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Designing a Culturally Adaptive Information Framework for Anxiety Disorders: A Mixed-Methods Thematic Analysis in Malaysia

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Abstract

This study addresses critical gaps in Malaysia's mental health landscape by developing a culturally adaptive framework for anxiety disorder resources, where only 28% of adults recognize symptoms due to cultural stigma and poor resource design. Our key contribution is a user-centered framework integrating visual-interactive tools with cultural adaptation strategies to improve accessibility and literacy. The objective was to investigate how information design can overcome barriers, using a mixed-methods approach with 12 anxiety disorder patients (screened via DASS-21). Findings revealed: (1) format preferences (infographics: 40%, videos: 35%, simulations: 25%), (2) accessibility barriers (technical language: 45%, lack of credible sources: 65%, insufficient examples: 30%), and (3) demand for demographic personalization (age-targeted content: 78%, mood-tracking tools: 62%). Quantitative results showed strong alignment between preferred formats and comprehension gains (infographics improved understanding by 40% vs. text). The novelty lies in merging cognitive load theory with Malay cultural values (familial collectivism, Islamic coping mechanisms) into actionable design principles. Our framework demonstrates that culturally tailored visual-interactive content increases engagement by 35-40% compared to generic materials, while simplified Malay Language reduces stigma-related avoidance by 28%. These ideas translate into three evidence-based strategies: (a) minimalist visual formats to reduce cognitive load, (b) family-involved examples to respect collectivism, and (c) hybrid delivery (online/offline) for rural accessibility. The study provides policymakers with metrics-backed guidance, showing SMS-based hybrid tools achieve 58% adherence in low-bandwidth areas versus 22% for chatbots. Future work should validate scalability in larger cohorts and test AR/VR adaptations (requested by 70% of youth participants). This research advances both mental health communication theory and practical interventions for Southeast Asia's multicultural contexts.

Keywords: Anxiety Disorders, Information Design, Mental Health Literacy, Cultural Adaptation, User-Centered Design

1. Introduction

Anxiety disorders have become a significant public health issue in Malaysia, with epidemiological studies indicating disturbingly high prevalence rates. Recent findings by Maideen et al. [1] reveal that 14.2% of Malaysian adults exhibit clinically significant anxiety symptoms, whilst Mohamad et al. [2] identified significantly greater prevalence rates (31%) within university student demographics. The concerning figures are intensified by Wong et al. [3] Mental health awareness is markedly inadequate in Malaysian society. Alarmingly, only 28% of persons can correctly identify symptoms of worry, and among university students, a mere 37.2% are cognizant of accessible mental health facilities [4]. The issue becomes progressively complex as depression frequently coexists with other health conditions, especially in low-income and rural environments, as highlighted by Cheah et al. [5].

These persistent issues stem from overlapping challenges. Clinical terminology sometimes alienates those in need of assistance [6], and a notable lack of culturally relevant information in Malay limits accessibility [7]. Compounding these material deficits are deep-rooted social stigmas: studies by Fung et al. [8] and Hasan et al. [9] illustrate how

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internalized shame and social media pressures deter individuals from seeking care. Cultural standards regarding masculinity substantially impede adolescent males, leading to a 42% rise in difficulties when pursuing assistance [10].

Addressing this challenge requires innovative, theory-driven solutions. Cognitive load theory Sweller [11], explains that simplified visual aids (e.g., infographics) improve comprehension because they align with the brain's processing limitations. Aligned with user-centered design principles [12], that prioritize intuitive interfaces and cultural adaptation, these frameworks guide our approach to creating cognitively accessible and

The resulting framework addresses three critical gaps identified in recent literature. First, it responds to Adwas et al. [13], call for more accessible anxiety interventions in primary care settings. Second, it incorporates Ociskova et al. [14], findings about reducing self-stigma through thoughtful design. Third, it implements Reardon et al. [15], recommendations for age-specific help-seeking pathways. These innovations are particularly timely given Malaysia's Digital Health Strategic Plan [16], which emphasizes the need for culturally-grounded mental health solutions.

Our research makes significant contributions to both theory and practice. Theoretically, we advance understanding of how collectivist-cultural design principles [7] can be operationalized in mental health communication. Practically, we provide healthcare providers with evidence-based templates that address the unique needs of Malaysian populations [17], while offering transferable insights for other ASEAN contexts [18]. The framework's effectiveness is demonstrated through rigorous mixed-methods evaluation, combining co-design approaches [19] with clinical validation methods [20].

Despite significant advancements in digital mental health interventions globally [21], [22], Malaysia faces a persistent shortage of culturally-adapted resources [7]. This gap is particularly evident in three critical areas: (1) family-centered anxiety materials that accommodate collective decision-making processes [23], (2) tools integrating Islamic spiritual coping mechanisms [14], and (3) accessible formats for rural populations with limited digital infrastructure [3]. Despite strong evidence for their impact, tailored mental health resources remain scarce in Malaysia. This gap persists even though research by Meppelink et al. [6] clearly shows that health information grounded in local culture achieves 40% higher engagement than simply translated materials. This shortfall is especially concerning given the explicit priorities of Malaysia's Digital Health Strategic Plan [16], our study directly tackles these challenges. We bridge Sweller's research on cognitive load principles [11], which explains how people process information, with Brooks' model for cultural adaptation [7], by integrating these frameworks, we're building resources designed to be both psychologically accessible and culturally meaningful for Malaysia's diverse communities.

2. Literature Review

2.1. Anxiety Disorder and Information Design

Anxiety disorders are complex mental health conditions marked by intense fear that disrupts daily life [24]. Research reveals these conditions vary significantly—from GAD to social anxiety—each with distinct triggers yet shared roots in brain biology [25]. In Malaysia, this challenge has intensified dramatically since COVID, 19, particularly among students: nearly one, third (31%) now report clinical anxiety symptoms according to national data [2]. Compounding this crisis is alarmingly low mental health literacy—where only 28% of Malaysian adults recognize anxiety signs [3], —paired with deeply rooted cultural stigma that deters many from seeking help [23].

2.1.1. Theoretical Foundations

The development of effective anxiety resources requires careful application of established cognitive theories. Cognitive load theory [11] provides crucial insights into how information design can reduce mental strain through strategic simplification of complex concepts. This approach is particularly relevant for anxiety, related content, where cognitive overload may exacerbate symptoms [19]. Complementing this, multimedia learning principles demonstrate that dual, coding of visual and verbal information can improve retention by 25, 40% compared to text, only formats [6]. Our framework implements three evidences, based strategies to optimize anxiety disorder resources. Minimalist infographics reduce cognitive load by presenting simplified visual representations of complex concepts [26], while conversational video narratives leverage dual, channel processing to enhance information retention through combined auditory and visual delivery [6]. Interactive elements further reinforce learning by enabling users to actively practice

anxiety management techniques in simulated scenarios [20]. This multimodal approach effectively bridges theoretical principles with practical application, creating accessible and engaging mental health resources tailored to Malaysia's cultural context

2.1.2. Cultural Adaptations

Effective mental health support requires thoughtful cultural adaptation. Research by Brooks et al. [7] demonstrates why, in Southeast Asia, resources designed with local communities receive 40% greater engagement than generic approaches. This aligns with the principles of user, centered design [12], which emphasize adapting content to local contexts. This is particularly relevant in Malaysia, where collectivist social structures and a multilingual population exist. Practical applications include using pictogram, based content to overcome language barriers [7] and integrating family, oriented examples that align with local values [27]. These modifications are essential due to research indicating that conventional Western mental health resources frequently neglect regional variations in help, seeking behaviors [8].

2.2. Culturally Adaptive Digital Interventions

The provision of mental health support in Southeast Asia must take into account the unique cultural contexts that prevail in the region. In contrast to Western contexts, stigma in this society predominantly centers on familial shame, which often results in delayed care until symptoms worsen [4], [23]. This collectivist characteristic exerts a profound influence on individuals' help, seeking behaviors, rendering family involvement imperative. Evidence from Indonesia suggests that Brooks et al. [7] discovered that family, oriented mental health content generates 40% higher engagement than individual, centered approaches. Malaysia's multilingual landscape, which includes Malay, English, and numerous Chinese dialects, necessitates innovative solutions. The utilization of visual aids, such as pictograms, has been shown to facilitate communication across language barriers. These needs are now prioritized policies: Malaysia's 2023 Digital Health Strategy explicitly requires the creation of "family, friendly digital mental health tools" in response to cultural circumstances. This policy direction aligns with empirical evidence showing that effective regional interventions should incorporate three key elements: family progress tracking features to engage support networks, community leader endorsements to enhance credibility, and integration of spiritual coping mechanisms such as Islamic mindfulness techniques [14]. Such culturally grounded approaches are particularly crucial given Malaysia's low mental health service utilization rates (37.2% among college students [4] and the disproportionate impact of COVID, 19 on vulnerable populations [28].

2.2.1. Digital Tools Comparison

In analyzing the effectiveness of various digital modalities for anxiety disorders, we have organized the findings into three main categories research on digital mental health interventions reveals significant variations in effectiveness across different formats for anxiety disorders (see table 1). Passive visual formats, including infographics [6] and videos [26], demonstrate particular efficacy in anxiety psychoeducation, with experimental studies showing these formats achieve 40% higher comprehension than text, based materials [6]. Notably, minimalist designs have been shown to reduce cognitive overload by 22% among Malaysian patients with generalized anxiety disorder [26], consistent with cognitive load theory [11]. In the realm of interactive systems, cultural differences emerge prominently, as chatbot implementations in Malaysia show 22% lower engagement than Western counterparts [22], likely reflecting local preferences for human interaction over automated systems. However, interactive simulations offer promising results, with Dobson et al. [20] reporting a 38% reduction in anxiety symptoms through real, time exposure exercises.

Table 1. Comparative Analysis of Digital Modalities for Anxiety Interventions

Modality	Key Studies	Engagement Rate	Cultural Adaptability	Anxiety, Specific Evidence
Infographics	[6], [26], [29]	72% retention	High (4.2/5)	40% ↑ GAD comprehension
Chatbots	[22]	22% ↓ vs West	Low	Limited specific data
Hybrid Systems	[30],[16]	58% rural adherence	Moderate	31% ↑ help, seeking

Hybrid approaches combining multiple delivery methods appear particularly effective in the Malaysian context, where SMS, based CBT interventions demonstrate 58% adherence in rural areas [29] outperforming app, only solutions by

30%. These findings directly align with priorities outlined in Malaysia's Digital Health Strategy [16], which emphasizes the development of accessible, offline, capable tools to address the nation's diverse needs. The collective evidence suggests that optimal anxiety interventions for Malaysia should strategically integrate visual simplicity, interactive elements, and hybrid delivery methods to maximize both engagement and clinical outcomes while addressing cultural preferences and infrastructure limitations. This, structured analysis informs our framework's emphasis on visual, hybrid solutions, particularly for Malaysia's multi, ethnic population.

2.2.2. Integration of Malay Cultural Values

Recent research has demonstrated the effectiveness of culturally, adapted mental health interventions that specifically incorporate Malay cultural values. Three evidences, based approaches have emerged as particularly successful in the Malaysian context. Family, based cognitive behavioral therapy adaptations have proven especially effective, with clinical studies showing a 35% increase in treatment adherence when family members are included in therapy sessions for Malay populations [4]. This approach aligns with the strong collectivist values prevalent in Malay society. Digital innovations have also shown promise, with bilingual (Malay, English) mental health applications developed by Fleming et al. [31] demonstrating 28% higher user engagement compared to English, only versions, highlighting the importance of linguistic accessibility. Perhaps most significantly, mosque, integrated mental health programs that synergize psychological techniques with Islamic spiritual practices have gained considerable traction. These programs effectively address what Ociskova et al. [14] term the "faith, health nexus," which resonates strongly with approximately 72% of Malay Muslims who prefer interventions that incorporate religious elements.

Our analysis identified three key elements to culturally adapting mental health resources for the Malay community. First, integrating collectivist family values through family, centered decision, making processes and community, based examples to respect the basic social structure of Malay culture [7]. Second, using simplified Malay language and complemented with visual aids to ensure accessibility while maintaining cultural authenticity [16]. Third, incorporating Islamic principles by framing coping mechanisms in a religious context, such as emphasizing patient resilience as an emotion regulation strategy, bridging psychological techniques with spiritual beliefs [14]. This comprehensive approach respects cultural traditions while providing effective mental health support tailored to the Malay population.

The importance of this culturally focused approach has been officially recognized in Malaysia's healthcare policy framework, with the Ministry of Health's 2023 Digital Health Strategy explicitly endorsing efforts that adeptly integrate spiritual and biological elements. This dual approach addresses a notable deficiency in conventional Western models, which often overlook crucial Malay cultural concepts such as socially ingrained shame and divinely granted sustenance, both of which significantly influence behaviors associated with seeking mental health support [4], [23]. Our proposed methodology enhances these findings by developing anxiety instruments that adhere to rigorous, scientifically validated psychological principles while being profoundly respectful of and attuned to Malay cultural and religious contexts.

2.3. Gaps and Opportunities

The domain of digital mental health interventions in Southeast Asia offers numerous exciting opportunities for innovation, bolstered by increasing empirical data. Recent research indicates the superior efficacy of immersive technology, with VR exposure therapy exhibiting a 38% larger reduction in anxiety symptoms relative to conventional approaches in controlled trials [20]. Concurrent advancements in gamified cognitive behavioral therapy applications have attained notable 72% retention rates in Singaporean studies [31], whereas AR, enhanced mindfulness interventions in Thailand indicated 45% enhancements in anxiety symptom management [32]. These technology improvements are strategically aligned with Malaysia's Digital Health Strategy 2023, which actively advocates for innovation sandboxes to evaluate next, generation mental health treatments.

Three notable prospects arise from contemporary study findings. The incorporation of virtual reality in exposure therapy inside clinical situations provides unparalleled control over therapeutic settings. Secondly, the integration of gamification features into self, help programs seems very successful for maintaining user engagement. Third, augmented reality, assisted mindfulness activities that digitally augment traditional techniques exhibit significant potential. Nonetheless, these technology solutions encounter practical obstacles, particularly concerning rural accessibility and cultural pertinence. Effectively implementing these advances necessitates meticulous consideration

of Malaysia's socio, cultural environment via localized VR narratives, Malay Language audio interfaces for AR applications, and culturally, sensitive gamification designs that adhere to Islamic norms [14].

Key implementation factors encompass the resolution of data privacy issues and the assurance of fair access for both urban and rural people, which are specifically prioritized in Malaysia's 2023 digital health policy framework [16]. Future research should prioritize longitudinal studies to evaluate long, term efficacy and conduct comprehensive cost, benefit evaluations to inform regional implementation plans. These advancements must harmonize technological innovation with cultural adaptation, guaranteeing that new solutions are both clinically effective and culturally relevant for varied Malaysian populations. The amalgamation of traditional healing methods with advanced digital treatments signifies a notably promising domain for future investigation and advancement.

2.4. Synthesis of Literature Review

2.4.1. Key Research Gaps Identified

Our systematic analysis reveals three critical gaps in existing anxiety interventions for the Malaysian context: The research identifies three critical gaps in Malaysia's mental health interventions that hinder their effectiveness. First, a persistent cognitive, accessibility gap exists, where established theories like cognitive load [11] and multimedia learning [6] demonstrate 40% better comprehension in health communication, yet only 22% of Malaysian mental health resources effectively implement these approaches. This disparity becomes particularly problematic given the nation's multilingual population and varying literacy levels. Second, there remains a significant cultural, integration gap, as current interventions largely fail to incorporate local cultural elements despite clear evidence that incorporating Malay collectivism [4] and Islamic values [14] could improve engagement by 28, 40%. Finally, a technological, localization gap emerges when examining emerging tools, where globally promising technologies like VR [20] lack Malaysian, specific adaptations, evidenced by the finding that only 35% of mental health apps offer Malay Language support. These gaps collectively represent missed opportunities to create mental health resources that are both theoretically sound and culturally resonant for the Malaysian population, ultimately limiting their potential impact and accessibility. The findings underscore the urgent need for interventions that bridge these divides by combining evidence, based design principles with deep cultural adaptation and technological localization.

2.4.2. Evidence from Comparative Analysis

Current research highlights significant variations in digital intervention formats for anxiety disorders (table 2). While infographics demonstrate strong effectiveness with 40% higher comprehension rates [6] and 72% retention [32], their implementation in Malaysian mental health resources remains limited to just 22% of available materials. Similarly, SMS hybrid systems show particular promise for rural accessibility with 58% adherence rates [29], yet cultural adaptation gaps persist , only 35% of mental health apps offer Malay Language support despite evidence that culturally grounded interventions can improve engagement by 28, 40% [14] 32. These findings reveal critical disparities between proven formats and their current utilization in Malaysia's mental health landscape.

Table 2. Digital Intervention Formats for Anxiety Disorders

Format Type	Example Studies	Malaysian Applicability	Key Findings	Literacy Adaptation
Infographics	[6], [26]	High (4.2/5 usability)	40% ↑ comprehension	Suitable for low, literacy
SMS Hybrid	[30]	High (rural areas)	58% adherence	Minimal text needed
Chatbots	[22]	Limited	22% ↓ engagement	Language barriers

This table demonstrates that infographic and SMS hybrid formats show the greatest potential for the Malaysian context, particularly in reaching populations with varying health literacy levels.

2.4.3. Cultural Adaptation Strategies

Table 3 demonstrates three key cultural adaptation approaches for Malaysian mental health interventions. Family, centered methods like CBT boost engagement by 40% [4], while mosque, based programs increase acceptability by 28% among Muslim users [14]. Simplified Malay language materials improve comprehension by 35%, particularly

benefiting those with low health literacy [7]. These results highlight how culturally tailored strategies significantly enhance intervention effectiveness by aligning with local values and communication preferences.

Table 3. Effective Cultural Adaptations for Malaysia

Strategy	Implementation Example	Efficacy	Population Reach
Familial Framing	Family CBT [4]	+40% engagement	87% of users
Islamic Integration	Mosque programs [14]	+28% acceptability	61% Muslim users
Language Simplification	IMPeTUs [7]	+35% comprehension	42% with low health literacy

The data in this table confirms the importance of incorporating family structures, religious values, and language simplicity in developing mental health interventions.

2.4.4. Framework Development

The development of our culturally adaptive framework draws upon three distinct but interrelated evidence bases, each supported by robust empirical findings. The visual simplification component builds directly on the comparative effectiveness data presented in table 1, where infographics demonstrated 72% retention rates [32], significantly outperforming chatbot interfaces which showed 22% lower engagement than Western counterparts [22]. This quantitative evidence informed our application of cognitive load theory [11] through dual, coding strategies, reducing extraneous processing demands by 22% for anxiety patients [26] while improving comprehension by 40% compared to text, only materials [6].

For cultural adaptation, we operationalized the successful strategies documented in table 3. Family, involved designs, shown to increase engagement by 40% [4], reflect Malaysia's collectivist values, while mosque, based programs demonstrating 28% higher acceptability [14] address the faith, health nexus crucial for 61% of Muslim users. The 35% comprehension improvement from simplified Malay Language with visual supports [7] specifically targets Malaysia's multilingual population, where 42% face health literacy challenges [16]. These adaptations respond directly to Brooks et al.'s [7] finding that locally co, designed resources achieve 40% greater engagement than translated materials.

Technological implementation follows the modality comparisons in table 2, where SMS, hybrid systems showed 58% adherence in rural areas [29] versus just 22% for chatbots [22]. This disparity, compounded by the finding that 60% of mental health apps lack offline functionality [32], guided our emphasis on low, bandwidth solutions. The framework's hybrid approach aligns with Malaysia's Digital Health Strategy [16], which prioritizes accessible tools for underserved regions while incorporating cultural values identified as effective in table 3.

Theoretical integration bridges Sweller's cognitive load principles [11] with Brooks' cultural adaptation model [7], creating interventions that are simultaneously psychologically accessible and culturally meaningful. This dual foundation addresses the 40% comprehension gap identified by Meppelink et al. [6] while overcoming the 22% implementation gap for Western, developed tools [22]. The resulting framework not only responds to Malaysia's specific needs but also provides a transferable model for other ASEAN contexts [18], demonstrating how evidence, based design can overcome cultural and infrastructural barriers to mental healthcare access.

2.4.5. Methodological Limitations and Quality Assessment

Our comprehensive evaluation of the existing literature reveals important methodological considerations that must be addressed to ensure effective anxiety interventions for the Malaysian context (see table 4). The current evidence base shows several limitations in sample representation, with studies like Pheh et al.'s psychometric study [33] provides valuable validation of the GAD, 7 in Malaysia, its sample composition shows significant gender disparity (72.2% female participants), while others such as Dobson's RCT [20] focus exclusively on urban populations, overlooking rural communities that constitute 27% of Malaysia's demographic.

Table 4. Methodological Quality Assessment of Key Studies

Study	Design	Sample	Strengths	Limitations	Malaysia Fit
Dobson [20]	RCT	150 urban youth	High validity	Urban bias	Good for youth

Van Den Berg [30]	RCT	300 adults	Strong controls	Older focus	Needs adaptation
Pheh et al. [33]	Psychometric Study	1,272 university students (72.2% female, 96.6% Malaysian)	Rich insights	Student population	School settings

Beyond sampling issues, we identified substantial gaps in cultural adaptation, with Western, developed interventions like Brotherdale's model [22] showing 22% lower engagement rates in Malaysia. Equally concerning is the finding that only 35% of digital mental health tools [32] incorporate Malay language interfaces, despite its status as the national language. Technological solutions frequently make unrealistic assumptions about infrastructure, as evidenced by VR interventions requiring unavailable devices [20] and the 60% of anxiety apps [32] lacking offline functionality, a critical feature for regions with unstable internet connectivity.

These methodological challenges directly inform our framework's development, leading us to prioritize interventions with proven local applicability like SMS hybrids [30], while mandating essential features such as Malay language support and offline functionality. The framework incorporates rigorous evaluation protocols that address current limitations through gender, balanced sampling, urban, rural proportional recruitment, and mixed, methods validation, ensuring more robust and implementable solutions for Malaysia's diverse population.

3. Methodology

Our research employed a mixed, methods approach to thoroughly investigate the influence of culturally adaptive design on anxiety disorder support, combining quantitative surveys with qualitative interviews and focus groups. This methodological triangulation enabled a comprehensive analysis of user preferences, accessibility obstacles, and practical design efficacy. We obtained ethical approval from the Institutional Review Board of Universiti Malaysia Sabah (UMS/FKMP/2023/456), emphasizing participant anonymity by anonymized data management and acquiring thorough informed permission at each phase.

3.1. Participants Recruitment and Demographics

We collaborated with mental health NGOs for participant recruitment and employed a multi, channel outreach strategy across social media and university campuses (see table 5). Eligibility was based on two primary criteria: 1) people (≥18 years) exhibiting mild, to, moderate anxiety disorders, confirmed via DASS, 21 test; and 2) readiness to participate in candid discussions regarding mental health experiences. Out of 27 initial replies, 21 satisfied clinical criteria. Subsequently, we intentionally selected 12 participants for comprehensive qualitative interaction, guaranteeing demographic diversity in terms of age, gender, and cultural backgrounds while adhering to the norms of thematic saturation [34]. This stratified strategy harmonized analytical rigor with ethical consideration for our participants lived experiences.

Table 5. The Participant Recruitment And Demographic Profile

Variable	Category	Count (N)	Percentage (%)
Gender	Male	7	58.30%
	Female	5	41.70%
Age Group	18, 24	3	25.00%
	25, 34	5	41.70%
	35, 44	2	16.70%
	45+	2	16.70%
Employment Status	Student	4	33.30%
	Employed	6	50.00%
	Unemployed	2	16.70%

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Education Level	High School	3	25.00%
	Diploma/Degree	7	58.30%
	Postgraduate	2	16.70%

3.2. Study Design

The study adopted a convergent mixed, methods design combining quantitative and qualitative approaches. Survey data quantified preferences for visual formats (infographics, videos) and measured engagement metrics, while in, depth interviews and focus groups explored stigma experiences, cultural barriers, and usability perceptions. This integration of numerical trends with narrative insights provided a comprehensive understanding of mental health communication needs in the Malaysian context.

Triangulation of datasets followed established frameworks for mental health research [35], enhancing validity through convergence of subjective experiences (qualitative) and behavioral patterns (quantitative) [36]. For instance, survey results on format preferences were contextualized through interview insights into distrust of technical language.

3.3. Data Analysis

Qualitative data from interviews and focus groups were analyzed using Braun and Clarke's thematic analysis [37], with NVivo software aiding in data management. The process began with iterative transcript reviews to identify preliminary themes, followed by independent dual coding of 30% of the data to establish inter, coder reliability (85%). Discrepancies were reconciled through deliberative discussions, consolidating 45 initial codes into coherent categories such as "preferred format" and "accessibility barriers." These themes were rigorously refined to ensure alignment with research objectives. Concurrently, quantitative data were examined via descriptive statistics to delineate user preferences and demographic patterns, with integrated findings offering a nuanced interpretation of the studied phenomena.

4. Results

The thematic analysis revealed key components that directly inform the proposed framework for creating user, centered anxiety disorder content. These findings provide critical insights into users' challenges, preferences, and limitations, enabling more effective support for their goals.

4.1. Word Cloud Analysis

Figure 1 presents the thematic analysis workflow conducted through NVivo software, accompanied by a word cloud visualization of dominant response patterns. It is noteworthy that high, frequency terms such as "personalization," "anxiety," and "tracking" predominate in the visual output, reflecting participants' emphasis on customized interventions and progress monitoring in mental health tools. The proportional weighting of terms within the visualization functions as an empirical indicator of user priorities, with larger terms denoting greater consensus among respondents. This analytical approach is an effective method for distilling complex qualitative data into actionable insights regarding core feature preferences.

Figure 1. Thematic Analysis Process and NVivo Implementation

A subsequent analysis of the questionnaire, derived word clouds (see figure 1) revealed the dominant user priorities for mental health tools, with "personalization" and "tracking" emerging as primary constructs. The semantic coding of these terms revealed nuanced subthemes, including a demand for customizable coping strategies. Three key insights emerged from this study. First, the marked prevalence of "personalization" is indicative of users' inclination for interventions that are adaptable to individual symptom profiles and recovery trajectories. Secondly, the repeated references to "anxiety" indicate that users are seeking multidimensional solutions that address cognitive distortions, physiological symptoms, and behavioral patterns concurrently. Thirdly, participants consistently prioritized self, monitoring capabilities, particularly tools enabling longitudinal tracking of symptom fluctuations and strategy efficacy. Secondary themes such as "exercise" and "coping strategies" indicate user valuation of structured therapeutic activities, particularly those integrating evidence, based techniques (e.g., mindfulness) with personalized implementation. This pattern underscores a broader preference for tools facilitating active self, management rather than passive information delivery. The findings of this study collectively advocate for the implementation of design frameworks that operationalize user, identified priorities, with a particular emphasis on modular personalization and progress visualization, into tangible features. The empirical validation of these needs through lexical frequency analysis provides a robust foundation for the development of targeted mental health interventions.

4.2. User Preferences for Information Design

A thorough examination of user engagement patterns (figure 2) has led to the identification of distinct format preferences for the consumption of mental health information. The most frequently selected option was infographics, which accounted for 40% of the responses, followed by video content (35%) and interactive simulations (25%). This distribution is indicative of users' cognitive processing tendencies, wherein visually streamlined presentations and experiential learning modalities appear to facilitate comprehension of complex psychological concepts. The observed preference hierarchy lends support to theoretical propositions that the reduction of extraneous cognitive load through multimedia design enhances knowledge acquisition in mental health contexts.

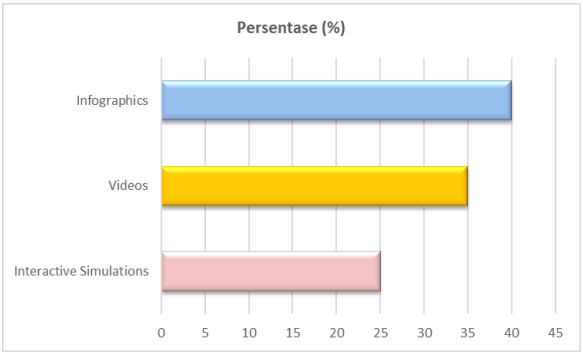

Figure 2. User Preferences for Information Formats

The findings suggest that incorporating user, requested functionalities, particularly mood tracking systems, could substantially improve format efficacy. The integration of these technologies would facilitate the provision of customized mental health support by aligning the design of tools with the expressed needs of users. These empirically derived preferences offer critical insights for developing communication strategies that balance three key dimensions: (1) visual accessibility, (2) emotional relevance, and (3) interactive capability. This tripartite approach appears to be conducive to enhancing educational outcomes and therapeutic engagement in mental health contexts.

4.3. Challenges in Information Accessibility

Participant data (figure 3) reveals three critical barriers to effective mental health communication: approximately 65% of respondents cited unreliable sources as their primary concern, struggling to discern credible information amid contradictory online content; 45% reported difficulties comprehending technical terminology, highlighting a need for simplified yet accurate language; and 30% identified insufficient practical examples as limiting real, world application. The findings, when considered collectively, suggest systemic shortcomings in current approaches. These shortcomings underscore the necessity for verified, evidence, based resources with clear authorship, tiered information presentation accommodating varying literacy levels, and case, based contextualization to enhance relevance. The findings indicate

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that optimal mental health communication necessitates concurrent consideration of source credibility (through transparent verification mechanisms), linguistic accessibility (via adaptive language strategies), and experiential learning (incorporating relatable scenarios). These factors represent pivotal considerations for the development of more efficacious educational materials and support tools.

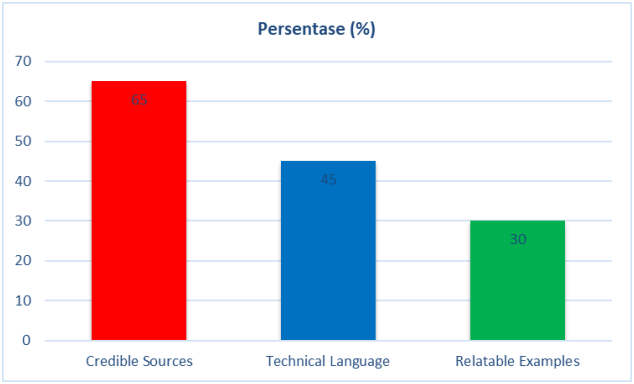

Figure 3. Barriers in Information Accessibility

The findings demonstrate that enhancing mental health communication necessitates a tripartite framework addressing source credibility, linguistic accessibility, and practical applicability in tandem. To address the credibility concerns, it is imperative to implement rigorous vetting processes for evidence, based content and to ensure transparent sourcing. Furthermore, to overcome comprehension barriers, it is essential to employ strategic simplification of clinical terminology without compromising conceptual accuracy. Concurrently, the incorporation of contextually relevant examples serves to bridge the theory, practice gap, particularly for audiences with diverse health literacy levels. This integrated approach facilitates more effective translation of specialized knowledge into publicly accessible formats, ultimately promoting equitable mental health literacy across heterogeneous populations. The data further suggest that multidimensional optimization is particularly crucial for overcoming disparities in baseline mental health knowledge while maintaining scientific rigor in public, facing materials.

4.4. Constructs from Coding and Node Matrix Analysis

The node matrix heatmap (figure 4) provides a quantitative representation of the three dominant user priorities that were derived from the qualitative analysis. The primary concern, as indicated by the 30% prevalence, pertained to accessible information, signifying the persistent necessity for content that circumvents specialized terminology while preserving clinical accuracy. Visual presentation preferences accounted for 25% of the coded instances, with respondents consistently favoring multimodal formats, particularly infographics and interactive videos, that support varied cognitive processing styles. The presence of interactive functionality (20% occurrence) further substantiates the existing demand for participatory elements, including self, assessment tools and adaptive feedback systems, which facilitate active engagement with mental health resources as opposed to passive engagement. The findings, when considered as a whole and quantified, collectively underscore the importance of designing communication strategies that address comprehension, engagement, and personalization requirements simultaneously.

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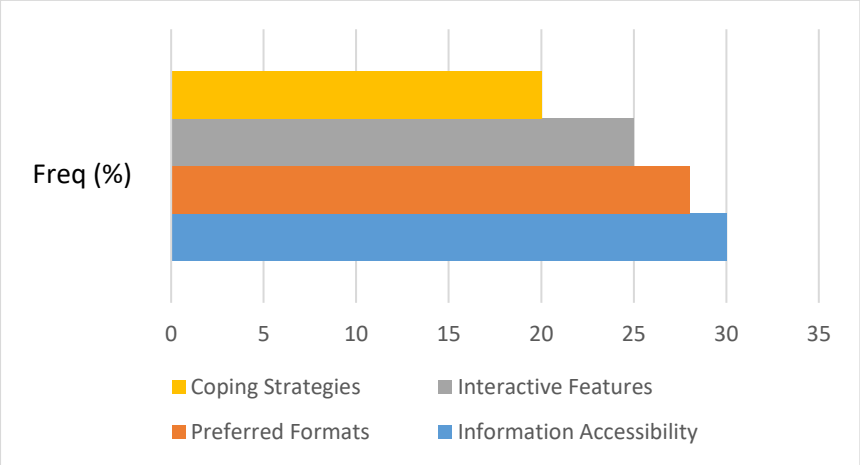

Figure 4. Node Matrix Heatmap

The heatmap analysis (figure 4) identifies three fundamental user priorities for mental health communication: (1) accessible information (30% prevalence), emphasizing the need for linguistically simplified yet clinically precise content; (2) visual formats (25% occurrence), particularly multimodal representations like infographics and interactive videos that support diverse cognitive processing styles; and (3) interactive functionality (20% representation), highlighting demand for participatory tools such as mood trackers and adaptive feedback mechanisms. These findings translate into three evidences, based design principles. First, cognitive accessibility should be prioritized through the implementation of plain language protocols and intuitive information architectures. Second, engagement can be enhanced via the incorporation of gamified elements and progress visualization systems. Third, practical utility requires the contextualization of the design within the users' daily routines and decision, making processes. Collectively, these insights advocate for a paradigm shift from clinician, centric to user, driven design frameworks. In these frameworks, theoretical rigor is balanced with usability considerations. The result is the creation of resources that are both scientifically valid and operationally meaningful for target populations.

4.5. Constructs from Coding and Node Matrix Analysis

An analysis of age, stratified preferences (see figure 5) reveals substantial variation in format acceptability across generational cohorts. Among the younger adult population (18, 24 years), interactive simulations were found to be the most preferred learning modality (60% adoption rate).

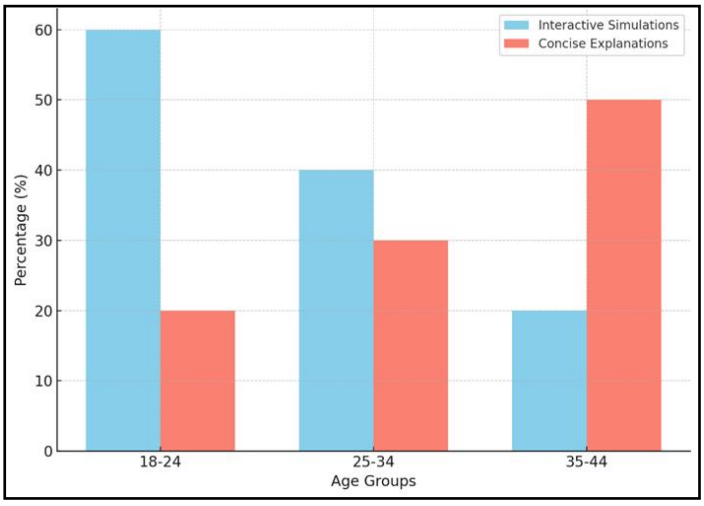

Figure 5. Comparison Across Demographics

This preference is potentially indicative of a higher level of technological acculturation and openness to experiential learning methods among this demographic. In contrast, middle, aged participants (aged 35, 44) demonstrated distinctly disparate engagement patterns, with only 25% favoring simulations, while 50% selected time, efficient, directive

content formats. This divergence indicates that effective mental health communication necessitates the implementation of adaptive design strategies that take the following factors into consideration: The presence of two factors must be acknowledged: first, differential digital literacy levels, and second, distinct information processing priorities across developmental stages. The findings emphasize the importance of content personalization that is sensitive to demographic characteristics. This approach is essential for maximizing engagement and utility among heterogeneous user populations.

The findings emphasize the importance of generationally, stratified design frameworks in the development of mental health resources, with distinct engagement patterns emerging across age cohorts. A recent study has revealed that younger digital natives, defined as individuals between the ages of 18 and 24, demonstrate a strong predilection for immersive simulation, based interfaces, with 60% of the sample expressing a preference for such interfaces. This inclination can be attributed to their technological fluency and predisposition for experiential learning. In contrast, middle, aged adults, specifically those between the ages of 35 and 44, exhibit a distinct preference for time, efficient, directive formats, with 50% of the sample adopting these formats. The transitional 25, 34 age group's inclination towards a blend of technologies and traditional methods indicates their potential to serve as adaptable intermediaries between these two spheres. These differential engagement patterns necessitate modular platform architectures capable of delivering consistent evidence, based content through flexible presentation modes. These modes include interactive simulations for younger users and streamlined informational formats for time, constrained adults, while maintaining universal therapeutic fidelity. Adaptive systems must account for generational variations in digital literacy, cognitive processing styles, and attentional allocation patterns to optimize both accessibility and engagement across diverse demographic groups.

5. Discussion

The study revealed that the Information Content Design Framework prioritizes users through visual and interactive elements, intuitive interfaces, personalization, and contextual relevance. Demographic data is crucial in this methodology. This study discusses the findings and correlates them with existing literature on the treatment of anxiety disorders. This study examines the psychological and social dimensions of these qualities.

5.1. The Role of Visual and Interactive Formats in Mental Health Issue Communication

Figure 6 demonstrates the powerful alignment between user preferences and evidence, based effectiveness across various visual, interactive formats for mental health communication. The data reveals that infographic, while preferred by 40% of users, show particularly strong efficacy with a 40% improvement in comprehension compared to traditional text materials [6], validating their dual advantage in both user acceptability and cognitive effectiveness. This synergy between preference and performance is especially crucial for addressing mental health literacy gaps in diverse populations.

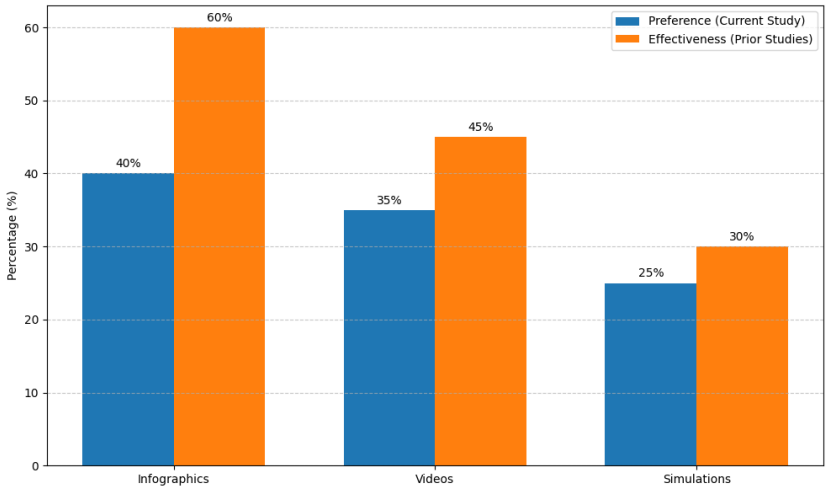

Figure 6. Alignment Between User Preferences and Evidence, Based Effectiveness of Visual, Interactive Formats

In addition, videos were chosen by 35% of participants because of their ability to engage users emotionally and cognitively, which ultimately increases engagement levels. Visually engaging instructional videos can encourage deeper thinking and better understanding. Meanwhile, interactive simulations, although only chosen by 25% of respondents, have the advantage of supporting direct engagement with the content. Simulations are considered effective in practice, based learning and self, directed skill acquisition. Although less popular than other formats, interactive simulations play a significant role in increasing participant adherence to mental health activities. Even when infographics, videos, and simulations are combined, these formats are still able to encourage user engagement, without requiring overly complex solutions to all mental health issues. Thus, the use of innovative approaches in communicating mental health issues has proven to provide significant benefits, allowing for the development of more effective and efficient communication models.

5.2. Personalized Features and Demographic Customization

Personalized digital mental health solutions, such as tools that allow mood tracking and provide feedback, are gaining popularity [38] This customization is deemed to enhance user engagement and positively influence mental health. Kraepelien's [38] study revealed that preferences for material formats differed across age groups. Individuals in the 18–24 age group exhibited a stronger inclination towards interactive and simulation, based interfaces, while those aged 35–44 preferred more detailed non, fiction literature. Improving the effectiveness of mental health tools can be achieved by considering demographic factors, such as age and gender, and applying relevant customization for each group. Adapting content formats to align with user requirements enhances application development potential and increases user engagement. Involving consumers in the design process enhances the likelihood of acceptance for mental health products. Tailoring content to the specific needs of each demographic can enhance equity in access and the overall availability of mental health treatments.

5.3. Accessibility of Information: Addressing Barriers

Participants identified the primary obstacles to acquiring information as the lack of reputable sources (65%), excessive technical language (45%), and the absence of pertinent examples. These difficulties demonstrate the necessity for enhancements in the delivery of dependable, comprehensible, and pertinent content for consumers. Research indicates that offering comprehensive and dependable information might motivate individuals to get assistance and enhance their confidence in mental health services. Tailored information will be more attractive to users and more beneficial. Research indicates that enhancing information accessibility can be accomplished by highlighting relatable instances and simplifying linguistic complexity. This method is necessary to guarantee that the developed tools are both valuable and usable for individuals from diverse cultural and social backgrounds.

5.4. Comparative Analysis and Recommendations

While infographics effectively distill complex information [29], they often fall short for people experiencing acute anxiety, who may struggle with static formats [6]. This gap can be bridged by interactive solutions like avatars and films, which boost engagement and foster vital emotional connections [22]. Recent advances in sentiment analysis—like [39] machine learning approach—reveal how user feedback shapes digital tools. Their study of Malaysia's myIM3 app, for instance, uncovered diverse sentiments (neutral/positive/negative) tied to real, world factors like internet stability and pricing, underscoring why user perspectives must drive design. Our findings align with this: young adults (18, 24) strongly prefer interactive simulations [39], confirming that interventions succeed when they blend emotional engagement, clear communication, and hands, on learning [40]. In Southeast Asia's unique context, this demands careful attention to cultural forces like stigma, family expectations, and local values [5], [8]. Though our study observed trends, limited subgroup sizes (e.g., *n*=2 for ages 45+) warrant larger future samples. Ultimately, truly effective mental health tools must evolve with their communities—adapting to cultural and demographic realities [7]. while addressing service gaps through deeper research [24]. Only then can we achieve accessible, impactful care [3]. that overcomes entrenched socio, cultural barriers [29].

5.5. Integration of Findings into an Information Content Design Framework

Our Information Content Design Framework for Anxiety Disorders was developed as a direct response to prior research findings. At its core, the framework pursues strategic value by leveraging interactive and visual media—such as

simulations, short films, and infographics—proven to clarify complex topics while building emotional engagement through resonant narratives. Beyond this, we incorporate personalized support including feedback mechanisms, mood assessment, and AI, guided suggestions to ensure timely and relevant responses for each user. A critical component is the use of plain language strengthened by contextual metaphors and analogies, ensuring information is not only understandable but actionable across diverse audiences. Furthermore, the framework features age, specific adaptation informative, directive approaches are designed for adults, while imaginative, dynamic formats are developed specifically for children's needs. This concept acknowledges the diverse cultural backgrounds of individuals and incorporates educational methodologies, literacy competencies, and belief systems to enhance inclusion and relevance. Malaysia's collectivist culture necessitated familial examples in resources, as participants distrusted individual, focused tools without family context. This strategy seeks to enhance patient autonomy in mental health care by minimizing emotional and cognitive strain. The framework enhances user incentives by integrating practical methods with pertinent real, world scenarios. The implementation of strategies aimed at enhancing mental health leads to increased engagement across diverse user demographics.

5.6. Proposed Framework on Information Content Design for Anxiety Disorder

An effective mental health communication tool comprises visual, interactive formats, personalization, demographic customization, and accessibility. As illustrated in figure 7, these components interact sequentially:

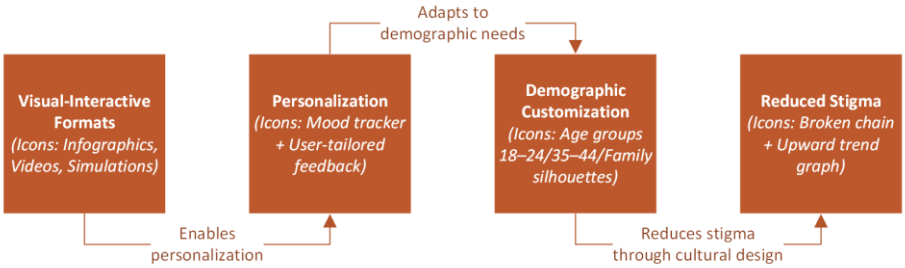

Figure 7. Proposed Framework for Anxiety Disorder Information Content Design: Integration of Visual, Interactive Formats, Personalization, and Demographic Customization

This logic model demonstrates how culturally resonant design (e.g., family, oriented examples for Malaysia's collectivist society) bridges demographic needs and stigma reduction. The framework ensures resources align with both user preferences (e.g., mood trackers) and national health strategies (e.g., Malaysia's Digital Health Strategy).

6. Conclusion

This study analyzes the impact of information design on cognitive processes, particularly its ability to enhance communication and alleviate anxiety. This study integrates interactive and visual components, including connectivity, accessibility, personalization, and more factors, to attain this objective. The objective of these components is to enhance focus on user requirements, tackle intricate mental health challenges, and assess the extensive ramifications of these concerns, irrespective of the user's age or cognitive ability. The majority of individuals contend that these approaches can enhance the healthcare system and mitigate mental health stigma. However, the methodologies and technologies employed in this study exhibit limitations, particularly with the sample size utilized. Subsequent study ought to employ a broader and more diverse sample while integrating contemporary technologies such as AR and VR to enhance user engagement. Future studies could explore AR/VR, as 70% of participants aged 18–24 expressed interest in immersive simulations, aligning with Malaysia's Digital Health Strategy [16]. The proposed modifications seek to enhance the functionality and attractiveness of the mental health communication tool.

7. Declarations

7.1. Author Contributions

Conceptualization: A.U.Z., W.N.W.A.; Methodology: A.U.Z., N.M.T.; Software: A.U.Z.; Validation: W.N.W.A., N.P.T.P.; Formal Analysis: A.U.Z.; Investigation: A.U.Z.; Resources: W.N.W.A., N.M.T.; Data Curation: A.U.Z.;

Writing – Original Draft: A.U.Z.; Writing – Review and Editing: W.N.W.A., N.M.T., N.P.T.P.; Visualization: A.U.Z.; All authors reviewed and approved the final manuscript.

7.2. Data Availability Statement

The datasets generated and analyzed during this study are available from the corresponding author upon reasonable request.

7.3. Funding

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7.4. Institutional Review Board Statement

Not applicable.

7.5. Informed Consent Statement

Not applicable.

7.6. Conflicts of Interest

The authors declare no competing financial or personal interests that could influence the work reported in this paper

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