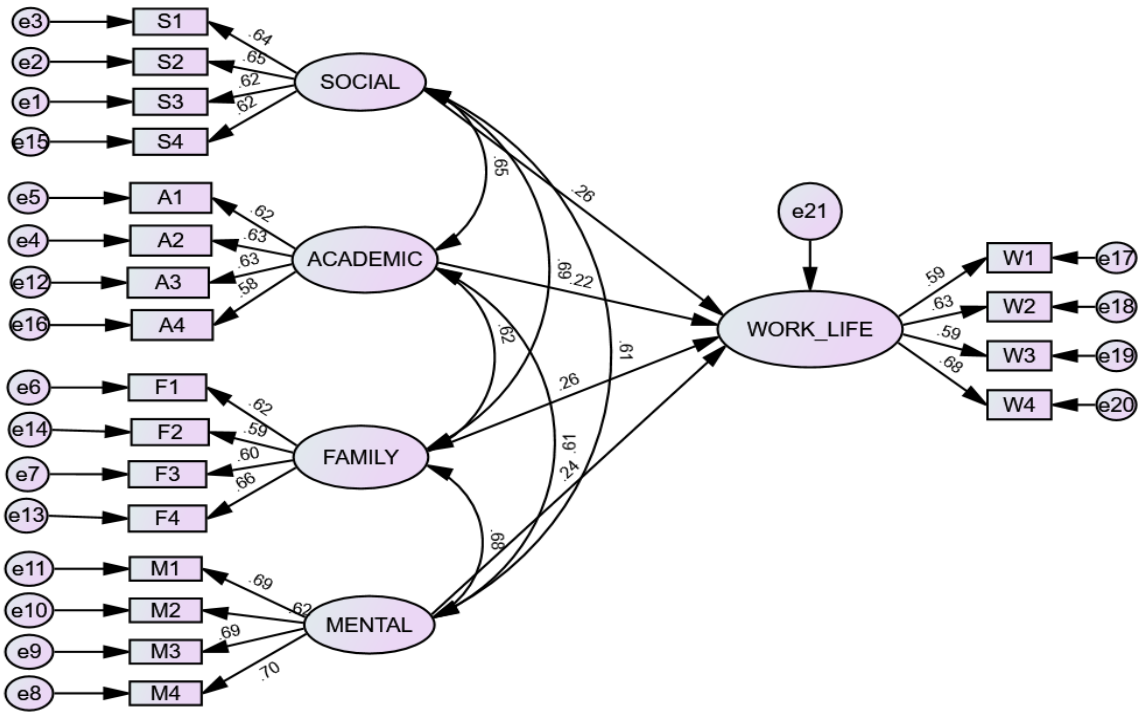

Figure 5. Structural equation model (model 3) examining the effects of social, academic, family, and mental factors on work–life balance

Model 3 shows a good fit statistically proving that it is adequate in describing the relationship between the factors (ONLINE, LEARNING, FAMILY, HEALTH) and WORK-LIFE BALANCE mediated by resilience, as seen in Figure 5. The key fit indices are above set thresholds: CMIN/DF (1.184) and RMSEA (0.019) show that the model is not badly fitted, whereas CFI (0.989) and SRMR (0.029) are close to the desired values of excellence, meaning that the hypothesized model fits the data quite well.

The model is also checked by the NFI (0.935), TLI (0.987), and GFI (0.965), which are all above the acceptability criteria. The moderate correlations ($p < 0.05$) between the factors and work-life balance indicate that ONLINE (digital engagement), LEARNING (educational activities), FAMILY (family life), and HEALTH (wellbeing) have a non-zero contribution to the work-life harmony, and that resilience is probably a mediator/enhancer of the effect. Although the model has a strong fit, the relatively small effect sizes (by the implication of moderate correlation) bring out the fact that other measurable factors (e.g., job demands, cultural context) can also play a role in work-life balance. On the whole, Model 3 is a statistically good model of relationships between these domains that can be used practically to develop the intervention to enhance the state of work-life integration.

DISCUSSION

Interpretation of Findings

The findings confirm that student resilience in the post-pandemic context is shaped by a network of interconnected ecological factors, rather than isolated individual traits. Strong positive correlations were observed among online communities, learning environment, family harmony, and health habits ($r = 0.607–0.691$), supporting a systems-based understanding of resilience. Online community and family harmony ($r = 0.691$) had the strongest inter-factor relationship, which implied that online community and supportive interaction can improve family relationships, especially in technology-mediated families. This is in line with the preceding evidence that joint presence in online space promotes emotional bonding and prosocial behaviour [22]. On the same note, the high correlation of online communities and learning environment ($r = 0.644$) corroborates the studies that point to the importance of online platforms in boosting collaborative learning and academic interaction [18].

The strong correlation between family harmony and health habits ($r = 0.681$) is corroborated by the results of developmental and social studies that defined family as one of the major contexts of health socialization, which shapes sleep, nutrition, and physical activity habits [23]. The spillover effects of the academic stress and support on the physical health of students are further supported by associations between the learning environment and health habits ($r = 0.607$). The resilience was significantly and strongly correlated with all four factors, which supported H2. The learning environment ($r = 0.723$) was the strongest predictor, highlighting the importance of the autonomy-enhancing, supportive educational environment in promoting adaptive coping and academic buoyancy [20]. Online communities were also closely followed ($r = 0.714$), which means that positive digital spaces serve as intense sources of informational and emotional support in the modern student life [18]. There was also a significant correlation between health habits ($r = 0.694$), which is also supported by the data on the connection between sleep, physical activity, and stress-regulating parameters and neurobiological resilience. Family harmony, albeit in a relatively weak form, was also a very powerful contributor ($r = 0.643$) to its protection against adversity [23].

The moderate and significant relationships of work-life balance (WLB) with all four factors ($r = 0.310 - 0.397$) proved H3. It was most strongly related to the online communities ($r = 0.397$), as digital networks are increasingly important in controlling role boundaries and gaining flexible support [24]. There was also a significant relationship between the learning environment and WLB ($r = 0.375$), which is in tandem with other studies that have found lifelong learning and perceived competence to be related to greater management of stress [25]. Albeit with lesser strength, associations with family harmony ($r = 0.310$) and health habits ($r = 0.314$) are theoretically significant, and they are consistent with the Work–Home Resources Model and physiological models of stress regulation. The small effect sizes, given the high level of statistical significance ($p <.001$), indicate that resilience and work-life balance are systemic phenomena, which are affected by a number of interacting domains and are probably moderated by context-based issues (socioeconomic status and cultural norms). The results are the extension of previous studies, which technically prove the synergistic nature of digital, educational, familial, and health-related resources in forming the post-pandemic student adaptation.

Suggestions and Implications

This paper develops a four-factor system model of resilience, online engagement, learning environment, family harmony, and health habits as dependent resources instead of independent predictors. The results emphasize the necessity to include combined interventions that can be used to reinforce the digital inclusion, the quality of pedagogy, family support, and the health of students. To promote learning and social support, educational institutions should support instructed online communities by using moderated discussion boards, peer academies, and collaborative digital classrooms to facilitate online learning. Resilience-building environments should also be reinforced in the home environments through the use of family-oriented programs that aim at building resilience by educating parents and guardians to communicate and manage stress and mental health needs. The adaptive capacity of the students can be further reinforced by including health promotion programs like sleep education, physical activity programs, and stress-management workshops in school curricula. To the policymakers, the findings highlight the significance of comprehensive recovery measures after the pandemic that cut across education, health, and digital equity. Further studies are required to use longitudinal designs to study the causal process and address the mediating factors, including institutional policies, cultural expectations, and socioeconomic conditions.

CONCLUSION

This paper has indicated that resilience and work-life balance are directly related to online engagement, learning, family support, and health habits. Such relationships indicate that well-being is not a matter of individual effort, but it depends on its supporting environments. To society, this would imply that schools, places of work, family, and health systems would have to collaborate with each other, such as learning and using digital tools to support mental health, supporting family-friendly policies in the workplace, or educating healthy behaviors in schools. It can be such a collaboration that will be able to combat such current challenges as digital isolation, stress, and unequal access to resources. With an emphasis on these interdependent spheres, communities will be able to create robust, more flexible support systems, and everyone will flourish in the modern world that moves at an extremely high pace and is based on technology. There are certain limitations of this research. To start with, it surveyed school students of Thrissur district only, and thus may not be generalized to other places, or even other age groups. Second, it failed to consider cultural divergence, income, and socioeconomic systems, which may play a significant role in such determinants as access to the internet or family structure. Third, using self-reported data (e.g., surveys) can result in biased responses, such as students exaggerating their positive habits. Lastly, four factors (online, learning, family, and health) are all that one could take into account, whereas other significant factors may be overlooked. Such gaps imply that the results might not reflect the diversity in the real world to the full extent. Further research needs to have a wider sample and more variables.

FUTURE STUDY

Further investigations ought to observe the effects of pandemic-related disruptions like the online study shift longitudinally, increased stress levels, and social distance on the four resilience domains (digital communities, learning, family, health) and determine how they impact the future outcomes of students. Studies should measure the effect that school supports (e.g., mental health clubs, peer tutoring) and family resources and access to tech have on recovery among different groups of people (rural/urban, with different incomes) to understand the needs that are missing. Critically, this work should analyze dynamic cross-domain impacts, for instance, how digital mentoring affects family stress or academic engagement over time, and test scalable interventions within blended digital-physical environments. The goal is to develop adaptive, equitable support systems for future crises.

Conflict Of Interest

There are no relevant financial or non-financial competing interests to report.

Declaration Of Funding

No funding was received.

REFERENCES

[1] Tan WY, Chen JN, Lu SH, Liu CQ, Luo Q, Ma Y, Zhou Y, Wong TK, Chen HF, Song LQ, Miao CY. Psychometric evaluation of the Chinese version of the Academic Resilience Scale-30 (C-ARS-30) in college students. Frontiers in Psychology. 2024 Aug 7;15:1276618. https://doi.org/10.3389/fpsyg.2024.1276618

[2] Hards E, Loades ME, Higson-Sweeney N, Shafran R, Serafimova T, Brigden A, Reynolds S, Crawley E, Chatburn E, Linney C, McManus M. Loneliness and mental health in children and adolescents with pre-existing mental health problems: A rapid systematic review. British Journal of Clinical Psychology. 2022 Jun;61(2):313-34. https://doi.org/10.1002/osp4.581

[3] Deng J, Zhou F, Hou W, Heybati K, Lohit S, Abbas U, Silver Z, Wong CY, Chang O, Huang E, Zuo QK. Prevalence of mental health symptoms in children and adolescents during the COVID-19 pandemic: A meta-analysis. Annals of the New York Academy of Sciences. 2023 Feb;1520(1):53-73. https://doi.org/10.1002/osp4.581

[4] Zoellner F, Erhart M, Napp AK, Reiss F, Devine J, Kaman A, Ravens-Sieberer U. Risk and protective factors for mental health problems in children and adolescents during the COVID-19 pandemic: results of the longitudinal COPSY study. European child & adolescent psychiatry. 2025 Jun;34(6):1849-59. https://doi.org/10.1007/s00787-024-02604-6

[5] Pietrobelli A, Fearnbach N, Ferruzzi A, Vrech M, Heo M, Faith M, Pecoraro L, Zoller T, Antoniazzi F, Piacentini G, Heymsfield SB. Effects of COVID-19 lockdown on lifestyle behaviors in children with obesity: longitudinal study update. Obesity Science & Practice. 2022 Aug;8(4):525-8. https://doi.org/10.1002/osp4.581

[6] Grigorenko EL. The extraordinary "ordinary magic" of resilience. Development and Psychopathology. 2024 Dec;36(5):2481-98. https://doi.org/10.1017/S0954579424000841

[7] Błaszczyk M, Kovalisko N, Pieńkowski P, Pachkovskyy Y, Ryniejska-Kiełdanowicz M. Coping with adversity: mechanisms of resilience in Ukrainian universities during the Russian-Ukrainian War—a perspective from Lviv University students. Higher education. 2025 Jul 25:1-20. https://doi.org/10.1007/s10734-025-01506-z

[8] Sari OD, Rangkuti AA, Deasyanti D. A Systematic Review of Academic Buoyancy in Adolescents: Psychological and Environmental Predictors of Educational Resilience. AL-ISHLAH: Jurnal Pendidikan. 2025 Dec 27;17(4). https://doi.org/10.35445/alishlah.v17i4.7572

[9] Diab A, Green E. Cultivating resilience and success: Support systems for novice teachers in diverse contexts. Education Sciences. 2024 Jun 30;14(7):711. https://doi.org/10.3390/educsci14070711

[10] Faghy MA, Tatler A, Chidley C, Fryer S, Stoner L, Laddu D, Arena R, Ashton RE. The physiologic benefits of optimizing cardiorespiratory fitness and physical activity–from the cell to systems level in a post-pandemic world. Progress in cardiovascular diseases. 2024 Mar 1;83:49-54. https://doi.org/10.1016/j.pcad.2024.02.006

[11] Sheng J, Ng DT, Tian P, Zheng Z. University students' resilience in post-pandemic period: a socio-ecological perspective. Frontiers in Psychology. 2025 May 9;16:1574153. https://doi.org/10.3389/fpsyg.2025.1574153

[12] Rossetto KR, Martin EM. "It's always about challenging and supporting": communicative processes of resilience in higher education. Communication Education. 2022 Oct 2;71(4):305-26. https://doi.org/10.1080/03634523.2022.2098351

[13] Ranschaert R, Hughes H, Murphy A, Benson K. Creating virtual third spaces that foster students' well-being. Middle Grades Research Journal. 2024 Oct 24;13(3):29-43. https://doi.org/10.1108/MGRJ-10-2024-0003

[14] Roest JJ, Welmers-Van de Poll MJ, Peer Van der Helm GH, Stams GJ, Hoeve M. A three-level meta-analysis on the alliance-outcome association in child and adolescent psychotherapy. Research on Child and Adolescent Psychopathology. 2023 Mar;51(3):275-93. https://doi.org/10.1007/s10802-022-00986-2

[15] Kim LE, Dundas S, Asbury K. 'I think it's been difficult for the ones that haven't got as many resources in their homes': teacher concerns about the impact of COVID-19 on pupil learning and wellbeing. Teachers and Teaching. 2024 Oct 2;30(7-8):884-99. https://doi.org/10.1080/13540602.2021.1982690

[16] Chen M, Yin W, Sung-Chan P, Wang Z, Shi J. The interactive role of family functioning among BMI status, physical activity, and high-fat food in adolescents: evidence from Shanghai, China. Nutrients. 2022 Sep 29;14(19):4053. https://doi.org/10.3390/nu14194053

[17] Ershadi M, Davis P, Newaz MT. Systematic review of resilience measures: construction management graduates' perspective. International journal of construction management. 2022 Aug 18;22(11):2037-50. https://doi.org/10.1080/15623599.2020.1764751

[18] Oroni CZ, Xianping F. Modelling the mediation role of digital learning platforms on social media capability and students' academic performance. Education and Information Technologies. 2024 Jul;29(10):11979-2000. https://doi.org/10.1007/s10639-023-12360-w

[19] Eichberger C, Derks D, Zacher H. A daily diary study on technology-assisted supplemental work, unfinished tasks, and sleep: The role of problem-solving pondering. International Journal of Stress Management. 2022 Feb;29(1):61. https://psycnet.apa.org/doi/10.1037/str0000237

[20] Cingel DP, Lauricella AR, Taylor LB, Stevens HR, Coyne SM, Wartella E. US adolescents' attitudes toward school, social connection, media use, and mental health during the COVID-19 pandemic: Differences as a function of gender identity and school context. PLoS One. 2022 Oct 27;17(10):e0276737. https://doi.org/10.1371/journal.pone.0276737

[21] Beratto L, Bressy L, Agostino S, Malandrone F, Brichetto G, Ponzano M. The effect of exercise on mental health and health-related quality of life in individuals with multiple sclerosis: A Systematic review and meta-analysis. Multiple Sclerosis and Related Disorders. 2024 Mar 1;83:105473. https://doi.org/10.1016/j.msard.2024.105473

[22] Gayatri M, Irawaty DK. Family resilience during COVID-19 pandemic: A literature review. The Family Journal. 2022 Apr;30(2):132-8. https://doi.org/10.1177/10664807211023875

[23] Ribeiro-Silva E, Amorim C, Aparicio-Herguedas JL, Batista P. Trends of active learning in higher education and students' well-being: A literature review. Frontiers in Psychology. 2022 Apr 18;13:844236. https://doi.org/10.3389/fpsyg.2022.844236

[24] Subramaniam PR, Wuest DA. Moving from detachment to connectedness: Student trauma and relationship building. International Journal of Physical Education. 2022 Mar 10;59(1):30-6. https://doi.org/10.5771/2747-6073-2022-1

[25] Zaitouni M, Hewapathirana G, Mostafa M, Al Hajj R, ElMelegy AR. Work-life balance: A landscape mapping of two decades of scholarly research. Heliyon. 2024 Jul 30;10(14). https://doi.org/10.1016/j.heliyon.2024.e34084