

Cultural Understanding Analysis: The VirtualMente Mobile Booth for Addressing Anxiety and Depression
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semantic and conceptual difficulties in the standardized instruments. Phase 3 incorporated a review by health, technology, and management experts, enabling adaptation of language and content without affecting clinical validity and ensuring the comprehension and cultural relevance of the questions.

Conclusions: Digital mental health interventions require contextual adaptation and knowledge exchange to be effective. This study provides evidence and tools to improve, scale, and sustain such initiatives in culturally diverse contexts.

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Original Manuscript

Cultural Understanding Analysis: The *VirtualMente Mobile Booth* for Addressing Anxiety and Depression¹

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Conclusions: Digital mental health interventions require contextual adaptation and knowledge exchange to be effective. This study provides evidence and tools to improve, scale, and sustain such initiatives in culturally diverse contexts.

Keywords: mental health; community psychiatry; anxiety; depression; qualitative research; digital health; equity (MeSH).

Introduction

In recent decades, mental illness has become a matter of global concern. Depressive and anxiety disorders, in particular, impact the functioning and quality of life of those affected by disrupting personal, social, and occupational aspects. According to the World Health Organization, in 2023, these disorders affected approximately 5% and 4% of the global population, respectively, generating a substantial impact on individual functioning and social productivity [1]. Depression ranks as the second leading cause of years lived with disability, and anxiety is the eighth. These disorders represent 37.3% and 22.9%, respectively, of disability-adjusted life years attributable to mental disorders [2].

In Latin America, one in four people experiences a mental disorder, with those with affective disorders (73.9%) or alcohol and other substance use disorders (85.1%) not receiving adequate treatment. This situation is exacerbated in rural areas by geographic, economic, and access barriers, as well as by poor coordination between levels of care and a shortage of specialized personnel. Some

initiatives, such as the program at El Tambo Hospital in Cauca, Colombia, have demonstrated the potential of community-based models to bring specialized care to remote populations. However, access challenges persist, and more than 75% of people with mental disorders in low- and middle-income countries do not receive treatment [3,4].

In this context, the *VirtualMente Mobile Booth* project was developed. This innovative strategy integrates virtual reality, artificial intelligence, and brief psychotherapeutic interventions to support the early detection and management of depressive and anxiety symptoms, as well as harmful substance use, in adolescents and young adults. The project also seeks to promote mental health education and provide psychological counseling to people identified as potentially in need of support. Screening is conducted using a virtual avatar that administers the following assessment instruments: the Penn Alcohol Craving Scale (PACS) [5], the Patient Health Questionnaire-9 (PHQ-9) for depressive symptoms [6], the General Anxiety Disorder-7 (GAD-7) [7], and the Severity of Dependence Scale (SDS) [8]. Mental health education includes topics such as human behavior, social construction, prevention strategies, and dealing with risk situations. Psychological intervention consists of brief guidance provided by psychologists trained in cognitive behavioral therapy and acceptance and commitment therapy.

Comparable international models exist, including the *Mental Health Kiosks* in Australia, which are located in public or community spaces. These kiosks serve as technological access points, providing information, self-assessment opportunities, and initial emotional support without requiring direct medical involvement [9].

Recent research has demonstrated the potential of artificial intelligence (AI) in youth contexts for detecting suicidal ideation, anxiety, and depression [10–14]. Some studies employed multimodal signals, such as facial expression, voice, and text, and even proposed the use of wearable devices for continuous monitoring or mobile applications that deliver psychoeducational interventions based on cognitive behavioral therapy. For example, Nemesure et al. [12] applied a machine learning approach to electronic health data to predict major depressive disorder and generalized anxiety disorder in university students, achieving moderate accuracy even when excluding explicit psychiatric data. Their findings highlight the potential of this technology in nonclinical settings. Conversely, Zafar et al. [14] emphasize that although AI-based approaches have shown efficacy in predicting and monitoring symptoms, their successful integration into clinical and community practice requires cultural sensitivity, local validation, and appropriate implementation strategies.

This research is situated within the framework of digital health and precision medicine, disciplines that seek to optimize healthcare through the use of advanced technologies. Digital health integrates artificial intelligence tools, data analysis, and telemedicine systems to enhance access to care and improve service efficiency [15], whereas precision medicine seeks to tailor diagnoses and treatments to the individual characteristics of each patient, thereby improving clinical outcomes [16].

Although digital interventions have proven effective in reducing depressive and anxiety symptoms, understanding how young people experience and engage with these technologies in non-conventional settings is insufficient. In particular, cultural adaptations are limited and often fail to capture the meanings participants attribute to the technology, thus compromising the relevance and sustainability of these interventions.

In light of these challenges, the objective of this study was to analyze the cultural interpretation of the *VirtualMente Mobile Booth* as a digital intervention for addressing anxiety and depression in rural youth, using a differential approach. This analysis will enable the generation of culturally relevant content and interventions, ensuring alignment with the identities and needs of young people across diverse cultural contexts.

Methods

A qualitative study was conducted using an interpretive [17–19] and cultural [20, 21] approach to explore the meaning and appropriateness of the *VirtualMente Mobile Booth*, a mental health intervention developed by the research team to address anxiety and depression in rural youth. The design is proprietary and is currently undergoing patent registration (see Figure 1).

The study received ethical approval from the Faculty of Health Sciences at the University of Caldas (Record No. 006 of 2022). Informed consent was obtained from all participants, along with authorization for the use of the assessment instruments.

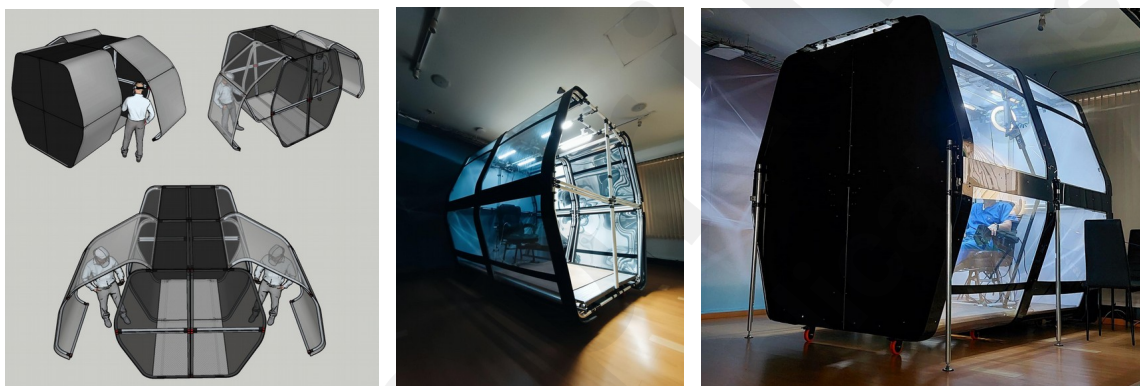


Figure 1. *VirtualMente Mobile Booth*

Source: Authors' files

Fieldwork

The study was conducted in Samaná, a municipality located in the northeast of the department of Caldas, 189 km (approximately 6 hours by road) from the city of Manizales. Access is via tertiary roads that become impassable during the rainy season. Samaná was one of the epicenters of the Colombian armed conflict during the period known as “La Violencia” (The Violence). According to the Health Situation Analysis [22], the leading causes of medical consultation among adults in the municipality are mental and behavioral disorders (83.84%), followed by psychoactive substance use (3.80%). Samaná comprises 167 villages across 5 predominantly rural districts, all with limited access to mental health services, an aspect central to understanding the cultural reception of the intervention.

Fifteen visits were conducted to the study area. During these visits, comprehension tests of the model were administered, and the instruments were adapted to align with the cultural needs and the differentiated perspectives of the participating youth.

In total, 87 young people participated in the pilot test, providing a broad sociodemographic profile of the project population. However, the present study focuses on a subgroup of 25 participants (13 in phase 1 and 12 in phase 2) who took part in cognitive interviews and cultural validation exercises. Additionally, a panel of eight experts participated in phase 3, contributing to the evaluation and adaptation of the instruments.

Phase 1: Cultural Understanding of the *VirtualMente Mobile Booth*

Participants: Purposive sampling [23] was used to select 13 young people aged 18–28 years, residing in both urban and rural areas of Samaná (Caldas), who agreed to participate in the research.

Techniques and Instruments: To understand the process and culturally assess the intervention, a visit protocol was designed to guide fieldwork structured around cognitive processes. Face-to-face cognitive interviews were conducted using the “Think Aloud” and “Verbal Probing” techniques [24] to explore participants’ perceptions of their interaction with the booth. Field diaries and semi-structured interview guides [25] were used to record experiences, bodily reactions, and difficulties encountered in the virtual environment.

Phase 2: Semantic and Cultural Validation of the Predictive Model Instruments

Participants: Using purposive sampling again, 12 additional young people, distinct from those in Phase 1, were recruited for this phase.

Techniques and Instruments: Cognitive interviews were conducted using the Cognitive Aspects of Survey Methodology (CASM) framework [26], which evaluates four processes: comprehension, information retrieval, judgment formation, and response formulation. The predictive model employed the following instruments: PACS, PHQ-9, GAD-7, and the SDS. An Excel spreadsheet was created to document semantic gaps, recall problems, and difficulties in adapting response options, based on the cognitive interviews and field diaries.

Phase 3: Panel of Experts

Participants: Eight experts were selected based on their academic background, research, or professional experience in mental health, and their familiarity with the project since its implementation. The goal was to evaluate the clarity of the instruments [27,28].

Techniques and Instruments: A structured evaluation matrix was designed, presenting each original instrument item along with the feedback previously collected from the young participants. The experts reviewed the items in light of this feedback, assessing their cultural and conceptual appropriateness. Their evaluations were subsequently compared with the young people’s observations to identify convergences and discrepancies. Any discrepancies were discussed collectively until agreement was reached regarding necessary modifications. These modifications were made without altering the underlying theoretical constructs, thus preserving semantic and conceptual equivalence with the original versions. This methodological strategy ensured that the instruments were culturally adapted to the specific needs of the youth, while respecting their identity and context.

Data Analysis

All sessions were recorded and transcribed. Together with the field diary data, the information was organized in Excel and subsequently analyzed using ATLAS.ti version 9 (ATLAS.ti Scientific Software Development, 2021). Three main categories and twelve subcategories were identified (see Figure 2), reflecting the cultural understanding of virtual interventions among rural youth.

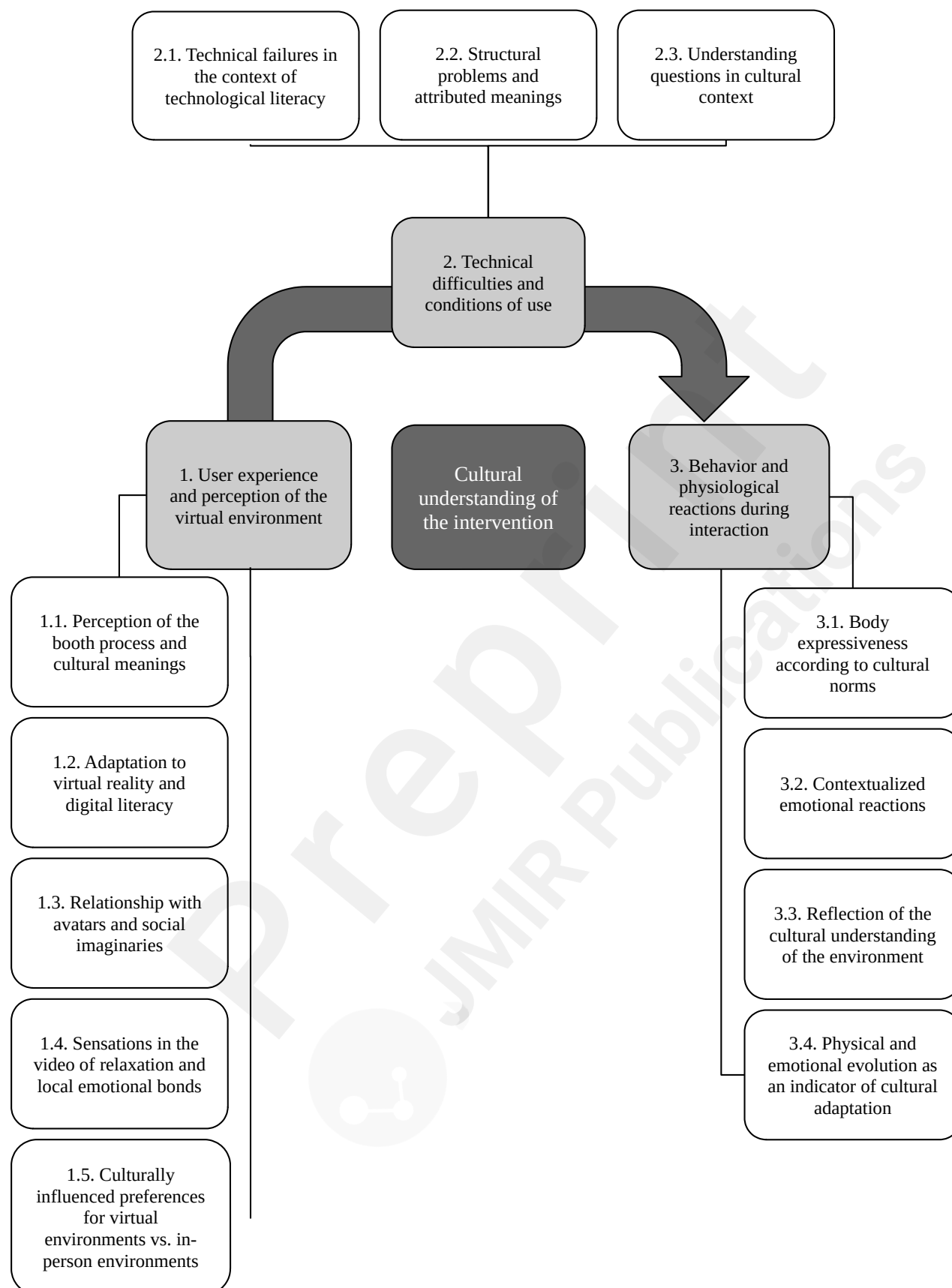


Figure 2. Representation of the cultural understanding of the intervention

Source: Authors

The integration of cognitive interviews, the CASM approach, and expert consensus provided a

triangulation that aligns with the quality criteria established for qualitative research [23].

Results

The following sociodemographic profile reflects the 87 young people who used the booth during the pilot test. This information provides context for understanding the broader population engaged in the project, though it should be noted that the subsequent qualitative analysis focused on a purposive subsample of 25 participants.

Accordingly, the results are presented in two parts. First, the sociodemographic characteristics of the 87 young people who participated in the pilot test are described to provide an overview of the project population. Second, the qualitative findings are reported, based on a purposive subsample of 25 participants who engaged in cultural validation activities, along with the contributions of eight experts who participated in Phase 3.

Participant Profile

The sample consisted of 87 young people between 18 and 28 years of age, with a mean age of 21.9 years, who participated in and used the booth. Most participants identified as women ($n = 60$), and 27 identified as men. In one case, sex was recorded as “Female” and gender as “Male,” suggesting diverse understandings of these categories in the local context.

The predominant marital status was single ($n = 72$), followed by common-law union ($n = 13$), and a small number were married ($n = 2$). Most participants lived in urban areas ($n = 74$), with only 13 from rural areas. Socioeconomic distribution showed that 94.2% of participants belonged to strata 0, 1, and 2.

Educational levels were varied: 41.8% had completed secondary education ($n = 36$), 31.4% had technical or technological training ($n = 27$), and 19.7% were pursuing or had completed university studies ($n = 17$). A minority reported having no schooling ($n = 2$) or postgraduate studies ($n = 2$).

Occupational status showed a balanced distribution: 29.8% were only studying ($n = 26$), 33.3% were only working ($n = 29$), and 35.6% were studying and working simultaneously ($n = 31$). Only one participant reported neither studying nor working.

In terms of health system affiliation, 52.8% were enrolled in the contributory system ($n = 46$), 37.9% were in the subsidized system ($n = 33$), and a few reported being beneficiaries ($n = 2$), not affiliated ($n = 1$), or not knowing their affiliation type ($n = 5$).

Memberships with protected groups were identified: more than half reported being forcibly displaced by the armed conflict ($n = 52$), and others indicated being direct victims of the conflict ($n = 11$), persons with disabilities ($n = 1$), members of the LGBTQI+ population ($n = 1$), or pregnant women ($n = 1$). Ethnic affiliation was less common, with most participants not identifying with any ethnic group ($n = 82$), although cases of indigenous identity ($n = 1$), Afro-Colombian identity ($n = 1$), and “other” identity ($n = 3$) were reported.

Cohabitation patterns showed a predominance of nuclear and single-parent households. Most participants lived in homes with both parents and children ($n = 25$), followed by single-parent households headed by mothers ($n = 20$). Seventeen participants reported living independently, 10 lived with a partner without children, and 9 lived in foster care, mainly with aunts, uncles, or grandparents. Cases of institutionalization ($n = 2$), single-parent paternal households ($n = 3$), and

non-consanguineous foster care ($n = 1$) were also reported.

There was no family history of mental health in 51.7% of participants, although 36.7% reported not knowing this information. A family history of depression or anxiety was reported by 11.4%. Regarding personal history, 54% reported no mental health problems, 14.9% reported symptoms of anxiety, and 6.8% reported a history of depression.

With respect to leisure activities, participants mentioned various recreational practices, most commonly playing sports ($n = 26$), using social media ($n = 16$), listening to music ($n = 13$), family activities ($n = 11$), and spending time with friends ($n = 7$).

The following phases describe the qualitative findings obtained from the purposive subsample of 25 participants and the perspectives of the eight experts.

Phase 1: Cultural understanding of the *VirtualMente Mobile Booth* digital intervention

This phase explored the experiences of 13 young people who interacted directly with the *VirtualMente Mobile Booth*. The focus was on understanding their emotional responses, sociocultural perceptions, and the contextual factors that shaped their use of the intervention.

Dimension 1: Subjective, emotional, and symbolic

The first interactions with the booth elicited various emotions, such as amazement, curiosity, and fear. The youths' overall impression was of technological novelty in a context where this type of device is unusual: *"It's something very novel here in a village... it's strange, but strangely positive"* (1:278-337).

The physical space, structure, and interface of the booth generated diverse sensory and emotional reactions, reflecting cultural references and prior expectations of technology. Familiarity and trust emerged as important factors: *"Wow, how cool! It's great! I'm somewhere else—it's like those games in shopping malls"* (1:291-349).

Avatar selection was central to participants' identification and symbolic engagement, as it was mediated by gender, perceptions of authority, and the need for trust. Most participants chose an avatar of the same gender, demonstrating a pattern of direct identification. However, some men chose female avatars, reporting that they felt more confident or comfortable with them: *"As a man, you choose a woman; it makes you feel more confident"* (1:130-236). Choices based on the avatar's physical or racial features also reflected social constructions of gender, authority, and care.

Although most participants approached the experience with openness and curiosity, some responses revealed the persistence of stigmatizing perceptions of mental health. For some, the intervention was associated with extreme situations such as suicide or altered states that could call into question its "normality." This suggests that simply entering the booth to answer questions about emotions or psychological states activates symbolic fears related to social judgment, exposure, or being singled out. *"Regarding substance use, I felt a little strange; maybe it was shame because there's also a huge taboo about that"* (2:41-236–239). These perceptions are related to a cultural context where talking about mental health remains taboo.

Dimension 2: Structural, material, and technological access: Self-perception of technological ignorance

During implementation, technical glitches occurred that affected the experience. The mouse pointer in the booth froze intermittently, and the system had to be restarted to continue the process. In some cases, sound was lost or loading errors occurred, affecting the continuity of the session.

Participants unfamiliar with the equipment sometimes pressed the control repeatedly without getting a response, or accepted default selections without understanding how to change them. Many expressed uncertainty about wearing the glasses and feared damaging the equipment. In multiple cases, assistance was needed to adjust the devices and explain again how they worked. This demonstrated that a lack of technological familiarity hindered independent use of the devices.

The technical glitches were interpreted through a cultural lens, reflecting both distance from the digital world and a certain resignation to error. A recurring phrase was: *“we are rustics”* (2:14-83), used humorously, but denoting a self-perception of technological ignorance. This feeling generated nervousness in some participants: *“I feel nervous about the glasses”* (1:334-391), or frustration when devices did not respond as expected.

The booth’s physical design did not adequately account for body diversity. Participants of greater height or stockier build found it difficult to enter and navigate the space.

Although the experience began with a detailed explanation, many participants simply nodded without asking questions, suggesting limited understanding: *“He constantly nodded at the psychologist’s explanations; however, when he handled the control, he didn’t know how to do it”* (1:41-46).

Dimension 3: Emotional embodiment and sociocultural expressions

At the start of the session, participants' tension and concentration were evident through repetitive movements such as constantly moving the head and feet, frequently adjusting glasses, or pursing the lips. These subtle gestures were unconscious strategies to regulate emotions or adapt to the new, technology-driven setting. The body, facing the confines and cognitive demands of the session, developed a form of nonverbal communication linked to the emotions and perceptions experienced in the booth.

Furthermore, these physical cues also revealed discomfort and distraction caused by technical problems or physical unease from the virtual reality device. Participants frequently touched the equipment and displayed signs of discomfort with their facial expressions, demonstrating how technical issues directly impacted the quality of their immersion.

A relaxation video played during the in-booth experience elicited varied reactions. Some participants achieved a state of calm by following the breathing instructions, whereas others displayed tension or discomfort: *“She looks at the control through her glasses, curious. She moves her head around while the question is being read, curious”* (1:144–168).

Toward the end of the session, several participants showed signs of tiredness, fatigue, or stress, such as yawning, deep sighs, or frequent posture changes: *“She yawns repeatedly, she seems tired”* (1:151 182–184). These reactions suggest that even a novel experience can be cognitively and emotionally taxing due to its duration and the nature of the topics covered.

The profound emotional impact of the virtual environment was highlighted by a notable case where a participant experienced a strong emotional reaction at the end of the session and requested immediate

professional support. This reaction was not observed during the virtual interaction, implying the experience may have triggered previously unexplored emotions: *“When she left, she cried, saying she felt shaken. She asked to speak to the psychologist immediately”* (1:182-240). This case reveals that even an automated, virtual intervention can have a profound emotional effect, highlighting the importance of developing emotional containment strategies and recognizing the powerful therapeutic potential of such environments.

Phase 2: Semantic and cultural validation of the predictive model instruments

This phase involved 12 young participants who took part in cognitive interviews and validation exercises. The aim was to identify and address semantic, conceptual, and cultural challenges in the assessment instruments to improve their clarity, accessibility, and local relevance.

Some participants had difficulty understanding the wording of certain questions, especially those using technical terms or unfamiliar categories, highlighting a mismatch between standardized instruments and local contexts. Terms such as “never” or “always” did not align with participants’ interpretations of their experiences: *“If I write ‘never,’ then I think I mean one thing, but if I write ‘always,’ then it’s something else.”* (1:18-16).

Mental health and substance use questions also caused confusion or disengagement, with some participants moving on without answering clearly due to the number of questions. One participant noted, *“There were some confusing questions”* (1:266-329), and another explained, *“I didn’t understand one question because I took antidepressants for a long time under prescription, and when they asked, I said yes”* (1:285-344).

The interviews provided deeper insight into the participants’ cognitive experience, revealing issues that the initial scale may have missed due to the temporality of the questions: *“It’s difficult for me to think about a week ago because if you ask me what I ate a week ago, well, I don’t remember”* (4:1-23). Participants also reacted negatively to words that are not commonly used: *“There are strange names: opioids, inhalants, anxiolytics. One understands ‘antidepressants’ better. But there are many people who won’t understand any of those names. Cigarettes, marijuana, alcohol, and cocaine are more familiar”* (4:3-85).

The data from these interviews were recorded in structured field diaries and organized into an analytical matrix designed specifically for this phase. Each matrix grouped, by item, the comments and assessments of the three participants assigned to each instrument. These matrices served as crucial input for the panel of experts in phase 3.

Phase 3: Panel of experts

This phase integrated the opinions of eight experts from the fields of health, technology, and management to improve the language and content of the instruments. The aim was to enhance their cultural appropriateness and usability, while preserving clinical validity.

Using their collective judgment, the expert panel made informed decisions to either keep or modify each item, ensuring both its clinical validity and its linguistic and cultural relevance. Proposed modifications were focused on simplifying grammar, replacing technical terms with common synonyms, and reorganizing the questions to improve comprehension. Likert-type response scales were not modified.

The panel was composed of experts in three key areas:

- Health (n = 4): a physician with a PhD in Public Health, two psychiatrists, one of whom had a PhD in Biomedical Sciences, and a psychologist with a master's degree in Community Psychology.
- Technology and Digital Design (n = 3): a systems engineer, a virtual reality designer, and a publicist specializing in 3D animation and digital marketing.
- Management and Applicability (n = 1): a business administrator with experience in virtual education.

Table 1 presents the instruments, showing the original items followed by their culturally adapted modifications.

Table 1. Culturally adapted instrument questions

Item		Instrument			
		PACS	PHQ-9	GAD-7	Severity of Dependence Scale
1	Original	During the past week, <i>how often</i> have you thought about drinking or about how good a drink would make you feel?	Over the past 2 weeks, how often have you experienced little interest or pleasure in doing things?	In the last 2 weeks, have you felt nervous, restless, or on edge?	Select the name of the substance you consume the most or that you have consumed at some point in your life.
	Modified	During the last 7 days, how often have you thought about or wanted to drink alcohol (e.g., beer, liquor, whiskey, rum, etc.)?	Over the past 2 weeks, how often have you felt little interest or pleasure in doing things?	In the last 2 weeks, have you felt restless or anxious?	Have you ever used substances in your life?
2	Original	At its most severe point, <i>how strong</i> was your craving during the past week?	In the last 2 weeks, have you felt sad, depressed, or hopeless?	Have you been unable to stop worrying or control your worries for the past 2 weeks?	Select the name of the second substance you currently consume the most, using the substances named above as a reference, if applicable. Otherwise, please answer <i>None</i> .
	Modified	Over the past 7 days, how intense has your craving for alcohol been?	No changes	In the last 2 weeks, have you been able to control your worries?	If the first answer was positive, select which ones you consume/have consumed.
3	Original	During the past week, <i>how much time</i> have you spent thinking about drinking or about how good a drink would make you feel?	Have you had difficulty falling or staying asleep, or have you slept too much in the last 2 weeks?	In the last 2 weeks, have you been worrying too much about different things?	In the past 12 months, have you ever thought your substance use was out of control?
	Modified	Eliminated	Over the past 2 weeks,	In the last 2 weeks,	In the past year, have

			have you had difficulty falling asleep or staying asleep, or have you slept too much?	have you been worrying too much about different things?	you ever thought your substance use was out of control?
4	Original	During the past week, <i>how difficult would it have been to resist</i> taking a drink if you had known a bottle was in your house?	Have you felt tired or low on energy over the past 2 weeks?	Have you experienced difficulty relaxing in the last 2 weeks?	In the past 12 months, did the prospect of missing a dose make you anxious or worried?
	Modified	Over the past 7 days, have you found it difficult to avoid drinking alcohol in situations that did not involve a special celebration (e.g., resisting drinking a bottle you have at home)?	No changes	In the last 2 weeks, have you had difficulty relaxing?	In the past year, how much have you worried about not having access to that substance?
5	Original	Keeping in mind your responses to the previous questions, please rate your overall <i>average alcohol craving</i> for the past week.	Have you felt like you had no appetite or overate in the last two weeks?	Have you been restless and found it difficult to sit still in the last 2 weeks?	In the past 12 months, have you worried about your substance use?
	Modified	No changes	No changes	In the last 2 weeks, have you been able to remain calm?	In the past year, how much have you worried about your substance use?
6	Original	In the last week, have you had an increased desire to drink alcohol when you're with friends?	Have you felt bad about yourself, or that you are a failure, or have you disappointed yourself or your family in the last 2 weeks?	In the last 2 weeks, have you become easily annoyed or irritable?	In the past 12 months, have you wished you could stop using drugs?
	Modified	Over the past 7 days, when you've been with friends or family, have you had an increased desire to drink alcoholic beverages (e.g., beer, rum, brandy, etc.)?	No changes	In the last 2 weeks, have you felt irritable?	In the last year, have you thought about quitting using the substance?
7	Original	In the last week, when faced with high-risk drinking situations, what do you think your first reaction would be?	Have you had difficulty concentrating on certain activities, such as reading the newspaper or watching television, in the last 2 weeks?	Have you felt scared, as if something terrible was going to happen, in the last 2 weeks?	In the last 12 months, how difficult would it have been for you to quit or do without either of the two drugs?
	Modified	If, in the last 7 days, you were in special situations (e.g., Christmas, gatherings with friends or family,	Over the past 2 weeks, have you had difficulty concentrating on certain activities, such as reading or studying,	In the last 2 weeks, have you felt scared, as if something was going to happen?	Eliminated

		social events, etc.) that involved alcoholic beverages, what was your reaction?	in the past two weeks?		
8	Original	-	Have you moved or spoken so slowly that other people might have noticed, or conversely, felt so nervous or restless that you've been moving around more than usual in the past 2 weeks?	-	-
	Modified	-	Over the past 2 weeks, have you been moving or speaking more slowly than usual, or have you been fidgeting or moving more than usual?	-	-
9	Original	-	Have you had thoughts that you would be better off dead or about hurting yourself in any way in the last 2 weeks?	-	-
	Modified	-	No changes	-	-

Source: Authors

Discussion

This study explored the cultural understanding of the *VirtualMente Mobile Booth* digital intervention from a differential perspective. Its purpose was to analyze the meanings this strategy acquires for rural youth in a context characterized by geographic isolation, stigma surrounding mental health, and gaps in access to technology.

The study used the sociodemographic and mental health profiles of the 87 young participants to provide a contextualized analysis of their experience. The findings emphasize the need for situated and relational care that recognizes local structures rather than imposing traditional biomedical models. As Nittas et al. [29] point out, digital health interventions require cultural adaptation to be inclusive; however, their implementation entails technical challenges and demands resources.

The social determinants of health play a central role in the profile of participants; therefore, identical strategies cannot be applied across different communities [30]. Mental health is influenced by social determinants, with poverty and socioeconomic inequity strongly linked to a higher risk of psychopathology.

The study population, characterized by low economic resources and experiences of armed conflict, reveals the complexities of delivering mental health interventions under such conditions. Poverty, forced displacement, and structural exclusion are key determinants in the onset of symptoms as well as in how people interpret their emotional health [31,32]. The data from this study revealed life trajectories marked by violence, precarity, and family fragmentation. This psychosocial context

highlights the need for intersectional approaches to health [33].

Sociocultural diversity also influenced how participants interacted with the technology, the questionnaires, and the virtual environments of the booth. The notion of “access” must be understood as the ability to use, understand, and appropriate technology [29]. In this study, the participants’ engagement with devices, virtual environments, and avatars demonstrated that the use of technologies in mental health goes beyond the functional and relates to the symbolic and corporeal. Decisions made within the booth, such as avatar selection based on gender or appearance, reflected cultural meanings related to care, trust, or authority.

Although the booth represents an innovation, its effectiveness depends on users’ familiarity with devices, basic technical understanding, and appropriate support. In rural contexts, where digital gaps persist, the lack of these could restrict the scope of the intervention or produce frustrating experiences for users. This barrier reflects not just technical challenges but structural inequalities. From a social justice perspective [34], innovations are meaningful only if they allow people to effectively exercise their rights. Accordingly, any replication of the booth model should be accompanied by educational activities, familiarization periods, and community engagement strategies.

Ergonomics, connectivity, climate, and privacy also impacted user experience. Physical discomfort, fatigue, tension, and postural strain arising from device interaction cannot be underestimated. These elements illustrate that digital interventions are not detached from the body. Even automated processes cause bodily responses that must be anticipated in design and evaluation.

The analysis of cognitive responses to the questionnaires revealed semantic mismatches between standardized clinical language and everyday use in the rural context. For example, confusion around terms such as “opioids” or “anxiolytics” contrasted with familiarity with “alcohol” or “marijuana,” confirming previous findings on substance-use vocabulary in rural areas [35]. This disparity requires active cultural, not just linguistic, translation.

Phase 2 of the study raises questions about the universality of biomedical approaches to mood disorders. As Bracken et al. [36] note, applying tools such as the PHQ-9 in conflict-affected populations can lead to “diagnostic colonization,” where social suffering is reframed as individual pathology. Cultural adaptation should therefore extend beyond wording to contextualization; for example, distinguishing between situational sadness and major depressive disorder. The ambiguity in question interpretation is consistent with critiques of psychometrics, which warn against imposing urban, Western-derived categories on populations with radically different sociocultural realities [37].

This approach ensures that the data remain useful for clinical research, but also relevant to the community. As Arora et al. [38] point out, cultural adaptation involves recontextualization, that is, ensuring instruments engage with local knowledge rather than simplifying content.

Expert review in this study enabled multidimensional validation that integrated clinical, technological, and social knowledge. The modifications made (grammatical simplification, use of common synonyms, and syntactical reordering) are aligned with the Meadows recommendations [39]. The decision not to alter Likert-type scales reflects the principle of conceptual equivalence, which preserves construct validity [40]. This ensures that the data remain comparable across populations while improving local comprehension.

Conclusions

This study examined the cultural understanding of the *VirtualMente Mobile Booth* digital intervention, designed to address anxiety and depression in young people, to identify the sociocultural, technological, and emotional factors that influence its adoption in rural contexts.

The sample profile revealed the prevalence of a group of young people, mostly women, from low socioeconomic backgrounds, who have experienced vulnerabilities associated with the armed conflict. These contextual conditions directly influenced their willingness to use digital interventions and how they engaged with them.

The young people perceived the booth as a novel space, albeit one marked by persistent mental health stigma. Interaction with the virtual environment revealed that social constructions of gender, authority, and familiarity influenced the experience. Limitations in technological access and mastery, coupled with technical failures, showed that in rural contexts it is essential to support implementation with digital literacy strategies and physical adaptations. Observed bodily and emotional reactions suggest that, although the booth holds strong mobilizing potential, containment mechanisms are needed to prevent emotional overload in some users.

The cultural adaptation of the instruments confirmed that standardized scales are not always comprehensible in local contexts, particularly when they include technical terminology or words far removed from everyday language. Linguistic adaptation is essential to ensure the validity and accessibility of the measurements. Expert review from various disciplines enabled item adjustments that preserved clinical rigor while enhancing cultural relevance.

The findings show that cultural understanding is crucial for ensuring the relevance of digital mental health interventions with rural youth, providing input for future implementations with a differentiated approach.

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Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Data Availability

The data supporting the findings of this study are available from the corresponding author upon request.

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Project Administration: OMCR

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