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Finnish Immigrants' Affective Attitude Towards the IMPMS for Loneliness Detection: A Descriptive Qualitative Study

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Abstract. Loneliness is a global health concern that contributes to morbidity in immigrant populations. However, traditional treatments for loneliness focus on symptom management rather than prevention. Technology-related solutions for preventing and assessing loneliness among immigrants are crucial. This study explored Finnish immigrants' affective attitude towards the IoT-based Multimodal Personalized mHealth System (IMPMS), a system for building predictive models for loneliness detection. In this descriptive qualitative study embedded within the DOMINO feasibility study, immigrants in Finland shared their experiences and perspectives of the IMPMS. Semi-structured interviews were conducted using an interview guide based on the Theoretical Framework of Acceptability (TFA). Data were analyzed using thematic analysis. Finnish immigrants considered the IMPMS acceptable, as evidenced by their positive experiences with the system. Areas for improvement highlighted in the results could be utilized to further refine and enhance the acceptability of the IMPMS for future implementation.

Keywords. Finnish immigrants, loneliness, IMPMS, theoretical framework of acceptability

1. Introduction

Loneliness is a public health concern that triggers a negative domino effect [1]. It impacts physical and mental health, increases healthcare utilization, and contributes to mortality rates [2–4]. However, interventions for loneliness largely adopt a reactive approach, with their research phase disregarding the potential advantages of technology, relying on observational and unvalidated tools [2,5]. While technology has been utilized in some studies, it has proven ineffective [5]. Considering the acceptability of technology-related healthcare interventions during their development processes, from the perspective of possible end-users, is vital as it influences the effectiveness of such interventions [5–8]. Immigrants are vulnerable to loneliness [9,10], and the levels among Finnish immigrants have been notably high [11]. The DOMINO project seeks to address loneliness within the Finnish immigrant population using the IMPMS, a multilayered system designed for gathering data and constructing predictive models for loneliness detection. DOMINO's feasibility study comprises both quantitative and qualitative components. This qualitative component aims to explore Finnish immigrants' experiences with the IMPMS and assess

its acceptability among them using the TFA, with a specific focus on the affective attitude domain of the TFA's seven core constructs [12].

2. Methods

This descriptive qualitative [13,14] study was ethically approved by the Ethics Committee for Human Sciences at the University of Turku, Finland, in September 2022 (26/2022). Purposive and snowball sampling techniques were employed to recruit potential participants [13,15]. Facebook groups and language schools catering to Finnish immigrants were identified and selected to recruit participants with diverse educational backgrounds, perspectives, and experiences [15,16]. Participants who met the inclusion criteria of the DOMINO feasibility study (Finnish immigrants who have lived in Finland for up to five years, aged between 18-65, fluent in English, smartphone users, experiencing loneliness with a UCLA Loneliness Scale score of ≥ 28 [17,18], and having completed baseline questionnaires) and had contributed to the four-week quantitative data collection were invited to participate in one-on-one semi-structured exit interviews. Interviews in English were conducted from November 2022 to January 2023, in private meeting rooms provided by Finnish public libraries and universities. The interview guide, aligned with the TFA, consisted of open-ended questions. Zoom recordings were utilized for online interviews, and a smartphone audio recorder app was used for face-to-face interviews. The sample size, determined by data saturation, was reached after 20 interviews [15]. Data underwent thematic analysis [19]. Data imported into the latest version of NVivo [20] were coded deductively using TFA constructs as coding frames, while those not directly related to the TFA were coded inductively [12,19]. Initial themes were ensured to align with the coded extracts while final themes underwent iterative refinement to ensure coherence and distinctiveness [19]. Clear, study-objective-connected extracts were selected to support the final themes [19].

3. Results

The 20 participants in this study aged between 22 and 46 years and had been residing in Finland for 2 to 58 months. While some held bachelor's degrees, the majority were either pursuing or had obtained master's or doctoral degrees. Over half of the participants were married and residing with their partners or children, with others either cohabiting or living alone. Affective attitude refers to how the participants felt about the IMPMS [12]. While some stated negative feelings towards certain aspects of the IMPMS, overall, most participants spoke positively about their experience with the system. The sub-themes of affective attitude included the participants' expressed feelings towards a) health benefits, b) system complexity, and the IMPMS as a c) convenient and fascinating technology. Most of the participants (n=17) agreed that using the system provided them with health benefits. When asked about their feelings towards the IMPMS, these participants reported that the system helped them track and improve the quality of their sleep, provided insights about their health status, helped them understand their emotions and the quality of their connections with others, and motivated them to modify negative health habits. Participants found the sleep data provided by the ŌURA ring particularly helpful, as it showed metrics like Rapid Eye Movement (REM) sleep, deep sleep, heart rates, and readiness scores. Additionally, many participants mentioned that the questionnaires and information from the wearables increased their awareness about their health situation, emotions, and feelings.

Some participants (n=6) felt the system was complicated due to the involvement of multiple applications, leading to feeling overwhelmed. Notifications from several applications (ŌURA and AWARE) distracted them, prompting them to focus only on what they considered significant. Many participants (n=17) also found the questionnaires complex, hence the most referenced complicated component of the IMPMS. Participants (n=11) felt the system had too many questionnaires reminding them of their negative feelings and leading to annoyance and frustration. One stated that the frequency of the daily questionnaires was the main thing that bothered him about the system. Despite some negative feelings towards the IMPMS, most experiences were positive, as all participants (n=20) found the system fascinating and convenient. Others referred to it as interesting, fancy, cool, and stylish associating these positive feelings with the accurate and detailed information provided by the system, particularly ŌURA. One participant mentioned finding both the technology and the study itself interesting, stating, "I think it was very cool, and this is a topic that I don't think many people are really concerned about…" (P1)

4. Discussion

Many participants reported experiencing health-related benefits from using the IMPMS and found the technology convenient and fascinating. Despite not receiving official interventions from the system, they maintained a positive attitude towards it, believing it helped them better understand their health status, monitor it regularly, and adjust their health habits when needed. Previous studies have also highlighted participants' positive views on technologies they had experience with, citing that they were efficient and fascinating. For example, participants in studies involving the Pharmacist-led IT-based intervention to reduce clinically important medication errors (PINCER) and Perturbation-based Balance Training (PBT) incorporating virtual environments for reducing falls in older adults expressed efficiency and novelty [21,22]. While participants in both studies communicated feelings of anxiety about using the technology, participants in this study primarily mentioned the complexity of the IMPMS, which included multiple questionnaires, wearable devices, and applications. Participants engaged with the IMPMS utilizing wearables (ŌURA ring and Samsung Galaxy Watch Active 2), smartphone sensors, and an interface application to respond to health- and loneliness-related questionnaires. This complexity, as highlighted by Finnish immigrants, corresponds with the anticipated challenges outlined in the DOMINO project. A notable strength of this study lies in its pioneering use of the TFA to qualitatively explore and assess the experiences and acceptability (affective attitude) of Finnish immigrants towards the IMPMS. Previous research of conventional and technology-based loneliness interventions focused on older adults [6,23,24], but strong evidence suggests that immigrants are particularly vulnerable to loneliness [10,25,26]. By employing an appropriate theoretical framework through open-ended questions, this study collected abundant evidence-based data from a population at risk for loneliness, ensuring their voices were heard in the development of a system intended for them [6,8,9,12]. However, a significant limitation of this study stems from the system's uniqueness, making comparisons to prior studies challenging. Previous studies on technology-based loneliness interventions were primarily quantitative in design, whereas those that applied the TFA involved different health interventions [27–28]. Additionally, the sample of Finnish immigrants may not fully represent the broader immigrant population, as it comprised individuals who had lived in Finland for five years or less and encountered varying external factors during data collection, like seasonal changes.

5. Conclusions

The predominantly positive affective attitude exhibited by the Finnish immigrants towards the IMPMS illustrates the system's acceptability. Finnish immigrants considered the system convenient and fascinating, emphasizing the health benefits they received from using it despite its current functions. Challenges were primarily attributed to the system's complexities, highlighting areas for future improvement.

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