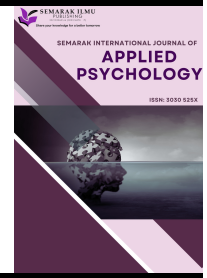




Semarak International Journal of Applied Psychology

Journal homepage:
<https://semarakilmu.my/index.php/sijap/index>
ISSN: 3030-525X



Attendance Detector with Integrated Mental Health Screening: A Conceptual Framework for Higher Education

Mughaneswari Sahadevan^{1,*}, Jogeswari Ramamoorthy¹, Xinwei Shi³, Dody Jenhar⁴, Shazwanis Shukri⁵

¹ Faculty of Business Management and Professional Studies, Management and Science University, 40100 Shah Alam, Selangor, Malaysia

² Durham University Business School, DH1 4LB Mill Lane, Durham University, United Kingdom

³ PT Titipan Kilat, Pekanbaru, Riau Indonesia

⁴ School of International Studies, Universiti Utara Malaysia, 06100 Sintok Kedah, Malaysia

ARTICLE INFO

Article history:

Received 12 August 2025

Received in revised form 25 September 2025

Accepted 10 October 2025

Available online 24 October 2025

Keywords:

Attendance system; mental health; student well-being; higher education; digital monitoring

ABSTRACT

Attendance has long been used as a measure of student engagement and performance in higher education. Yet, attendance alone does not provide insight into students' overall well-being, particularly their mental health, whereas it is a critical determinant of academic success and persistence. Growing evidence shows that absenteeism is often linked to stress, anxiety, or depression, making attendance data a potentially valuable proxy for early mental health detection. This paper proposes a conceptual framework for integrating attendance detection with mental health screening in higher education institutions. Drawing on literature from education technology, mental health informatics, and student support systems, the study highlights how a triangular model linking attendance, mental health, and institutional support can foster holistic student engagement. The paper identifies research gaps, outlines method, practical implication and suggests directions for future empirical research.

1. Introduction

In higher education, student attendance continues to function as a core indicator of academic engagement, persistence, and institutional accountability. Traditionally, universities have relied on attendance as a compliance measure—tracking participation to ensure students meet course requirements and remain on a trajectory toward graduation. However, recent scholarship underscores that absenteeism extends beyond administrative monitoring, serving instead as a potential warning signal of deeper underlying issues [7,12]. Among these, mental health challenges have emerged as a particularly salient concern.

* Corresponding author.

E-mail address: mughaneswari_sahadevan@msu.edu.my

Mental health disorders, including anxiety, depression, and stress-related conditions, are increasingly recognized as significant impediments to student learning, retention, and overall academic achievement [2]. The prevalence of these challenges within university populations has sparked global initiatives aimed at strengthening mental health services, ranging from counselling programs and peer support networks to digital well-being platforms. Despite these efforts, many interventions remain siloed, failing to integrate systematically with academic monitoring systems such as attendance tracking [8]. This fragmentation creates a missed opportunity for institutions to detect early warning signs and provide timely, holistic interventions.

This paper contends that a more effective strategy lies in reconceptualizing attendance not merely as a metric of classroom presence, but as a proxy indicator of psychological well-being. By embedding mental health screening into attendance detection systems, universities can generate a multidimensional understanding of student engagement that combines behavioral, emotional, and institutional dimensions. To this end, a triangular conceptual framework is proposed, linking three interrelated domains: (1) attendance monitoring as a behavioral measure of academic participation, (2) mental health indicators as psychological dimensions influencing attendance patterns, and (3) institutional support systems as the structural mechanisms that translate detection into action.

Within this framework, absenteeism may function as an early diagnostic cue that triggers further mental health screening and intervention. Conversely, institutional support systems such as academic advising, counselling services, and digital referral mechanism to ensure that identified students receive tailored assistance. The interplay between these domains offers universities a proactive, rather than reactive, approach to student well-being, aligning academic accountability with holistic care.

By situating attendance monitoring within the broader ecology of student mental health, the framework not only enhances institutional capacity for early intervention but also reframes student engagement as a multidimensional construct. This integration has implications for policy, pedagogy, and practice, offering higher education institutions a scalable model to address rising mental health concerns while strengthening academic outcomes.

2. Literature Review

2.1 Attendance Detection Technologies in Higher Education

Traditional attendance-taking methods such as manual roll calls, paper signatures, or sign-in sheets have long been criticized as inefficient, prone to error, and vulnerable to manipulation [14]. In response, universities have increasingly embraced digital solutions such as RFID tags, QR codes, biometric scans, and IoT-enabled systems [5,17]. Among these, facial recognition technologies are gaining prominence for their accuracy in large classroom settings, offering a streamlined mechanism to deter fraudulent attendance [24].

While these innovations significantly enhance administrative efficiency, their utility remains narrowly operational. The predominant function of such systems is compliance enforcement on tracking presence for institutional reporting rather than generating actionable insights into student engagement or well-being. Yet, attendance data, when cross-analyzed with other behavioral and psychological markers, can reveal deeper patterns associated with academic success and distress [13]. Thus, there is an urgent need to reconceptualize attendance systems beyond their administrative role and explore their potential as predictive and diagnostic tools.

2.2 Mental Health Challenges among University Students

Parallel to these technological advancements, higher education institutions are confronting an unprecedented mental health crisis. The World Health Organization [23] estimates that nearly one in three university students globally meets the criteria for a diagnosable mental disorder. Empirical evidence across regions including the United States, United Kingdom, and Asia confirms alarming rates of depression, anxiety, and stress among student populations [7,20,21].

These conditions profoundly influence educational trajectories. Depression and anxiety have been linked to absenteeism, diminished academic performance, and higher attrition rates [1,18]. Notably, avoidance behaviors tied to anxiety often manifest in chronic class non-attendance, reinforcing a cycle of disengagement. Although universities have expanded wellness programs, the persistent stigma surrounding help-seeking behaviors combined with the underutilization of counselling services—limits their effectiveness [12,23]. While emerging digital interventions such as mobile apps, tele-counselling, and AI chatbots [8] offer scalable alternatives, they remain disconnected from academic monitoring frameworks. This disjuncture prevents universities from leveraging attendance as an early-warning mechanism to complement mental health services.

2.3 Linking Attendance and Mental Health

Recent research reinforces the view that attendance patterns are not merely administrative records but behavioral signals with diagnostic value. Richardson *et al.*, [18] demonstrated that poor attendance correlates significantly with depressive symptoms, while Eisenberg *et al.*, [7] showed that absenteeism strongly associates with elevated anxiety and depression scores. Similarly, Alharbi and Pius [1] argue that persistent absenteeism should be treated as an indicator for mental health screening rather than as grounds for punitive measures. These findings collectively suggest that attendance trajectories can serve as proxy markers for psychological well-being, offering institutions a low-cost, scalable method for early detection of distress [13].

Nevertheless, the potential of attendance as a predictive tool remains underutilized. Existing systems capture valuable behavioral data but operate in isolation from institutional support networks, thereby missing opportunities for timely intervention. Integrating attendance with mental health monitoring could enable a paradigm shift from reactive crisis management to proactive well-being promotion.

Despite its promise, integrating biometric attendance and mental health data raises critical ethical challenges. Issues of informed consent, student autonomy, and data protection remain central to debates on digital monitoring in higher education [16]. Over-surveillance risks undermining trust, particularly if data are deployed punitively rather than supportively. Scholars caution that such systems must be guided by transparent governance structures and ethical safeguards to ensure confidentiality and protect student agency [19]. Failure to address these concerns could exacerbate stigma and resistance, undermining the intended benefits of integration.

3. Research Gaps and Justification

From the reviewed literature, several key gaps emerge:

1. **Lack of Integration:** Attendance and mental health monitoring remain studied in silos, with limited interdisciplinary frameworks combining them.

2. **Predictive Potential Untapped:** Attendance continues to be treated primarily as a compliance measure, rather than a predictive marker for psychological distress.
3. **Fragmented Support Systems:** Digital mental health interventions exist, but they are rarely embedded within institutional engagement platforms.
4. **Contextual Limitations:** Much of the empirical evidence originates from Western contexts, with limited focus on developing countries where stigma and cultural barriers to mental health support are more pronounced [20].
5. **Ethical Oversight:** Few studies offer comprehensive frameworks for balancing predictive monitoring with student rights to privacy and autonomy.

The convergence of two global trends which are the rising prevalence of student mental health challenges and the rapid digitization of attendance systems demands scholarly and practical attention. Treating attendance solely as an administrative requirement neglects its potential as a predictive tool for identifying psychological distress. Conversely, current mental health interventions, though innovative, remain fragmented from academic monitoring systems, reducing their effectiveness.

By proposing an integrated framework that links attendance data with mental health screening and institutional support mechanisms, this study addresses both theoretical and practical gaps. Theoretically, it advances the conceptualization of attendance as a multidimensional construct, capturing both academic engagement and psychological well-being. Practically, it provides universities with a scalable model to transition from reactive crisis management to proactive, preventive interventions. Such integration is not merely an academic exercise but a policy imperative: institutions that fail to detect early signs of disengagement risk higher dropout rates, weaker academic outcomes, and exacerbated mental health crises. A transparent, ethically governed framework offers the dual advantage of safeguarding student welfare while strengthening institutional accountability. In this way, attendance data can be repositioned from a compliance tool to a cornerstone of holistic student support.

3.2 Justification for the Research

The argument for integrating attendance monitoring with mental health screening is not only practical but also theoretically grounded. Two frameworks provide a compelling basis for this study: Student Engagement Theory and the Job Demands–Resources (JD-R) model. Student engagement theory posits that student success is shaped by the degree to which learners invest time, effort, and psychological energy in both academic and co-curricular activities [11]. Attendance, as a behavioral manifestation of engagement, represents a visible marker of student participation. Declining attendance, therefore, is not simply an administrative irregularity but a sign of disengagement that can precede academic underperformance or attrition. At the same time, psychological distress such as depression and anxiety diminishes students' capacity to engage meaningfully with their academic environment [7]. By embedding mental health screening within attendance systems, institutions can operationalize engagement theory more holistically, capturing both behavioral (attendance) and psychological (well-being) dimensions of student involvement.

Moreover, the Job Demands–Resources (JD-R) model offers an additional explanatory lens, even in educational contexts [3]. The model argues that individual performance and well-being result from the dynamic balance between demands (stressors that deplete energy) and resources (supports that sustain engagement). For university students, academic workload, performance pressure, and financial stress constitute significant demands, while counselling services, peer support, and

institutional care represent critical resources. Absenteeism may serve as an early behavioural cue indicating that students' demands have outweighed their available resources. Integrating attendance monitoring with institutional support mechanisms, therefore, aligns with the JD-R model by ensuring that students who demonstrate disengagement behaviors are connected with resources before stress escalates into burnout or dropout.

Together, these frameworks underscore why attendance data cannot remain siloed as an administrative tool. Within student engagement theory, it reflects participation and energy investment; within the JD-R model, it signals the balance or imbalance between demands and resources. Bridging attendance with mental health indicators and support services thus provides a theoretically coherent and practically actionable strategy.

By anchoring the proposed triangular framework in these theories, the study not only addresses empirical and contextual gaps but also contributes to the advancement of engagement scholarship. It redefines attendance from a compliance requirement into a multidimensional construct that simultaneously reflects academic participation, psychological resilience, and institutional responsiveness.

4. Methodology

4.1 Research Design

This study adopts a technology-enabled mixed-methods design, combining app-based attendance tracking with student surveys and follow-up interviews. Integrating digital trace data with psychological self-assessments allows for an accurate and holistic evaluation of student engagement, mental health, and institutional support [13,16].

4.2 Attendance Detector App

A custom attendance detector app will be deployed across selected undergraduate courses. The app uses QR code scanning and geolocation validation to record class presence, thereby reducing proxy sign-ins and ensuring accuracy [17,24]. Attendance data will be stored securely and anonymized for analysis. The app also includes a check-in prompt where students can voluntarily report their mood on a simple Likert scale (e.g., "How are you feeling today?"), serving as a soft psychological screening indicator [8].

4.3 Mental Health Indicators

In parallel, students will complete validated psychological assessments, including:

- **GAD-7** for anxiety [22].
- **PHQ-9** for depression [10].

These scales provide standardized measures of psychological distress that can be statistically linked to attendance patterns [7].

4.4 Institutional Support Systems

Survey modules will assess perceptions of university support (counselling services, peer mentoring, academic advising), adapted from Lipson *et al.*, [12]. This domain functions as a moderating factor in the triangular model, capturing how supportive environments buffer the effects of psychological distress on absenteeism.

4.5 Data Collection

- **Phase 1 (App Deployment):** Attendance and mood data collected automatically for one semester across 5–7 courses (~500 students).
- **Phase 2 (Survey Administration):** Students complete GAD-7, PHQ-9, and support perception measures.
- **Phase 3 (Qualitative Interviews):** Semi-structured interviews with 20–25 participants (students, faculty, counselors) to contextualize findings, focusing on app usability, privacy concerns, and support-seeking behaviors [15].

4.6 Data Analysis

- **Quantitative:** Attendance data (frequency, consistency, lateness) will be linked with mental health and support survey data using **PLS-SEM** [9]. Patterns of absenteeism will be tested as potential predictors of anxiety and depression scores.
- **Qualitative:** Interview transcripts will be analyzed thematically [4] to explore student perceptions of the app, ethical concerns, and institutional support effectiveness.

All app data will be anonymized and encrypted to avoid surveillance risks [16]. Students will provide informed consent before app installation and survey participation, with the option to opt out at any time.

5. Conclusion

This study proposes a novel integration of attendance detection technologies with mental health monitoring and institutional support systems, offering a paradigm shift in how universities conceptualize and respond to student engagement. By leveraging a dedicated attendance detector app, attendance is no longer a purely administrative exercise but a source of behavioral data that, when triangulated with psychological indicators, can serve as an early-warning system for student distress.

The findings are expected to demonstrate that irregular attendance patterns captured by the app are significantly associated with higher levels of anxiety and depression, aligning with prior evidence that absenteeism is a reliable proxy for disengagement and psychological strain [7,18]. Moreover, the study situates these relationships within two theoretical lenses: Student Engagement Theory, which frames attendance as a visible indicator of behavioural participation, and the Job Demands–Resources (JD-R) model, which conceptualizes mental health as the balance between demands (psychological challenges) and resources (institutional support).

The triangular conceptual framework developed here highlights the interconnectedness of three domains:

1. **Attendance Monitoring** – detecting behavioral disengagement.
2. **Mental Health Indicators** – capturing psychological demands.
3. **Institutional Support Systems** – providing compensatory resources.

Together, these domains create a holistic system for identifying, understanding, and addressing student well-being challenges. Importantly, the framework emphasizes proactive rather than reactive intervention, enabling universities to act before academic performance declines or dropout occurs.

From a practical perspective, integrating app-based attendance detection with digital mental health screening holds significant promise for universities seeking to strengthen retention, enhance accountability, and foster a supportive learning environment. However, ethical safeguards, particularly regarding privacy, consent, and non-punitive use of data must remain central to implementation to preserve student trust and autonomy.

In conclusion, reframing absenteeism as a signal of potential distress rather than a mere compliance failure advances both theory and practice in higher education. By embedding technological innovation within established engagement and well-being frameworks, this study contributes to a new model of data-informed, student-centered education that balances academic accountability with holistic care.

References

- [1] Alharbi, E., & Pius, A. (2021). Predictors of anxiety and academic performance among undergraduate students. *Journal of Affective Disorders*, 282, 889–897. <https://doi.org/10.1016/j.jad.2020.12.038>
- [2] Auerbach, Randy P., Philippe Mortier, Ronny Bruffaerts, Jordi Alonso, Corina Benjet, Pim Cuijpers, Koen Demyttenaere et al. "WHO world mental health surveys international college student project: Prevalence and distribution of mental disorders." *Journal of abnormal psychology* 127, no. 7 (2018): 623. <https://doi.org/10.1037/abn0000362>
- [3] Bakker, Arnold B., and Evangelia Demerouti. "Job demands–resources theory: taking stock and looking forward." *Journal of occupational health psychology* 22, no. 3 (2017): 273. <https://doi.org/10.1037/ocp0000056>
- [4] Braun, Virginia, and Victoria Clarke. "Using thematic analysis in psychology." *Qualitative research in psychology* 3, no. 2 (2006): 77-101. <https://doi.org/10.1191/1478088706qp063oa>
- [5] Chowdhury, A. I., Uddin, M., & Bhowmik, T. K. (2019). IoT-based smart attendance system. *International Journal of Computer Applications*, 178(14), 37–41.
- [6] Creswell, John W., and Vicki L. Plano Clark. *Designing and conducting mixed methods research*. Sage publications, 2017.
- [7] Eisenberg, D., Lipson, S. K., & Phillips, M. (2021). Trends in college student mental health and help-seeking by race/ethnicity: Findings from the Healthy Minds Study, 2013–2021. *Journal of Nervous and Mental Disease*, 209(5), 331–338. <https://doi.org/10.1097/NMD.0000000000001313>
- [8] Firth, J., Torous, J., Nicholas, J., Carney, R., Prata, A., Rosenbaum, S., & Sarris, J. (2019). The efficacy of smartphone-based mental health interventions for depressive symptoms: A meta-analysis. *World Psychiatry*, 18(3), 325–336. <https://doi.org/10.1002/wps.20673>
- [9] Hair, J. F., Hult, G. T. M., Ringle, C. M., & Sarstedt, M. (2019). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). SAGE Publications.
- [10] Kroenke, Kurt, Robert L. Spitzer, and Janet BW Williams. "The PHQ-9: validity of a brief depression severity measure." *Journal of general internal medicine* 16, no. 9 (2001): 606-613. <https://doi.org/10.1046/j.1525-1497.2001.016009606.x>
- [11] Kuh, George D. "The national survey of student engagement: Conceptual and empirical foundations." *New directions for institutional research* 2009, no. 141 (2009): 5-20. <https://doi.org/10.1002/ir.283>
- [12] Lipson, S. K., Lattie, E. G., & Eisenberg, D. (2022). Increased rates of mental health service utilization by U.S. college students: 10-year population-level trends (2007–2017). *Psychiatric Services*, 73(1), 24–30. <https://doi.org/10.1176/appi.ps.201900507>
- [13] Nguyen, T., Rienties, B., & Toetenel, L. (2020). Examining the designs of computer-based learning activities in relation to self-regulated learning and student engagement. *British Journal of Educational Technology*, 51(1), 52–71. <https://doi.org/10.1111/bjet.12795>

- [14] Patel, D., & Patel, D. (2017). Attendance management system: A review. *International Journal of Computer Applications*, 167(6), 36–39.
- [15] Patton, M. Q. (2015). *Qualitative research and evaluation methods* (4th ed.). SAGE Publications.
- [16] Prinsloo, P., & Slade, S. (2017). Ethics and learning analytics: Charting the (un)charted. *British Journal of Educational Technology*, 48(5), 1534–1547. <https://doi.org/10.1111/bjet.12261>
- [17] Rahman, M., Hossain, M. A., & Bhuiyan, M. M. H. (2020). RFID-based smart attendance system. *International Journal of Computer Applications*, 975(8887), 1–5.
- [18] Richardson, Thomas, Peter Elliott, and Ron Roberts. "Relationship between loneliness and mental health in students." *Journal of public mental health* 16, no. 2 (2017): 48-54. <https://doi.org/10.1108/JPMH-03-2016-0013>
- [19] Roberts, L. D., & Hernandez, K. A. (2019). Ethical considerations in digital research with children and young people. *Children and Youth Services Review*, 100, 234–239. <https://doi.org/10.1016/j.childyouth.2019.02.030>
- [20] Said, David, Kypros Kypri, and Jenny Bowman. "Risk factors for mental disorder among university students in Australia: findings from a web-based cross-sectional survey." *Social psychiatry and psychiatric epidemiology* 48, no. 6 (2013): 935-944. <https://doi.org/10.1007/s00127-012-0574-x>
- [21] Son, Changwon, Sudeep Hegde, Alec Smith, Xiaomei Wang, and Farzan Sasangohar. "Effects of COVID-19 on college students' mental health in the United States: Interview survey study." *Journal of medical internet research* 22, no. 9 (2020): e21279. <https://doi.org/10.2196/21279>
- [22] Spitzer, Robert L., Kurt Kroenke, Janet BW Williams, and Bernd Löwe. "A brief measure for assessing generalized anxiety disorder: the GAD-7." *Archives of internal medicine* 166, no. 10 (2006): 1092-1097. <https://doi.org/10.1001/archinte.166.10.1092>
- [23] World Health Organization. *World mental health report: Transforming mental health for all*. World Health Organization, 2022.
- [24] Zhang, Z., Wu, C., & Chen, J. (2019). Face recognition-based classroom attendance system using deep learning. *Journal of Physics: Conference Series*, 1239, 012028. <https://doi.org/10.1088/1742-6596/1239/1/012028>