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UI/UX design for mental health: surveying college students to shape the future of wearable devices

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Abstract

This study explores the intersection of wearable technology, UI/UX design, and mental health among college students, arguing that user-centered design principles can significantly improve the mental well-being of this demographic. With the increasing adoption of wearable devices and the growing prevalence of mental health challenges in student populations, this research investigates how the design of these devices influences user behavior and well-being. Through a comprehensive survey of college students, we collect insights into their perceptions of wearable devices, preferred features, and pain points in current UI/UX designs. Survey data is analyzed to identify behavioral patterns and design elements that support or hinder mental health. Based on these findings, we propose a user-centered UI/UX design framework tailored to the mental health needs of college students. By bridging the gap between user behavior, design innovation, and mental health outcomes, this study demonstrates that intentional, evidence-based UI/UX design can create wearable devices that actively support and improve the mental well-being of college students. The results offer actionable insights for designers, developers, and researchers looking to create technology that improves mental health in student populations.

Keywords: wearable devices, user interface, user experience, mental health, college student

Introduction

The mental health crisis gripping college campuses has reached unprecedented proportions, with recent studies indicating over 60% of students now meet diagnostic criteria for at least one mental health condition (National Education Association, 2023). This alarming trend coincides with the explosive growth of wearable technology, which has demonstrated remarkable success in monitoring physical health metrics but has yet to fulfill its potential in addressing psychological well-being. The disconnect stems not from technological limitations but from fundamental design flaws. While wearables can track heart rate variability, sleep patterns, and activity levels with clinical accuracy (Huhn, et al., 2022), their mental health applications frequently suffer from three critical failures: poor integration that creates data silos, low engagement due to non-intuitive interfaces, and inadequate personalization for student lifestyles.

Market penetration data reveals a striking paradox: nearly one-third of Americans now use wearables, with adoption rates highest among the college-aged demographic (18-49 years), yet less than 25% of at-risk individuals consistently engage with available mental health features (Dhingra, et al., 2023). Clinical

research confirms wearables' potential, having successfully predicted COVID-19 outbreaks through physiological data analysis (Huhn, et al., 2022) and detected serious conditions like atrial fibrillation (Dhingra, et al., 2023). However, the translation of these successes to mental health applications has been hampered by interfaces that fail to meet users' needs, a critical shortcoming when 53% of health app users abandon platforms due to poor design (Shani & Omer, 2021).

Research Questions

This study investigates how user-centered design principles can bridge this gap by addressing four core research questions:

1. *How do college students perceive the impact of current wearable devices on their mental health management?*
2. *Which specific wearable device features do students identify as most beneficial for their mental well-being?*
3. *What are students' self-reported experiences with existing wearable technologies designed for mental health support?*
4. *What UI/UX design elements should future wearables prioritize to effectively address students' mental health needs?*

Contributions and Implications

By analyzing student preferences and experiences, we propose an evidence-based, user-centered UI/UX framework that bridges the gap between user behavior, design innovation, and mental health outcomes. Offering actionable insights for designing wearables that communicate anxiety alerts effectively, leverage gamification for adherence, and align with students' daily routines. The significance of this work extends beyond product design, demonstrating how intentional UI/UX strategies can transform wearables into active mental health tools. Our findings aim to inform the next generation of wearable technologies, ensuring they are not only clinically viable but also deeply attuned to the behavioral patterns and wellbeing needs of college students.

Literature Review

This section synthesizes research on: (1) the campus mental health crisis, (2) wearables' potential and limitations in mental health support, (3) evidence-based UI/UX design principles, and (4) unresolved challenges. We conclude with frameworks to guide future student-centric wearable design.

The Academic Toll of Campus Mental Health Crises

College students face unprecedented levels of depression, anxiety, and stress (DAS), with over half diagnosed criteria for mental health conditions (Flannery, 2023). Despite this prevalence, only 25.3–29.5% access treatment (Pei et al., 2024), creating a gap with dire academic consequences: DAS increases dropout risk (Peng et al., 2023) and erodes GPA through impaired engagement (Sinval et al., 2025). This cyclical relationship, in which poor mental health worsens academic performance and thereby exacerbates stress, demands scalable solutions. Wearable technology emerges as a promising intervention, yet its potential remains unrealized due to design limitations that fail to address student-specific needs (Kantharaju et al., 2023).

Mental Health in Wearable Technology

Modern wearables excel at capturing physiological markers linked to mental health, including heart rate variability, sleep patterns, and activity levels (Huhn et al., 2022). Multimodal studies demonstrate their

predictive potential; for instance, analysis of sleep, smartphone use, and social interactions in 168 students identified behavioral patterns associated with stress (Sano, 2016). Clinically, wearables paired with biofeedback training have reduced stress and depression symptoms (Chen et al., 2024), while rehabilitation applications (e.g., post-ACL recovery monitoring via SmO_2 tracking) highlight indirect mental health benefits (Seshadri et al., 2024). However, these advancements are constrained by systemic data fragmentation, where critical health metrics remain isolated from contextual academic data streams (Borghare et al., 2024). Adoption barriers further exacerbate these issues. While one in three Americans now uses wearables (Dhingra et al., 2023), few leverage mental health tools due to privacy concerns (Yosep et al., 2024), design flaws (Borghare et al., 2024), and non-actionable data outputs (Sano, 2016). Emerging solutions, such as digital mindfulness apps (Yosep et al., 2024), suggest that user-centered design, effectively bridging clinical potential with intuitive interfaces, could increase wearables' role in mental health support.

UI/UX Design Principles for Mental Health

The translation of wearable technology's technical potential into meaningful mental health support hinges on user-centered design (UCD) frameworks that address three interconnected student needs: lifestyle alignment, autonomy preservation, and physiological responsiveness (Borghare et al., 2024). These principles emerge from the stark contrast between wearables' clinical capabilities and their current limitations in implementation on campus. Personalization stands as the foundational requirement for student engagement. Academic rhythms, including exam cycles, seasonal transitions, and extracurricular commitments, demand interfaces that dynamically adapt (Khosravi et al., 2022) rather than imposing static health metrics. The success of physical education wearables in boosting motivation through real-time, context-aware feedback (Xu et al., 2024) demonstrates the potential for similar mental health applications. Customizable dashboards that allow students to prioritize sleep monitoring (Dhingra et al. 2023) during finals or stress tracking (Dias et al. 2024) during recruitment seasons address both the engagement crisis and the individual differences in health prioritization identified in comprehensive reviews of wearable mental health solutions (Borghare et al., 2024).

This personalization must extend to interaction paradigms. Students overwhelmingly reject diagnostic framing in favor of tools that facilitate self-understanding, as demonstrated by the mSense neurofeedback wearable's success with its “easier, faster stress estimation” approach (Dias et al., 2024). Such autonomy-supportive designs require parallel attention to data privacy concern for students (Yosep et al., 2024), particularly through transparent controls that enable opt-in clinician sharing while preserving user agency.

Context-aware systems bridge the gap between physiological monitoring and academic reality. The 25% improvement in stress detection accuracy achieved by combining PPG (Photoplethysmography), stress detection measurement, data with smartphone context (Aqajari et al., 2024) underscores the necessity of academic-calibrated notifications. This includes silencing alerts during lectures and prioritizing delivery during natural break periods, creating what Aqajari et al. (2024) term “stress-interruption-safe zones” across the campus ecosystem.

Visual and interactive design elements require physiological grounding. The 80.6% EEG (electroencephalography), to capture brain activity, classification accuracy for color responses (Chaudhary et al., 2020) confirms that interface aesthetics directly impact emotional safety, favoring calming blue/green palettes. Similarly, gamification mechanics must balance academic-aligned motivators (e.g., exam-period challenges) with safeguards against the compulsive use patterns observed in 22% of students (Cheng & Ebrahimi, 2023). This delicate equilibrium, which balances engagement with ethics, personalization with privacy, and guidance with autonomy, defines the next generation of campus mental health wearables.

Research Gaps and Opportunities

Current literature on mental health wearables exhibits three critical limitations this study addresses: (1) lack of academic-context adaptation, with no frameworks for campus-specific temporalities or environments; (2) underdeveloped social connectivity features despite evidence of student willingness to share wellness data; and (3) persistent disciplinary silos between clinical, human-computer interaction, and educational research. These gaps stem from over-reliance on general population studies, neglect of student co-design methodologies, and failure to integrate physiological monitoring with academic behavioral patterns. Our research bridges these divides through its novel focus on academic-life synchronization, privacy-conscious social features, and interdisciplinary co-creation, directly addressing limitations consistently identified but unresolved in prior wearable studies.

With 82% of users willing to share health data (Dhingra et al., 2023) and clear evidence of unmet student mental health needs (Borghare et al., 2024), our study transforms wearables into active wellbeing tools through: (1) academic-synced health monitoring, (2) student-co-designed social features, and (3) interdisciplinary interfaces. This approach directly addresses limitations in current literature.

Theoretical Framework

To address the gap between technical capability and student adoption of mental health wearables, this study applies the Double Diamond Framework (Design Council, 2019), which emphasizes iterative, user-centered design through discovery, definition, development, and delivery. This model aligns with the need to adapt wearables to campus-specific contexts and student preferences. Building on Vial's (2023) mapping review and Minaoglou's (2023) findings, which highlight the neglect of ergonomic integration and innovation in 89% of current devices, we argue that effective mental health wearables must prioritize not only accuracy but also comfort, usability, and personalized engagement. This framework guides our analysis of UI/UX strategies that enhance long-term use and align with students' lived experiences.

Methodology

To investigate college students' perceptions of wearable devices for mental health management, this study employed a mixed-methods survey design, collecting both quantitative and qualitative data. The survey was structured into five key sections, each addressing specific dimensions of the research questions:

1. Demographics (screening for age 18-25 and student status while capturing gender and academic discipline)
2. Wearable Device Experience (assessing device ownership and usage frequency)
3. UI/UX Design Influence (evaluating interface usability and feature accessibility)
4. Impact on Mental Health (measuring perceived effects on stress and anxiety)
5. Future Expectations (identifying desired features and design improvements)

The survey was administered through Microsoft Forms for its seamless integration with institutional systems and robust data security features. Over a three-week period, we distributed the survey via university email lists, student discussion platforms, and targeted social media channels to ensure diverse participation while approved by our Institutional Review Board ethical standards. Participants received clear information about the study's purpose, data confidentiality measures, and their right to withdraw at any point without consequence. Data cleaning was performed using Microsoft Excel with VBA automation, followed by statistical analysis in IBM SPSS. Descriptive statistics including means, standard errors, and frequency distributions were calculated to summarize response patterns. Inferential statistics employing independent t-tests examined group differences in variance across demographic categories and device usage patterns.

All participant information remained securely stored and anonymized throughout the research process. Refer to Appendix A for the survey questions.

Results

Our survey yielded 107 complete responses from college students (age 18+), with a gender distribution of 51% female and 48% male and a diverse academic representation. Nearly half of respondents (47%) major in legal studies, while business/economics and STEM fields each accounted for 19%. The remaining 15% spanned health, social sciences, arts, education, and applied studies.

Smartwatches emerged as the most prevalent device (46% of respondents), followed by fitness trackers (11%), with limited adoption of smart rings (5%) and other devices (6%). Notably, 31% of respondents reported no wearable ownership. Usage patterns revealed two primary user groups: constant wearers (28% using devices all day) and daily users (28% removing devices periodically). Secondary usage patterns included activity-specific (19%), weekly (12%), and rare use (13%), as detailed in Table 1.

Table 1. Wearable Devices Type based on Usage Frequency

Dev./Freq.	All day	Daily	Only	Few times	Rarely	Total
Smartwatch	19	14	11	9	6	59 (46%)
Fit Tracker	5	1	6	-	2	14 (11%)
Smart Ring	-	5	-	1	1	7 (5%)
Others	1	5	-	-	2	8 (6%)
None	-					40 (31%)
Total	25 (28%)	25 (28%)	17 (19%)	10 (12%)	11 (13%)	128

Survey respondents demonstrated moderate agreement ($\mu = 4.97 \pm 1.65$ on 7-point scale) that wearable design impacts mental well-being, with calming interfaces receiving the strongest endorsement ($\mu = 5.28 \pm 1.60$). Practical functionality outweighed aesthetic considerations, as smooth operation (38% of respondents) and intuitive navigation (29%) were prioritized over responsive (11%), visual calmness (9%), or accessibility (13%). This functional emphasis persisted in color preferences ($\mu = 5.13 \pm 1.67$), where white (26%) emerged as the most calming hue overall despite male respondents favoring black (24%). Additionally, blue and green tied for third with each accounted for 11%.

Table 2. Participant-Selected Wearable Device Features Associated with Mental Well-Being

Tracking Features	%	UI/UX Contributors	%	Key Customizations	%
Sleep Analysis	69.2%	Soft & Calming	62.6%	Change Color	67.3%
Stress Monitoring	63.6%	Easy Navigation	46.7%	Display Styles	55.1%
Mood Tracking	56.1%	Clean design	44.9%	Health Insight	52.3%
Focus Tracking	35.5%	Custom Layouts	39.3%	Mindful Reminders	42.1%
Mindful Reminders	33.6%	Haptic Feedback	37.4%		
Breathing Exercises	30.8%	Dark Mode	26.2%		

Customization proved particularly salient among respondents, with adaptive color themes (67.3% of participants) dominating personalization choices and achieving high satisfaction ratings ($\mu = 5.10 \pm 1.54$). Analysis of core functionality revealed sleep monitoring (69.2%) and stress tracking (63.6%) as most valued features, while soft/calming interfaces (62.6%) ranked highest among UI/UX contributors. Table 2 presents these preferences in descending order of importance, highlighting their prioritization of health monitoring and customizable displays. No significant differences emerged across device ownership or gender groups.

Table 3. Wearable Device Features' Perceived Impact on Anxiety Reduction and Mental Well-Being

Opinion	Q7e	Q7h	Q7j	Q7b	Q7f	Q7d	Q7c	Q7a	Q7g	Q7i
Mean (SE)	5.30 (.147)	5.22 (.142)	5.12 (.147)	5.11 (.147)	5.11 (1.47)	5.10 (.153)	5.04 (.156)	4.97 (.152)	4.71 (.154)	4.71 (.170)

Respondents generally "somewhat agreed" ($\mu = 5.0$) that wearable devices help mitigate anxiety through design features, with notable variation across specific elements (Table 3). App compatibility ($\mu = 5.30 \pm 1.53$) and activity tracking ($\mu = 5.22 \pm 1.47$) received respondents' strongest endorsement as anxiety-reducing features, while button placement ($\mu = 4.71 \pm 1.60$) and social connectedness tools ($\mu = 4.71 \pm 1.75$) ranked lowest. The response spectrum showed clustered mid-range ratings ($\mu = 4.97$-5.12) among respondents for features like haptic feedback and display customization.

Table 4. Significant Difference in Terms of Error Support and Social Connection features

Significance Diff.	Female μ (SE)	Male μ (SE)	Mean Diff. Δ	p-value
Error Message Support	5.36 (.186)	4.65 (.247)	.717	.021
Social Connection	5.05 (.218)	4.37 (.258)	.682	.045

While no significant differences emerged between device owners and non-owners, analysis of respondent subgroups revealed gender patterns (Table 4). Female respondents rated error message clarity significantly higher than males ($\Delta = 0.717$, $p = .021$), with a similar preference gap for social connectivity features ($\Delta = 0.682$, $p = .045$).

Table 5. Frequency of Wearable Feature Usage for Mental Health Management

Frequency	Q8b	Q8e	Q8a	Q8d	Q8c
Mean (SE)	2.75 (.172)	2.67 (.167)	2.46 (.168)	2.46 (.166)	2.31 (.140)

Respondents reported infrequent engagement with mental health features on wearable devices (Table 5). On a 5-point frequency scale (1=Never to 5=Always), average usage fell between "Rarely" and "Sometimes" across all features. Sleep tracking ($\mu = 2.75 \pm 1.19$) showed the highest adoption, followed by social connection features ($\mu = 2.67 \pm 1.16$), while guided breathing exercises were used least frequently ($\mu = 2.31 \pm 0.97$).

Table 6. Perceived Effectiveness of Wearable Features on Mental Health Outcomes

Experience	Q9e	Q9c	Q9a	Q9b	Q9d
Mean (SE)	2.50 (.055)	2.43 (.060)	2.41 (.059)	2.41 (.058)	2.38 (.062)

On a 3-point scale (1=Worsened, 3=Improved), respondents reported modest benefits (Table 6): social connectedness ($\mu = 2.50$) ranked highest, followed by sleep quality ($\mu = 2.43$), with anxiety/stress reduction ($\mu = 2.41$) and emotional well-being ($\mu = 2.38$) showing slightly weaker effects (all $\sigma = 0.6$). Respondents generally prioritized mental health-focused UI/UX ($\mu = 5.36 \pm 1.22$ on 7-point scale) in future wearables, with highest anticipation for: (1) comfort (69.2% of respondents), (2) AI-driven mood prediction (63.6%), and (3) social wellness tools like mood-based suggestions (66.4%). Neurofeedback (58.9%) and accurate

health monitoring (62.6%) emerged as key expected health features, while practical considerations like battery life (58.9%) and privacy protections (56.1%) were similarly prioritized. Social connectivity expectations included shared goal tracking (62.6%) and messaging systems (57%). Table 7 provides the complete feature breakdown across health monitoring, device functionality, and social support categories.

Table 7. Most Requested Mental Health Wearable Features by Category

Health Features	%	Support Feature	%	Social Features	%	Support Socialization	%
Prediction	63.6%	Comfort	69.2%	Messaging	57%	Suggestions	66.4%
Feedback	58.9%	Accuracy	62.6%	Sharing	55.1%	Sharing	62.6%
Detect	52.3%	Battery	58.9%	Reminders	50.5%	Reminders	53.3%
Risk	51.4%	Privacy	56.1%	Community	43.9%	Networking	49.5%
Monitoring	46.7%	Durability	55.1%	Relationship	40.2%	Emergency	53.3%
Automation	38.3%	Affordability	50.5%	Group	39.3%	Privacy	32.7%
Assistance	38.3%	Insight	36.4%	Socials	29%	Integration	31.8%
Integration	34.6%	Integration	35.5%				

Open-ended (n = 30) responses revealed both enthusiasm and reservations about mental health wearables, highlighting three key tensions. Students recognized the value of AI-driven monitoring for tracking stress and sleep patterns, with one participant noting how wearables "revolutionize mental health management through real-time physiological monitoring" (p9), while others expressed concerns about over-reliance, emphasizing the need to "still talk to real people" (p6). This paradox extended to privacy concerns, particularly regarding data intrusion, as exemplified by one student's caution that excessive integration "feels like my life is invaded" (p10). However, respondents universally valued devices that balanced advanced functionality with user autonomy, using them primarily as "reference tools" (p10) rather than definitive diagnostics.

Collectively, these responses suggest that successful wearable designs must reconcile technological sophistication with discreet, user-controlled interfaces while maintaining rigorous privacy standards, a challenge underscored by the mixed reactions to social connectivity features. As one participant summarized, the ideal device would offer "advanced but non-intrusive monitoring" (p10) with customizable engagement levels.

Discussion

This study provides empirical evidence to address four persistent challenges in wearable mental health technology through the lens of college student needs. Our findings reveal both the potential and limitations of current devices while offering actionable design pathways forward.

Perceptions of Wearable Devices for Mental Health Management

The findings of this study suggest that college students generally view wearable devices as potentially supportive tools for mental health management. Participants expressed moderate agreement that wearable technology, when designed with user needs in mind, can positively affect their mental well-being. Specifically, design elements such as soft and calming interfaces (62.6%) and intuitive navigation (46.7%) were recognized as contributors to reduced cognitive load and emotional stress. However, this positive

perception did not consistently translate into high levels of actual use. Many respondents acknowledged the theoretical benefits of wearables for mental health but reported only occasional engagement with features designed for psychological well-being. This gap between perceived usefulness and behavioral adoption highlights the need for more engaging and tailored mental health functionalities.

Beneficial Features for Mental Well-Being

Among the available features, sleep monitoring (69.2%) and stress tracking (63.6%) were most cited as beneficial to students' mental health. These functionalities support users by offering insight into physiological states closely tied to emotional regulation and academic stress. The high rating of app compatibility ($\mu = 5.30$) and seamless navigation ($\mu = 5.11$) further indicates that integration into existing digital routines is critical to user satisfaction. Personalization also emerged as a key theme, as students showed strong preferences for customizable displays and adaptive color schemes (67.3%), which enable them to tailor device experiences to their individual needs and preferences. These findings suggest that users prioritize features that provide both meaningful feedback and the flexibility to adapt the technology to their mental health routines.

Student Experiences with Existing Mental Health Wearables

Despite the availability of various mental health-related features, usage rates remained relatively low across the board. On a 5-point frequency scale, the average use of features such as guided breathing ($\mu = 2.31$), mood tracking ($\mu = 2.46$), and social connection tools ($\mu = 2.67$) fell between "rarely" and "sometimes." Sleep tracking was used more frequently but still did not approach regular engagement levels. Open-ended responses illuminated some of the reasons behind this limited use: students expressed a preference for wearables that support self-awareness, dynamic interaction, rather than acting as diagnostic tools, and many voiced concerns over data privacy and over-surveillance. The sentiment that wearables should be "non-intrusive" and under user control was consistently emphasized, suggesting that autonomy is a critical component of student acceptance.

Design Priorities for Future Mental Health Wearables

Students articulated clear expectations for future improvements in the UI/UX of wearable devices. Comfort (69.2%), AI-driven mood prediction (64%), and personalized wellness tools (66.4%) were among the most frequently requested features. These responses indicate growing interest in intelligent systems that can anticipate and respond to emotional states in real time. Additionally, participants valued features that foster social connections such as shared goal tracking and mood-based interaction suggestions, while simultaneously emphasizing the need for strong privacy protections. Female respondents highlighted the importance of error message clarity and social functionality, suggesting that inclusive and responsive design strategies may increase overall effectiveness. Finally, respondents stressed the need for long battery life, affordable pricing, and durable construction, indicating that practical considerations remain as vital as digital capabilities.

Recommendations

This study provides actionable insights into optimizing UI/UX design to enhance wearable devices' effectiveness in supporting mental health among college students. Based on the findings, future designs should prioritize intuitive and minimalistic interfaces to reduce cognitive load and enhance usability, making devices approachable and effective for ongoing mental health management. Adopting soft, calming color schemes should be a strategic choice due to their demonstrated psychological benefits in stabilizing mood and reducing stress. These design considerations help make wearable devices more conducive to mental wellness.

Monitoring capabilities should be expanded to include comprehensive tracking of mental health indicators such as sleep quality, stress levels, and emotional fluctuations. Of particular interest is the incorporation of AI-driven mood prediction, which received strong endorsement from respondents. Such technology can enable real-time mood recognition and personalized interventions, offering users timely feedback and suggestions for behavioral or emotional regulation. When implemented responsibly, these features can serve as proactive tools that anticipate mental health challenges and provide nonintrusive support based on physiological and behavioral cues.

Customization options must be further developed, enabling users to personalize layouts, themes, and functionalities to suit individual preferences and needs. Such personalization can significantly boost user satisfaction and device engagement, providing tailored health tracking and interventions.Educational content on mental health embedded within the devices can equip users with immediate strategies and insights for managing stress and anxiety, offering preventive measures and fostering proactive mental health management.

Data security and privacy must remain top priority, with robust, transparent practices for collecting, handling, and protecting sensitive user information. Maintaining user trust through rigorous security measures and clear privacy policies is crucial for the success of health-oriented technologies. Interoperability and cross-platform functionality must be improved, ensuring seamless integration with various health applications and devices. This interconnectedness provides users with a comprehensive overview of their health data, enhancing overall mental health management capabilities.

Lastly, a dynamic and responsive feedback loop should be established, involving diverse user groups to continually refine and improve wearable devices. Ongoing feedback and iterative design enhancements will ensure devices remain relevant and effective in addressing the evolving mental health needs of college students. Implementing these recommendations will significantly enhance wearable devices, making them more impactful tools for mental health support, leading to improved individual experiences and broader public health benefits.

Proposed Design

Based on the survey results, we propose a campus-centric design framework that prioritizes functional simplicity, adaptive personalization, and privacy-conscious social connectivity to enhance student engagement with mental health wearables. By applying the Double Diamond Framework (Design Council, 2019), we systematically address problems through evidence-based design. When targeting college students in mental health interventions, it is crucial to consider not only accuracy but also comfort, usability, and personalized engagement. This framework helps guide our analysis of UI/UX strategies that promote long-term use and align with students' lived experiences. In such, we present a circular-based interface for smartwatches (46% adoption) that balances immediate readability with deep functionality, specifically addressing the engagement challenges identified in our study ($\mu = 2.31 - 2.75$ usage frequency) based on our finding through the design process framework.

Core Interface Architecture

The proposed smartwatch interface employs a quad-ring visualization system that directly addresses students' need for glanceable mental health monitoring (validated by 62.6% preference for calming interfaces). Each colored arc corresponds to key survey-identified metrics: purple (69.2% prioritized sleep tracking), red (63.6% valued stress monitoring), blue (63.6% desired AI mood prediction), and green (66.4% interest in social features). This design resolves the engagement paradox by enabling instant status checks without menu navigation, particularly crucial during academic activities. The ring completeness

visually communicates metric adequacy - for example, a full purple arc indicates optimal sleep duration - while pulsing animations signal urgent alerts (Figure 1 left).

Adaptive Display System

Respondents' environmental needs (26% white/24% black color preference) inform a context-sensitive display engine. Dark mode activates automatically during evening hours (7pm-7am) to support sleep hygiene and in lecture halls via location detection (Figure 1 right). During exam periods, the interface simplifies to show only sleep/stress rings (prioritizing 69.2% and 63.6% top features), while break periods reveal full mood/social functionality. This academic-phase adaptation specifically targets the student's academic pursuit for focused monitoring during intensive study sessions.

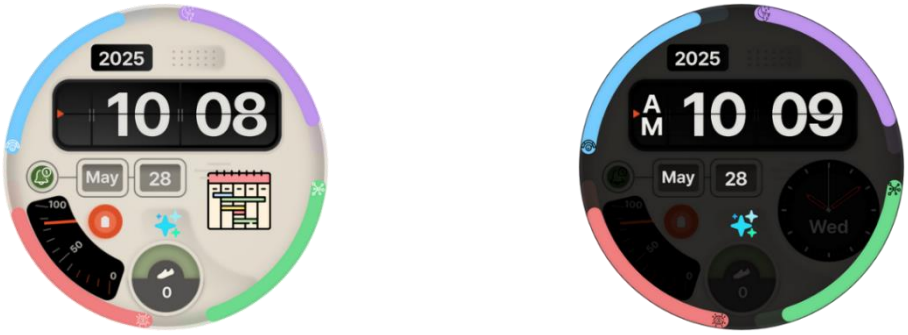

Figure 1. Adaptive Smartwatch UI/UX

Privacy-Customization Balance

The design reconciles students' conflicting desires for social connectivity (66.4% interest) and data privacy (56.1% concern) through three innovations: First, the green social ring remains hidden by default in academic locations, requiring deliberate interaction to activate. Second, department-specific theme options (67.3% customization demand) include law student-oriented monochrome palettes. Third, a tiered sharing system allows temporary data export to campus wellness portals (addressing $\mu = 5.30$ app compatibility) while auto-deleting mood data after 48 hours unless manually saved.

Hardware-Software Integration

Survey-driven hardware specifications ensure seamless daily use: battery optimization disables AI features when charge falls below 30% (addressing 58.9% battery concerns), while ergonomic haptic alerts (37.4% approval) deliver stress notifications through distinct vibration patterns (Figure 2). The system implements gender-differentiated defaults, providing female users (51%) with enhanced error explanations ($\Delta = 0.72$ preference) and social wellness prompts while offering males streamlined data views.

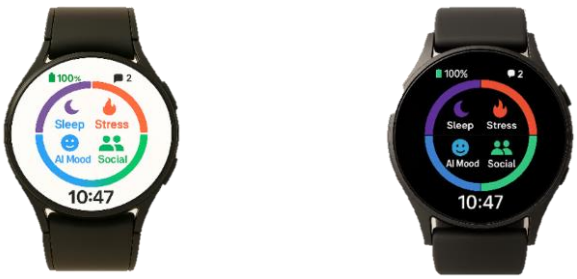

Figure 2. Other UI/UX Consideration

Limitations and Future Research

Our study has a few limitations. First, the sample composition presents constraints with a modest number of participants and nearly half concentrated on legal studies. These findings do not account the confounding factor of each participant. While the normally distributed responses provided reliable central tendency measures and accuracy, the limited variability reduced our ability to detect nuanced effects, particularly for subgroup analyses like the gender differences in social feature preferences. The substantial portion of non-wearable owners further restricted our capacity to examine usage-based differences that might reveal critical adoption barriers.

Second, the cross-sectional design captures only a snapshot of student perceptions, unable to track how engagement fluctuates across academic cycles. This temporal limitation proves especially significant given the paradox we observed between high feature valuation and surprisingly low usage frequency. Without longitudinal data, we cannot determine whether this discrepancy reflects design shortcomings or natural usage patterns that vary by semester phase.

Third, while smartwatches represented the dominant device type, our aggregation of all brands and operating systems may mask important platform-specific effects. This oversight leaves unanswered questions about how proprietary UI conventions (e.g., Apple's crown navigation versus Wear OS gestures) might impact the usability of mental health features. It’s a crucial consideration given students' strong emphasis on intuitive navigation.

These limitations chart clear directions for future research and implementation. Most urgently, ecological momentary assessment studies could bridge the gap between reported preferences and actual behavior by tracking real-time interactions with mental health features across academic calendars. Additionally, brand-stratified research comparing implementation on Apple Watch, Fitbit, and specialized devices like Whoop would clarify whether low engagement stems from generic design issues or platform constraints. Longitudinal studies incorporating exam periods could also validate our proposed stress-triggered interface adaptations. Ultimately, these advances would innovate wearables that truly meet students' mental health needs throughout their academic journeys.

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Appendix A

Personal Information Questions:
All participants were eligible if they were 18 years or older and currently enrolled as college students.
Gender, Field of study

Wearable Experience Questions:
WEQ1: Select the wearable devices you currently own or use
WEQ2: Frequency of wearable device use

UI/UX Mental Health Questions:
UIUXMHQ1: Agreement (1–7 scale) that well-designed wearables support mental well-being
UIUXMHQ2: Selection of features associated with mental health tracking
UIUXMHQ3: Selection of UI/UX design elements that help reduce stress
UIUXMHQ4a: Agreement (1–7 scale) that color influences emotion/mental state
UIUXMHQ4b: Rank of calming colors commonly used in wearables
UIUXMHQ5a: Agreement (1–7 scale) that customization enhances control and satisfaction
UIUXMHQ5b: Selection of customization features helpful for mental well-being
UIUXMHQ6a: Agreement (1–7 scale) that smooth, calming UI contributes to comfort
UIUXMHQ6b: Ranking of important UI attributes in wearable devices

Scale: 1 (Strongly Disagree) – 7 (Strongly Agree)
UIUXMHQ7a: Anxiety reduction through seamless integration with other devices
UIUXMHQ7b: Anxiety reduction via simple, user-friendly navigation
UIUXMHQ7c: Stress relief from clear, helpful error messages
UIUXMHQ7d: Mental load reduction through organized layout
UIUXMHQ7e: Efficient info processing via health/wellness app compatibility
UIUXMHQ7f: Sense of control via intuitive features and feedback
UIUXMHQ7g: Reduced frustration due to thoughtful button placement
UIUXMHQ7h: Motivation and encouragement to stay active
UIUXMHQ7i: Social connection through data sharing features
UIUXMHQ7j: Overall positive impact on mental health

Frequency: Never, Rarely, Sometimes, Often, Always
How often are wearable devices used to manage mental health-related features.
UIUXMHQ8a: Stress monitoring (e.g., heart rate variability, skin temperature)
UIUXMHQ8b: Sleep tracking (e.g., REM analysis, sleep disturbances)
UIUXMHQ8c: Guided breathing exercises for relaxation
UIUXMHQ8d: Mood tracking (e.g., AI-based emotional insights)
UIUXMHQ8e: Social connection features (e.g., reminders, digital wellness notifications)

Opinion: Worsened, No Effect, Improve
User perception of how wearable devices affect key mental health aspects.
UIUXMHQ9a: Anxiety levels
UIUXMHQ9b: Stress levels
UIUXMHQ9c: Sleep quality
UIUXMHQ9d: Emotional well-being
UIUXMHQ9e: Feeling of social connectedness

Future Expectation Questions:
FEQ1: Importance (1-7 scale) of user-centric, mental health-aware UI/UX in next-gen wearables.
FEQ2: Desired mental health-focused features in future wearables (Select all that apply):
Sleep apnea risk reduction, Brainwave analysis, Mood prediction AI, Smart temperature control, Contact exchange via handshake, Continuous blood pressure/glucose monitoring, Panic attack detection & assistance, Integration with mental health apps & therapists.
FEQ3: Key feature priorities for supporting mental health (Select all that apply):
Battery life, Comfort & wearability, Tracking accuracy, Privacy & security, Durability, Affordability & accessibility, Seamless mental health integrations, User-friendly insights.
FEQ4: Improvements desired for enhancing social connection & belonging (Select all that apply):
Real-time location sharing, Wearable-to-wearable messaging, Social wellness reminders, Community challenges & leaderboards, AI-powered relationship insights, Improved group activity tracking, Social media/messaging app integration.
FEQ5: Preferred social connection methods via wearables (Select all that apply):
Smart social reminders, Mood-based interaction suggestions, Shared health & fitness goals, Wearable-based social networking, Emergency contact notifications, Social platform integration, Privacy controls for selective sharing.
FEQ6: Open comment field regarding wearable devices and mental health.