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Conference Paper

Socially Immersive Virtual Spaces and Student Well-Being: Insights into Mental Health, Belonging, and Social Connectedness in a Metaverse

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Abstract:

As higher education increasingly adopts hybrid learning models, understanding the role of digital environments in supporting student well-being has become essential. While prior studies have examined the clinical and instructional applications of the metaverse, little attention has been given to its informal, socially immersive uses. This study explores how voluntary participation in a beach-themed, off-campus metaverse environment relates to students' perceived stress, mental health, social connectedness, and academic belonging. Using a quantitative observational design, data were collected from validated psychological scales and behavioral engagement metrics. Correlational analyses revealed that greater time spent in the metaverse was significantly associated with lower perceived stress and higher social connectedness. Multiple regression indicated that recurring peer interactions and event attendance were significant predictors of academic belonging, while time spent alone was not. ANOVA results showed that students with higher levels of metaverse engagement reported significantly greater perceived social support, with a trend toward lower psychological distress. These findings highlight the psychosocial value of informal metaverse spaces. When designed to support peer interaction and voluntary participation, such environments can serve as digital third places that promote emotional resilience, connection, and belonging in hybrid academic settings. Overall, this study extends the current literature by foregrounding the affective and social affordances of metaverse environments beyond structured therapeutic or instructional contexts.

Keywords:

Metaverse, Virtual Spaces, Immersive Technology, Sense of Belonging, Social Connectedness, Mental Health

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INTRODUCTION

Well-being is widely recognized as a multidimensional construct encompassing emotional, psychological, relational, and environmental domains. In schools, student well-being is increasingly framed not just as the absence of distress, but as the presence of positive learning experiences, social connectedness, and opportunities for meaningful engagement (Jiang et al., 2025; Khatri et al., 2024; Sturiale & Espino-Díaz, 2024). Research consistently shows that students who report higher levels of perceived stress and limited social support are more vulnerable to academic burnout, disengagement, and attrition. Conversely, when students experience a strong sense of belonging and relational safety within their academic community, they demonstrate greater motivation, resilience, and persistence. The Organisation for Economic Co-operation and Development (OECD, 2017) underscores this duality by highlighting the importance of assessing both negative indicators (e.g., anxiety and underachievement) and promotive factors (e.g., interest, engagement, and achievement motivation) in well-being. With students today navigating a complex array of pressures, the role of schools in promoting well-being is more critical than ever (Coulombe et al., 2020; Pulimeno et al., 2020). As a response, schools have implemented various interventions including curriculum-embedded programs, psychosocial scaffolds, teacher-student relational training, and environment-based initiatives that integrate well-being into daily practice rather than treating it as an ancillary concern (Murray et al., 2024; Upsher et al., 2022). Consequently, the learning environment itself becomes a powerful determinant of student well-being as it serves as a space of academic exchange and an ecosystem that can either mitigate or amplify the psychological load students carry.

As educational demands grow increasingly complex, technologies have facilitated the emergence of new learning environments that extend beyond traditional classroom boundaries. Blended learning, or the purposeful integration of synchronous face-to-face instruction with asynchronous and digital learning modalities, has become a pedagogical response to the need for flexibility, personalization, and accessibility in contemporary education. This approach leverages the strengths of both physical and virtual spaces, which enables differentiated instruction and expanded learner engagement. Building upon this paradigm, the metaverse is emerging as an educational ecosystem that offers immersive, interactive, and persistent virtual spaces capable of simulating real-world learning contexts (Illi & Elhassouny, 2025; Li & Yu, 2023). Characterized by interactivity, embodiment, and persistence, the metaverse affords learners embodied presence through avatars, real-time spatial collaboration, and continuity of experience across sessions (Garcia, 2025; Qian et al., 2023). Scholars have proposed that metaverse-based platforms can enhance learner engagement, foster authentic social interaction, and simulate real-world learning contexts even in virtual reality classes (Uribe et al., 2024). However, despite its promise, the metaverse remains under-explored as a sustained instructional space, with a paucity of empirical studies evaluating its pedagogical efficacy and contextual adaptability. As schools begin to experiment with these immersive platforms, the metaverse increasingly presents itself as a viable and complex school environment that requires deeper empirical exploration.

The metaverse has increasingly become a subject of psychological and mental health research, particularly as immersive technologies gain traction in digital therapy and wellness (Din & Almogren, 2023; Govindankutty & Gopalan, 2024). While the integration of metaverse technologies into mental health and well-being interventions is no longer novel, the existing literature remains disproportionately focused on clinical applications, formal educational contexts, or consumer engagement frameworks. Prior studies have established the metaverse as a promising environment for delivering digital therapies, exposure-based treatments, and mindfulness interventions aimed at improving psychological outcomes (Buragohain et al., 2025). Others have examined how affordances in metaverse retail settings influence subjective well-being and social satisfaction (Ranade & Menon, 2022; Singh et al., 2025). Yet, despite this growing body of research, little empirical attention has been given to the informal, voluntary, and socially immersive use of metaverse platforms outside structured educational or therapeutic programs. Most metaverse studies still center on high-intensity applications, leaving the impact of casual, non-academic metaverse experiences on students' stress levels, emotional well-being, and sense of belonging underexplored. Moreover, the few studies that have examined negative outcomes primarily focus on risks to self-esteem and discontinuation (Jia & Mvondo, 2025), without fully interrogating the social dynamics that might serve as buffers or protective factors in educational contexts. To address this gap, the present study investigates how participation in an informal, off-campus, beach-themed metaverse environment relates to students' stress, mental health, social connectedness, and academic belonging. Specifically, it explores the following questions:

1. To what extent does participation in an informal, off-campus metaverse environment relate to students perceived stress, mental health, and social connectedness?
2. Does increased voluntary engagement in the metaverse environment predict a greater overall sense of belonging within the academic community?
3. How do patterns of voluntary participation in a socially immersive virtual space support emotional wellbeing and peer support in a hybrid higher education context?

METHODS AND MATERIALS

Study Context and Design

This study employed a quantitative, observational design to investigate how voluntary participation in an off-campus metaverse environment relates to student well-being. This design was chosen to capture naturally occurring variations in student behavior and psychological outcomes without manipulating exposure or participation levels. The metaverse platform featured a beach-themed environment that served as an extension of the university's digital twin campuses. This socially immersive space was designed specifically to foster informal peer interaction and community engagement beyond formal learning settings (Garcia et al., 2023a; Garcia et al., 2024b). The platform incorporated real-time avatar communication, spatial voice chat, and proximity-based interaction features that allowed students to naturally gather, disperse, and socialize as they would in physical campus leisure spaces. The environment also supported

customizable avatars that enable students to express identity and social presence (Garcia, 2025), and included dynamic environmental elements (e.g., shifting daylight cycles, ocean wave effects, and ambient soundscapes) to enhance immersion and relaxation. To ensure accessibility and allow students to join from a variety of locations and bandwidth conditions, the platform was optimized for low-spec devices and supported both mobile and computer versions. To simulate a recreational atmosphere, the platform included activity zones featuring interactive elements such as virtual fishing, water racing, kayaking, beach dancing, and other leisure-oriented experiences (see Figure 1). Conducted at a mid-sized university in Southeast Asia, the study involved 85 undergraduate students (61% male, 37% female, 2% nonbinary; age range = 18–29 years, M = 21.6, SD = 2.8). Eligible participants were actively enrolled in university coursework and had access to the institution's metaverse platform. Participation was entirely voluntary with no academic requirements or incentives. All participants provided informed consent, and the study complied with the university's ethical standards for educational research.

Figure 1. Immersive Recreational Zones in the Metaverse

Implementation and Timeline

At the outset of the study, participants completed a baseline online survey assessing psychological and social well-being. Once baseline data were collected, participants were given access to the beach-themed metaverse environment for a four-week observational period. Although the platform was technically open to the broader university community during the summer season, activity within the environment was largely participant driven, with most interactions and event attendance involving students enrolled in the study. In week 1, participants

were encouraged to explore the platform's interactive zones. This phase allowed students to become familiar with the space and initiate unstructured social interactions with peers. In Weeks 2 and 3, the environment featured scheduled community-building events inspired by virtual hangouts, game nights, guided mindfulness sessions, and informal wellness circles. These activities were optional and promoted through in-platform announcements. Their purpose was to foster casual peer engagement and a sense of community beyond academic demands. Week 4 maintained open access but shifted toward reflective and self-paced engagement. No new events were introduced to allow participants revisit favorite activities, deepen peer connections, or disengage naturally if preferred. This final phase preserved the voluntary nature of the experience and captured natural variations in sustained engagement. At the end of the fourth week, participants completed a follow-up survey identical to the baseline instrument set.

Instruments and Variables

Psychological and social outcomes were measured using validated self-report instruments. Perceived stress was assessed with the 10-item Perceived Stress Scale (PSS-10; Cohen et al., 1983), which asks about stress experiences over the past week using a 5-point Likert scale (Cronbach's $\alpha = .87$). General psychological distress was measured using the Patient Health Questionnaire-4 (PHQ-4; Kroenke et al., 2009), a brief 4-item scale for depression and anxiety symptoms, rated on a 4-point scale ($\alpha = .82$). Social connectedness was evaluated using the Social Connectedness Scale-Revised (SCS-R; Lee et al., 2001), a 20-item measure of perceived interpersonal closeness and integration, rated on a 6-point Likert scale ($\alpha = .91$). Perceived social support was captured using the 12-item Multidimensional Scale of Perceived Social Support (MSPSS; Zimet et al., 1988), which assesses emotional and instrumental support from family, friends, and significant others on a 7-point scale ($\alpha = .89$). To assess students' sense of academic belonging, a custom 5-item scale was developed (e.g., "*I feel like I am part of the university*"; $\alpha = .88$). Behavioral engagement was measured using data extracted from the platform's backend analytics. Three primary indicators were tracked: (1) total time spent within the metaverse, recorded in hours per week; (2) recurring peer interactions, defined as repeated exchanges with the same user across multiple sessions; and (3) event attendance, calculated as the number of informal virtual events students participated in during the study period. Collectively, these metrics captured patterns of voluntary engagement over the four-week duration.

Data Analysis

All data were analyzed using SPSS and standard statistical procedures. To examine the relationship between metaverse engagement and psychological outcomes (RQ1), Pearson correlation analyses were conducted between time spent in the metaverse and participants' self-reported levels of perceived stress, mental health, and social connectedness. To evaluate whether specific engagement metrics predicted a sense of academic belonging (RQ2), a multiple linear regression analysis was performed with time spent, recurring peer interactions, and event attendance entered as predictor variables. Prior to conducting the regression, assumptions of

linearity, normality, and multicollinearity were tested and satisfied. To investigate how different levels of engagement influenced emotional well-being and perceived social support (RQ3), participants were categorized into quartiles based on a composite index of engagement. One-way analyses of variance (ANOVAs) were used to compare mental health and social support scores across these groups, followed by Tukey's HSD tests for post hoc comparisons where appropriate.

RESULTS

Relationship Between Metaverse Engagement and Psychological Outcomes

The results of Pearson correlation analyses (Table 1) show distinct patterns in the relationship between time spent in the metaverse and psychological outcomes. Greater time spent was significantly associated with lower perceived stress ($r = -.34$, $p = .004$), suggesting that students who engaged more frequently in the informal metaverse environment reported feeling less stressed. Time spent was also significantly positively correlated with social connectedness ($r = .29$, $p = .010$), indicating that higher engagement was linked to a stronger sense of interpersonal closeness and social integration. Although time spent showed a negative correlation with general psychological distress (PHQ-4), the association was not statistically significant ($r = -.18$, $p = .117$), implying that time in the metaverse may have limited or inconsistent effects on symptoms of anxiety and depression. These findings suggest that informal metaverse engagement may serve as a protective social and emotional outlet for students navigating hybrid learning environments.

Table 1. Correlations Between Metaverse Engagement and Psychological Outcomes

Variables	M (SD)	Time Spent (r)	p-value
Perceived Stress (PSS-10)	18.3 (5.2)	−.34	.004
Social Connectedness (SCS-R)	42.7 (10.8)	.29	.010
Mental Health (PHQ-4)	4.2 (2.1)	−.18	.117

Metaverse Engagement as a Predictor of Academic Belonging

A multiple linear regression analysis was conducted to examine whether students' behavioral engagement in the metaverse could predict their sense of academic belonging (Table 2). The overall model was statistically significant, $F(3, 81) = 6.73$, $p < .001$, accounting for 20.7% of the variance in belonging scores ($R^2 = .207$). Among the predictors, the frequency of recurring peer interactions emerged as the strongest contributor ($\beta = .36$, $p = .001$), suggesting that repeated, meaningful interactions with peers in the metaverse were closely linked to students' perceived inclusion within the academic community. Event attendance also significantly predicted belonging ($\beta = .24$, $p = .017$), indicating that participation in informal virtual events may foster a stronger connection to the institutional environment. Although time spent in the metaverse showed a positive association with belonging ($\beta = .18$), this relationship did not reach statistical significance ($p = .092$), implying that frequency and quality of social engagement may be more

important than duration alone. These findings suggest that socially immersive behaviors, rather than mere presence, are key drivers of students' academic belonging in virtual spaces.

Table 2. Multiple Regression Predicting Sense of Belonging from Metaverse Engagement Metrics

Predictor Variables	B	SE B	β	p-value
Time Spent (hrs/week)	0.15	0.09	.18	.092
Recurring Peer Interactions	0.43	0.13	.36	.001**
Event Attendance (count)	0.27	0.11	.24	.017*

Group Differences in Well-Being Across Engagement Levels

To explore how varying levels of metaverse engagement relate to students' well-being, participants were divided into quartiles based on a composite index of behavioral engagement, which combined time spent, frequency of recurring peer interactions, and event attendance. A one-way ANOVA was conducted to compare mean scores on mental health (PHQ-4) and perceived social support (MSPSS) across the four engagement groups. The analysis revealed a significant main effect of engagement level on perceived social support, $F(3, 81) = 4.89$, $p = .004$. Post hoc comparisons using Tukey's HSD test indicated that students in the very high engagement group reported significantly greater social support than those in the low engagement group ($p = .002$), suggesting that greater involvement in informal virtual spaces may enhance students' perceived availability of emotional and instrumental support. Although the group effect on mental health approached statistical significance, $F(3, 81) = 2.41$, $p = .073$, the trend suggested that students with higher levels of metaverse engagement experienced lower psychological distress. These findings indicate that increased voluntary engagement in socially immersive environments may offer emotional and relational benefits for students in hybrid learning contexts.

Table 3. Mean Mental Health and Social Support Scores by Engagement Level (Quartile Split)

Engagement Level	PHQ-4 (M ± SD)	MSPSS (M ± SD)
Low	4.8 ± 2.4	50.1 ± 10.5
Moderate	4.3 ± 1.8	54.3 ± 9.6
High	3.9 ± 1.7	56.2 ± 8.4
Very High	3.4 ± 1.5	59.7 ± 7.9

DISCUSSION

The metaverse has rapidly evolved from a speculative digital concept into an active site of educational, therapeutic, and social engagement (Garcia et al., 2023b; Garcia et al., 2024a; Illi & Elhassouny, 2025; Li & Yu, 2023). However, while much of the existing research has concentrated on formal educational applications, therapeutic interventions, or commercial user

behavior, relatively little attention has been given to how students engage with socially immersive metaverse environments outside structured academic or clinical contexts. This study addressed that gap by examining the relationship between voluntary participation in a beach-themed, off-campus metaverse space and students' perceived stress, mental health, social support, and academic belonging. By integrating behavioral analytics with validated psychological measures, the findings demonstrate that informal virtual environments can play a meaningful role in students' emotional and relational experiences. The results highlight the potential value of metaverse-based social spaces in higher education settings (Aboul-Yazeed et al., 2025), particularly as institutions seek to support student well-being in increasingly hybrid and digitally mediated learning environments (Almeida, 2024; Illi & Elhassouny, 2025; Martin & Alarcón-Urbistondo, 2024). These observations underscore the importance of looking beyond academic utility to consider the social and emotional affordances of virtual environments.

Virtual Third Spaces and the Psychosocial Function of Informal Metaverse Use

As students increasingly navigate hybrid academic demands, the need for informal spaces that support emotional regulation and social connection has grown more pronounced (Geister et al., 2025; Qi et al., 2024; Wu et al., 2020). The present findings suggest that socially immersive metaverse environments may serve this function by operating as digital third spaces, or settings that are neither home nor classroom but offer opportunities for low-pressure social engagement (Garcia et al., 2024b; Li & Gao, 2022; Oh et al., 2023). This interpretation aligns with the conceptualization of online third places (Dörr & Aylon, 2023), where users engage in meaningful peer interaction outside formal institutional structures. In this study, the virtual beach setting appeared to offer a space where students could decompress, build relational ties, and momentarily disengage from performance-driven academic routines. The observed stress-buffering function of metaverse engagement echoes findings from campus-based studies on the psychological benefits of access to naturalistic spaces. For example, Liu et al. (2022) found that campus green spaces have an important positive effect on student mental health, suggesting that environmental design can play a therapeutic role. The metaverse environment used here, with its relaxed aesthetic and optional participation, may have created similar conditions for affective restoration. This is further supported by stress and coping theory (Lazarus & Folkman, 1984), which frames informal social interaction as an emotion-focused coping strategy, particularly useful in contexts characterized by ongoing but non-crisis stress, such as university life.

Sustained Peer Interaction as a Pathway to Belonging in Virtual Spaces

Virtual environments may provide space for interaction, but it is the relational substance of those interactions that determines their social impact. The present study found that students' sense of academic belonging was more strongly predicted by recurring peer interactions and event participation than by the total time spent in the metaverse. This finding underscores the idea that belonging within academic communities is shaped not simply by access to digital environments but by the quality of interpersonal dynamics they afford. This study affirms that the social architecture of virtual environments plays a more critical role in shaping academic

belonging than mere access or exposure. Luo and Sun (2025) emphasized that student-student interactions significantly influence a sense of community, with stronger effects than other forms of engagement. Similarly, Allen et al. (2024) identified peer connectedness, perceived value, and inclusive participation as central to belonging in higher education. These findings align with the current results, where recurring peer interactions and event participation were key predictors of belonging. The pattern across studies suggests that digital environments become meaningful when they facilitate sustained interpersonal dynamics that foster emotional safety, shared identity, and mutual recognition. This growing body of evidence points to the significance of interactional depth as a defining feature of meaningful engagement in virtual academic spaces.

Peer-Led Immersion and Psychosocial Support in Hybrid Learning Models

Recent developments in digital mental health suggest that immersive environments such as the metaverse may offer significant emotional and relational benefits when engagement is socially meaningful and user directed (Chung et al., 2025). Rather than serving solely as platforms for structured therapy or instruction, these virtual spaces are increasingly recognized as affective ecosystems where peer interaction can foster emotional resilience and social support (Govindankutty & Gopalan, 2024). In the current study, students who demonstrated the highest levels of voluntary engagement reported elevated perceptions of social support and exhibited a trend toward improved mental health. These findings are consistent with emerging work on metaverse-based interventions that emphasize the therapeutic potential of immersive, socially interactive settings. For example, Buragohain et al. (2025) observed that simulated social environments in the metaverse can enhance emotional regulation and reduce symptoms of anxiety through experiential co-presence. Similarly, Ranade and Menon (2022) argued that immersive platforms can bridge the gap between intention and behavior in mental health practices by fostering emotionally salient and user-controlled interactions. These insights highlight a central theme in which virtual environments support psychological well-being most effectively when they foster a sense of visibility, connection, and autonomy among students (Aboul-Yazeed et al., 2025). The meaningful impact of these spaces emerges from the strength of the social structures they enable, rather than from the technological features alone. As institutions navigate digitally mediated learning landscapes, socially immersive virtual spaces represent a promising complement to traditional support structures.

Implications, Limitations, and Future Research

The present study contributes to growing evidence that socially immersive digital spaces can function as valuable psychosocial resources in higher education, particularly when shaped by voluntary participation and meaningful peer interaction. These findings hold practical implications for institutions designing hybrid learning ecosystems. Informal virtual environments, even when not directly tied to academic instruction, may play a critical role in supporting student well-being and strengthening institutional connection. Universities could enhance their student support strategies by integrating metaverse-based third spaces as digital extensions of campus life, purposefully designed to promote inclusion, autonomy, and low-pressure social engagement.

However, several limitations warrant consideration. The sample size was modest, self-selection bias may have influenced who chose to engage with the metaverse, and the four-week duration may not fully capture longer-term outcomes. Additionally, the study did not account for offline social factors that could affect perceived stress or connectedness. Future research should adopt longitudinal designs, investigate diverse types of immersive environments, and examine how individual identity factors (e.g., introversion, cultural background) may moderate these effects. Experimental or intervention-based approaches could further clarify causal relationships. Nevertheless, the present findings suggest that as universities work toward more holistic, student-centered learning environments, voluntary social metaverse platforms should be viewed as promising components within a broader strategy to foster connection and well-being.

CONCLUSION

Student well-being is not and must not be treated as a supplementary outcome of higher education. It is a foundational condition for sustained academic engagement, psychological resilience, and equitable learning experiences. As institutions transition toward hybrid and digitally mediated models, there is an urgent need to reimagine how emotional support and social connection are integrated into the student experience. This study advances that effort by examining how socially immersive, peer-driven metaverse spaces can support students' mental health, sense of belonging, and perceived social support. The findings challenge the prevailing assumption that informal digital environments are peripheral to academic life. On the contrary, when thoughtfully designed to encourage autonomy, co-presence, and relational depth, these virtual spaces become critical sites for cultivating student well-being. Emotional safety, connection, and a sense of inclusion are not incidental to learning, but they are co-constructed through shared experience in environments that allow students to feel both autonomous and recognized. In this context, the metaverse serves as a relational medium that can recreate some of the most human aspects of campus life. As universities face growing concerns about student stress, alienation, and attrition, the imperative is clear. Institutions must begin to view digital social spaces not as optional enhancements but as essential infrastructures of care. If higher education is to remain relevant in a digitally complex world, it must evolve into a system where emotional connection is as intentionally designed as the syllabus. To neglect the social dimension of virtual life is to ignore one of the most powerful determinants of student success.

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LET'S COLLABORATE!

If you are looking for research collaborators, please do not hesitate to contact me at mbgarcia@feutech.edu.ph.

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