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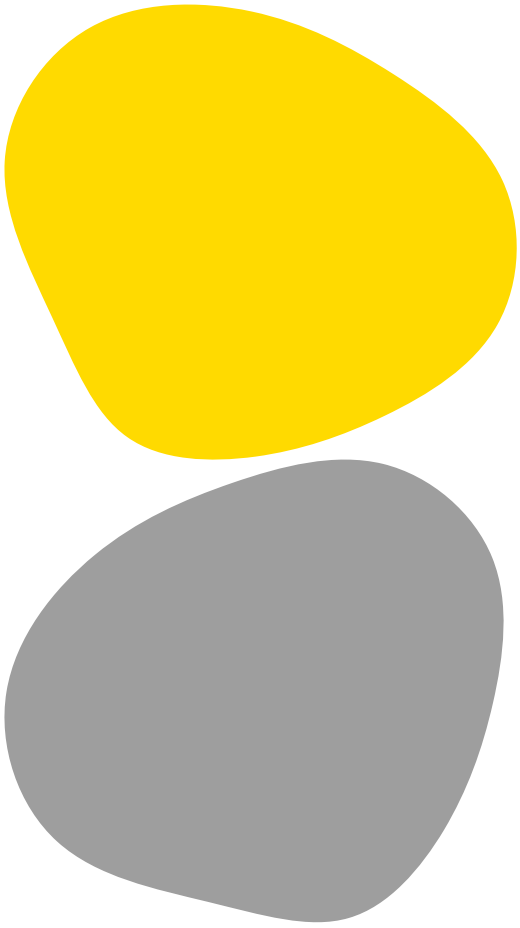
Enhancing Mental Health Literacy and Challenging Stigma in Clinical Contexts: Insights from the '*Bicho De 7 Cabeças*' project

Ana Paula Soutelo



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Psychosocial Rehabilitation Laboratory — affiliated with the School of Health of the Polytechnic of Porto and the Faculty of Psychology and Education Science of the University of Porto

Enhancing Mental Health Literacy and Challenging Stigma in Clinical Contexts: Insights from the 'Bicho De 7 Cabeças' project

Author

Ana Paula Soutelo

Advisor(s)

PhD, Paula Portugal, CIR - LabRP, E2S

PhD, Raquel Simões de Almeida, CIR - LabRP, E2S

PhD, Sara de Sousa, CIR - LabRP, E2S

PhD, Maria João Trigueiro, CIR - LabRP, E2S

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Abstract

Mental health literacy and reducing stigma among healthcare professionals are vital for providing compassionate and effective care. This research evaluated the impact of the *'Bicho de 7 Cabeças'* project, a local psychoeducational initiative in Póvoa de Varzim, a municipality in the North of Portugal, on improving MHL and reducing stigmatising attitudes. The intervention combined immersive technologies, such as virtual reality, with participatory methods like sociodrama to foster emotional engagement and attitudinal change. This study adopted a quasi-experimental pre-post design. Data were collected from healthcare professionals across three institutions using four instruments: The Mental Health Knowledge Schedule, Mental Health Literacy Measure, Community Attitudes Towards the Mentally Ill, and Reported and Intended Behaviour Scale. Results showed significant improvements across all dimensions, with the strongest improvements seen in attitudes and practical literacy. Participants with lower educational backgrounds and less prior exposure to mental health issues benefited most from the intervention. These findings suggest that training programmes featuring experiential elements, such as sociodrama and virtual reality, may effectively shift attitudes and reinforce knowledge. Despite limitations, the study highlights the necessity of interventions designed to meet the unique characteristics of professionals, thereby promoting clinical environments that are more inclusive and responsive to mental health needs.

Keywords: Mental Health Literacy; Stigma; Health Professionals; Psychoeducational Intervention; Virtual Reality.

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1. Introduction

This dissertation reports the findings of a pioneering collaborative project between the Psychosocial Rehabilitation Laboratory from Polytechnic of Porto's School of Health and the Municipality of Póvoa de Varzim. The empirical study investigates mental health literacy (MHL) and associated stigma among healthcare professionals. Its primary objective is to evaluate the impact of a psychoeducational intervention on these professionals' knowledge and attitudes.

Despite the spread of training initiatives, the evidence is mixed: gains in knowledge are consistent, but changes in attitudes and behaviours tend to be more modest in real-world contexts and multidisciplinary teams. To clarify what we evaluate, we distinguish MHL (the ability to recognise signs, decide when/where to seek help, and understand the effectiveness of responses) and stigma at three levels: public (attitudes and discrimination by others), self (internalisation of these labels), and structural (norms, policies, and practices that perpetuate inequality). In general, greater literacy is associated with fewer misconceptions and more help-seeking, while stigma—especially public and structural—raises barriers to access, participation, and recovery. It is therefore crucial to test, in our context, whether and how gains in literacy (MAKS, MHLM) translate into improvements in attitudes (CAMI) and behaviours (RIBS), and in which subgroups such effects are most pronounced (P. W. Corrigan & Watson, 2002; Patrick W Corrigan et al., 2014; Jorm et al., 1997)

This dissertation aims to address these issues by evaluating a multicomponent intervention comprising psychoeducation, virtual reality and sociodrama, applied in a service context, and by measuring complementary domains using validated instruments for the Portuguese population. The following measures were selected: the Mental Health Knowledge Schedule (MAKS) and the Mental Health Literacy Measure (MHLM) for assessing mental health literacy; the Community Attitudes Towards the Mentally Ill (CAMI) and the Reported and Intended Behaviour Scale (RIBS) for evaluating attitudes and stigma.

1.1. Research Questions and Objectives

This study aims to address some key subjects relating to the topic in question. Throughout the dissertation, three questions are posed in search of answers:

i. To what extent does a multi-component intervention involving psychoeducation, virtual reality and sociodrama, when applied in a real healthcare setting, promote MHL and reduce stigma among healthcare professionals?

ii. Do the effects of the intervention vary according to the characteristics of the participants (e.g. education level, previous experience of or contact with mental health (MH) services, profession)?

iii. To what extent are improvements in knowledge and practical literacy associated with changes in reported and intended attitudes and behaviours?

1.1.1. General objective

Assess the immediate (pre-post) impact of a multicomponent intervention (psychoeducation, virtual reality, and sociodrama) on MHL and stigma among healthcare professionals in a real-world setting.

1.1.2. Specific objectives

The main objective gives rise to some specific objectives that will be addressed throughout the study:

i. Estimate the pre-post change in MH knowledge, measured by MAKS (total score/sub-scales);

ii. Estimate the pre-post change in practical literacy (recognition, self-efficacy of help and resource navigation), measured by MHLM;

iii. Estimate pre-post change in attitudes towards mental illness, measured by CAMI;

iv. Estimate pre-post change in reported behaviour and behavioural intention, measured by RIBS;

v. Explore effect moderators (e.g., educational level, previous contact with people with mental illness, profession/professional group), comparing differences in change between subgroups.

1.2. Scientific Relevance

The scientific relevance of this study rests on three current contributions. First, it addresses a still-unresolved gap in training programmes for healthcare professionals: the most recent reviews and meta-analyses consistently show gains in knowledge, but heterogeneous and often short-lived effects on attitudes and behaviours, particularly outside tightly controlled settings. To address this, the study simultaneously measures knowledge/literacy (MAKS, MHLM), attitudes (CAMI) and reported/intended behaviour (RIBS), thereby testing the transition from knowledge to action among practising professionals (Guerrero et al., 2023; McCullock & Scrivano, 2023; Wong et al., 2024).

Second, it tests a mechanistic rationale grounded in meaningful contact and experiential learning with immersive components (sociodrama and virtual reality). Recent evidence suggests such approaches can improve empathy and attitudes and may reduce stigma, though effects vary by dose, design, and context, hence the relevance of evaluating a multicomponent format in real-world services (Lin et al., 2024; Tay et al., 2025; Weiß et al., 2025).

Finally, it contributes original effectiveness data from Portuguese services, a setting under-represented in recent international summaries on healthcare professionals, particularly in primary health care, where reviews still report moderate, variable effects and limited follow-up (Zhamaliyeva et al., 2025).

2. Theoretical Framework

It is possible to state that MH is an inseparable component of overall health. In fact, the World Health Organisation (WHO) defines MH as "a state of well-being in which the individual realises his or her own abilities, can handle the normal stresses of life, can work productively and fruitfully, and can contribute to his or her community" (*Saúde Mental - OPAS/OMS | Organização Pan-Americana Da Saúde*, n.d.). This concept goes beyond the mere absence of mental illness, encompassing emotional, psychological and social well-being. As Franjić (2022) points out, MH plays a crucial role in individuals' ability to adapt to change, maintain healthy relationships and participate actively in society. In recent years, there has been a considerable increase in the global incidence of MH problems, a trend exacerbated by the COVID-19 pandemic (Guo et al., 2021).

In Portugal, the National Epidemiological Study of Mental Health (EESM-PT), carried out under the World Mental Health Survey Initiative, with fieldwork between 2008 and 2009, estimated a 12-month prevalence of 22.9% for any mental disorder in the adult population. Subsequent publications using the same sample report very similar figures (21.8%), in addition to quantifying the associated functional impact in terms of 'days out of role'. To date, no new national survey using equivalent methodology has been conducted to update these estimates, which therefore remain the standard epidemiological reference (Almeida et al., 2013; Cardoso et al., 2017; Pires et al., 2023). These data reinforce the urgent need for initiatives to promote MHL to address this challenge. To provide a conceptual anchor for this discussion, we first outline the broader construct of health literacy before situating MHL within it.

2.1. Mental Health Literacy

Health literacy (HL) is broadly defined as the ability of individuals to acquire, comprehend, evaluate, and apply health information in order to make informed decisions, strengthen self-management, and reduce health risks. It is recognised as a key determinant of health promotion (Nutbeam, 2000; Sørensen et al., 2012). Beyond the understanding of information, HL also encompasses the capacity to interact effectively with health professionals and to navigate complex health systems (Sørensen et al., 2012). According to Nutbeam (2000), HL can be conceptualised across three domains: functional, interactive,

and critical, while Sørensen et al. (2012) propose an integrated model in which literacy is understood as a process involving access, understanding, appraisal, and application of information and services.

Within this broader framework, MHL refers to the knowledge and skills that enable individuals to recognise, manage, and prevent MH problems, as well as to seek appropriate help when necessary (Jorm et al., 1997; Kutcher et al., 2016). The most widely cited definition, proposed by Jorm et al. (1997, p.182), conceptualises MHL as "the set of knowledge and beliefs about mental disorders which aid their recognition, management, or prevention." Over time, the construct has evolved and is now commonly operationalised across four interrelated components (Kutcher et al., 2015, 2016; Sampaio et al., 2022; Türkoğlu Mutlu & Yüksel, 2024):

(a) knowledge of strategies to maintain MH and psychological well-being;
(b) knowledge of mental disorders, their symptoms, and treatment options;
(c) stigma reduction, aimed at counteracting prejudice and negative stereotypes;
(d) help-seeking and self-care efficacy, referring to the effectiveness with which individuals seek professional support or engage in self-help and mutual aid strategies.

Aligned with the WHO's broader conceptualisation of literacy, MHL extends beyond accessing and understanding information to include the appraisal and practical application of knowledge for health promotion and well-being (World Health Organization, 2021). This perspective suggests that effective interventions should address both declarative knowledge (e.g., symptom recognition, awareness of available treatments) and practical skills (e.g., resource navigation, self-efficacy in providing or seeking support).

In this dissertation, MHL is operationalised through the MAKS (knowledge) and MHLM (practical literacy) instruments, thereby capturing both cognitive and applied dimensions. Given that stigma reduction remains a core element of MHL and a frequent barrier to translating knowledge into behaviour, subsequent sections of this work explore contemporary models of stigma and their practical implications. The intervention designed for this study is expected to improve MAKS and MHLM outcomes by combining structured informational content with training activities oriented toward real workplace tasks, thereby enhancing informed decision-making and competent action (Jorm et al., 1997; Kutcher et al., 2016; Nutbeam, 2000; Sørensen et al., 2012).

2.2. Mental Health Stigma

Stigma in MH can be understood as a social process involving labelling, stereotyping, separation, loss of status, and discrimination, all sustained by power relations (Link & Phelan, 2001). At an operational level, the literature distinguishes between public stigma, self-stigma, and structural stigma, each shaped by specific determinants and producing different impacts (Patrick W Corrigan et al., 2014). This distinction is particularly relevant for practice, as different mechanisms call for different intervention strategies, including education, meaningful contact, empowerment, and organisational change.

However, evidence suggests that increasing knowledge alone does not automatically reduce stereotypes and prejudices. In many contexts, factual information coexists with negative representations, which fuel social distancing and delay help-seeking behaviours (Doll et al., 2022). For this reason, MH promotion programmes are more effective when they combine informative content with dialogical and contact-based components that mobilise empathy and perspective-taking (Cazals et al., 2019; Patrick W Corrigan et al., 2014; Crowe et al., 2018).

Importantly, stigma is not restricted to the general public. Studies consistently document the presence of literacy gaps and stigmatising attitudes among health professionals, which are associated with reduced accessibility, poorer clinical communication, and lower continuity of care (Carrara et al., 2019; Patrick W Corrigan et al., 2014; Henderson et al., 2014). Across different countries and institutional contexts, research reports only moderate knowledge and low self-efficacy in managing MH problems, alongside persistent beliefs in dangerousness and pessimism about prognosis—even among highly trained professionals (Al-Yateem et al., 2017; Jauch et al., 2023; Shahwan et al., 2020). These findings are not unique to one region but appear across diverse health systems, albeit with contextual variations (Guo et al., 2021; Tonsing, 2018; Wang & Nyamapfene, 2022).

In Portugal, results mirror international trends: stigma levels are generally low to moderate, with more positive attitudes among professionals who have received specific training or have greater contact with individuals experiencing mental illness (Torres et al., 2024). Both national and international research converge on the conclusion that higher levels of MHL are consistently associated with lower stigmatisation, reinforcing the importance of educational initiatives complemented by contact-based strategies (Simões de Almeida et al., 2023).

Furthermore, stigma has been shown to negatively affect help-seeking, treatment adherence, and the quality of clinical communication, with direct consequences for continuity and outcomes of care (Patrick W Corrigan et al., 2014; Thornicroft et al., 2022).

In light of this framework, it is important to explain the mechanisms that support change beyond the accumulation of knowledge. Two theoretical frameworks, solidly supported by the literature, guided the design of the workshops and the interpretation of the results:

(i.) **Contact hypothesis:** Allport (1954) suggested that prejudice can be reduced by contact between different groups, as long as these groups have similar status, common goals, cooperation and support from institutions. Pettigrew & Tropp (2006) meta-analysis confirmed that these effects were strong and common. In the workshops, these ideas are put into practice through teamwork and clear rules about respect, which makes it more likely that stereotypes will be reduced.

(ii.) **Experiential and transformative learning:** Kolb (1984) describes a cycle that involves doing, thinking about what you have done, imagining what you could do, and then trying out what you have imagined. Mezirow (1991, 2000) emphasises that challenging experiences accompanied by guided reflection can reconfigure frames of reference. Within this framework, sociodrama facilitates perspective-taking and belief revision through role-playing, externalisation of narratives, and collective reflection (Giacomucci, 2021; Nolte, 2020). VR adds presence and immersion, and embodiment — principles associated with increased empathy and attitude change (Kilteni et al., 2012; Slater, 2003). Psychoeducation provides the facts to ground the experience, avoiding stories and correcting myths.

The combination of psychoeducation, sociodrama, and VR is expected to generate cognitive gains (MAKS, MHLM) and attitudinal change—reduction of stereotypes with greater empathy and acceptance—reflected in higher CAMI scores and greater intentions of contact and support in RIBS.

2.3. Healthcare Professionals

Evidence suggests that health professionals — often the first points of contact for those seeking help — can also hold stigmatising attitudes, which in turn impact the accessibility and quality of care delivered to people with MH challenges (Sartorius, 2002; Thornicroft, 2006). This highlights the importance of addressing stigma and promoting MHL within the healthcare sector itself.

Although MHL is frequently assumed to be higher among healthcare professionals due to their role in recognising and addressing MH concerns (Jorm, 2000), research consistently demonstrates a disparity between this perception and the actual levels of knowledge and attitudes. In various contexts, healthcare professionals often exhibit only a moderate understanding of MH conditions and may hold stigmatising beliefs (Al-Yateem et al., 2017; Shahwan et al., 2020; Smit & Marais, 2025). For example, in the Arab Gulf and Southeast Asia, numerous studies reveal low awareness and limited confidence among practitioners

in managing MH issues (Guo et al., 2021; Tonsing, 2018; Wang & Nyamapfene, 2022). Stigma continues to exist among healthcare professionals, regardless of their speciality. Despite their clinical skills, many share the same biased attitudes as the general public (Carrara et al., 2019; Henderson et al., 2014). Negative views of individuals with psychiatric diagnoses, such as beliefs about dangerousness or poor prognosis, are frequently reported, even among those with specialised training (Jauch et al., 2023; *Speaking out on the Stigma of Mental Health*, n.d.). According to Őri et al. (2023), Portugal ranks 6th on the scale of stigmatising attitudes among MH professionals, with an average of 32.47 points on a scale of 15 to 75, where higher scores reflect more stigmatising attitudes. These findings therefore suggest that although practical experience and exposure to cases of MH would serve positively to influence the professionals' attitudes, work culture and continuing training opportunities must play significant roles in reducing stigma associated with mental illness. In this context, addressing the attitudinal dimension becomes especially pertinent. (This undermines the role of providers as advocates for MH and may reduce the quality of care provided.)

Portuguese studies, on the other hand, do not reflect these international findings. Stigmatising attitudes among healthcare professionals are, on average, low to moderate: in a national study of 292 professionals (including family doctors/family health units/personalised healthcare units), the average score was 22.2/60, with less stigma among MH professionals than in general and family medicine. Close contact with someone with mental illness was associated with less social distance, while personal history was associated with greater discomfort with disclosure/seeking help (a sign of self-stigma) (Torres et al., 2024). Furthermore, MHL tends to be associated with lower stigma, which highlights the importance of educational programmes incorporating contact-based components (Simões de Almeida et al., 2023). As shown, although stigma levels among healthcare professionals are generally categorised as low to moderate, they nevertheless remain a significant concern.

The gap between the anticipated role of these professionals and their existing level of preparedness underscores an urgent need for targeted interventions. Enhancing MHL and addressing internalised stigma within this demographic is imperative not only for improving patient outcomes but also for empowering health workers to contribute to broader MHL and anti-stigma initiatives actively. Considering these findings, the development of targeted educational interventions becomes imperative to address the identified gaps in MHL and stigma among healthcare professionals.

2.4. Psychoeducation

Considering these findings, the development of targeted educational interventions becomes imperative to address the identified gaps in MHL and stigma among healthcare professionals. This study specifically focuses on evaluating the effectiveness of the '*Bicho de 7 Cabeças'* project as a local initiative designed to enhance MHL and reduce stigmatising beliefs within clinical settings. By employing validated tools to assess changes in knowledge and attitudes, the study aims to contribute to a deeper understanding of how structured educational programmes can shape more inclusive and responsive healthcare environments.

In this framework, psychoeducation is not merely an ancillary element; rather, it constitutes a pivotal mechanism for transformation, effectively transmitting theoretical knowledge into pragmatic self-management practices, facilitating the pursuit of assistance, and promoting socially integrated behaviours. Meta-analytic and review evidence suggest that, while population-focused psychoeducational formats consistently enhance MHL, the impact on stigma depends on design features such as interactivity, contact elements and emotional engagement, rather than on information delivery in isolation (Nazari et al., 2023; Waqas et al., 2020). Overall, when programmes incorporate dialogue-based tasks and contextual applications, they often transcend simple knowledge acquisition and promote a transformation in attitudes. In contrast, a notable quasi-experimental study involving public safety personnel showed that brief psychoeducation, which was primarily informative, resulted in an increase in knowledge and a modest yet significant decrease in public stigma (excluding self-stigma), highlighting both the promise and the limits of purely educational formats (Marks et al., 2024). As noted by Yang et al. (2024), advancements in MHL seem to diminish stigma indirectly by improving the perception of social support and altering attitudes towards seeking help. As a result, this fosters more positive reactions to distress.

In the field of occupational therapy, psychoeducation is aligned with various psychosocial approaches and is often provided in group settings that directly relate the material to occupational (role) performance and community participation (Rocamora-Montenegro et al., 2021). Together, these insights support the development of psychoeducation as a participatory, occupation-focused foundation of MH education. The impact is most significant when accurate information is combined with experiential, dialogic elements that confront stereotypes and apply learning to daily roles (Marks et al., 2024; Yang et al., 2024).

2.5. Sociodrama

Situated within this structure, the experiential aspect of the intervention — especially sociodrama — is revealed not merely as a supplementary educational tool but as a fundamental mechanism that facilitates change. Sociodrama immerses participants in the intricate dynamics of social interactions, enabling them to explore and alter their thoughts and feelings through role enactment. Research conducted by Nolte (2020) emphasises its capacity to reveal and address interpersonal and systemic conflicts, while Giacomucci (2021) highlights its ability to promote the internalisation of diverse viewpoints, thus enhancing empathy and social connectedness. Consistent with these findings, Sølvhøj et al. (2021) indicate in their scoping review of drama-based interventions that such approaches — including sociodrama — effectively challenge stigmatising attitudes among healthcare professionals by involving them in emotionally charged, simulated clinical situations. Together, these mechanisms may elucidate the attitudinal improvements noted in the current study, particularly regarding CAMI scores, and advocate for the application of participatory, embodied practices as transformative instruments in MH education.

This interpretation is further supported by a recent meta-analysis conducted by Orkibi et al. (2023), which reported medium effect sizes for drama-based therapies — including sociodrama and psychodrama — on psychological and behavioural outcomes. Their findings reinforce the notion that interventions grounded in embodied, interactive methods are uniquely positioned to elicit meaningful change, particularly in complex and affectively charged domains such as MH stigma.

2.6. Virtual Reality

Finally, virtual reality (VR) stands out as an innovative technological tool that has been integrated into educational interventions in the field of MH, thanks to its unique immersive characteristics. Through VR, it is possible to create an immersive environment by simulating auditory and visual hallucinations, partially replicating the experience of a person with schizophrenia. This makes it possible to replicate the subjective experience of patients to some extent, enabling participants to gain a deeper understanding of the difficulties they face. In the *'Bicho de 7 Cabeças'* project, for instance, VR technology was used to expose participants to a simulation of psychotic symptoms, such as imaginary voices and confusing visual scenarios, to foster empathy and comprehension of serious MH conditions (Marques et al., 2022). Participants are invited to 'put on the glasses' of a person with mental illness and immerse themselves in their point of view for a few minutes — an experience that is difficult to recreate through videos or lectures. which promotes a deeper understanding of the difficulties faced by users.

This method, which has been extensively researched, has significantly reduced stigma and increased empathy among health professionals. Studies show that VR improves both the ability to recognise the signs and symptoms of mental disorders and the ability to interact empathetically, promoting long-term attitude changes. For instance, Bell et al. (2020) found that nursing students who were exposed to a virtual schizophrenia scenario could identify behaviours indicative of a psychotic episode more quickly and felt more comfortable and understanding when communicating with real patients afterwards. Rodríguez-Rivas et al. (2024) randomized controlled experiment indicated that a single VR session focused on experiencing schizophrenia symptoms significantly reduced stigmatising attitudes and boosted reported empathy relative to the control group. VR users typically describe the experience as eye-opening, citing enhanced awareness of the influence of voices and visions in daily life and questioning previously held views, such as the relationship between schizophrenia and aggression or lifelong damage (Marques et al., 2022). Furthermore, there is evidence that immersive formats outperform traditional ones in certain educational contexts. For example, a comparative study found that a virtual reality (VR)-based simulation of psychotic symptoms was significantly more effective than a conventional informational video at increasing empathy and reducing stigmatising attitudes among participants. This finding emphasises the importance of immersion: by engaging all of the senses and creating the illusion of 'walking in someone else's shoes, VR promotes deeper emotional and cognitive engagement, making prejudice deconstruction more effective than passive activities like watching a movie or listening to a lecture (Marques et al., 2022). In short, immersive technology enhances the experience of empathy and perspective-taking, making learning about MH more vivid and meaningful.

3. Materials and Methods

A quasi-experimental, single-group study design was used to evaluate the impact of the 'Bicho de 7 Cabeças' intervention on healthcare professionals (Goertzen, 2017). This strategy was adopted since including a control group would have been impractical, given that the intervention's target population was established within the framework of a Recovery and Resilience Plan (PRR) project.

The study used a two-stage evaluation method: an initial assessment (pre-test) was conducted prior to the intervention, followed by a final assessment (post-test) after the intervention was completed. Previous research by Ruzafa-Martínez et al. (2024) and Ahmed et al. (2024), suggests that this strategy is effective in situations where direct comparisons with a non-intervention group are not practicable.

3.1. Participants

The study employed a convenience sampling method, resulting in a non-probabilistic sample (Andrade, 2020), based on the operational structure of the Recovery and Resilience Plan (PRR). The Municipality of Póvoa de Varzim defined the sample in collaboration with three local healthcare institutions: *WeCare Saúde*, *A Beneficente*, and *Santa Casa da Misericórdia da Póvoa de Varzim*.

Participants were eligible if they met three criteria: (i) be fluent in Portuguese (spoken and written); (ii) actively employed by one of the organisations involved; (iii) working in a role recognised as part of the health sector. Although no formal exclusion criteria were applied, participants were asked about any history of epilepsy or seizures, given the contraindications associated with virtual reality (VR) exposure.

The professional roles were classified using the World Health Organization's 2019 system, which follows the structure of the International Standard Classification of Occupations (ISCO-08) (*Classifying Health Workers*, n.d.). Thus, three broad groups were identified:

- Health Professionals – including nurses, occupational therapists, physiotherapists, among others, whose roles require formal higher education and involve direct patient care.
- Health Associate Professionals – such as assistants and technicians who support care delivery, often under supervision.
- Health Management and Support – those in administrative or logistical roles, helping to coordinate and maintain health services.

This classification helped reflect role diversity in the sample and offered a more transparent structure for interpreting differences between groups.

3.2. Instruments

The assessment included sociodemographic questions, followed by validated instruments aimed at evaluating MHL and the stigma associated with mental illness. Two questionnaires were administered for each domain to ensure a robust evaluation. The Mental Health Knowledge Schedule (MAKS) and Mental Health Literacy Measure (MHLM), both applied in their Portuguese version, were used to measure MHL. As for stigma-related attitudes, the Portuguese adaptations of the Community Attitudes Towards the Mentally Ill (CAMI) and the Reported and Intended Behaviour Scale (RIBS) were utilised.

The study's research team developed the Sociodemographic Questionnaire, which consists of six items: age, gender, marital status, educational level, occupation, and institution.

The instrument MAKS (Evans-Lacko et al., 2010; Lim, 1987; Simões de Almeida et al., 2023) , in its Portuguese adaptation, addresses six key domains associated with stigma: seeking help, recognition, support, employment, treatment, and recovery, as well as knowledge related to conditions of mental

illnesses. The instrument consists of 12 items in total, divided into two parts: the first six items aim to explain factors related to the stigma associated with mental illness. In comparison, the last six items assess knowledge about specific mental illness conditions. The scoring of items is conducted using a Likert scale ranging from 1 to 5, where higher scores indicate a greater level of knowledge about MH. The Portuguese validation of the scale demonstrated lower internal consistency than the original version, with Cronbach's α measuring 0.285 (Lim, 1987; Simões de Almeida et al., 2023).

The CAMI instrument (Doumit et al., 2019; Lopes et al., 2022; Simões de Almeida et al., 2023; Taylor & Dear, 1981), used in its Portuguese version, comprises 27 items that appraise community attitudes toward people with mental illnesses. This scale is divided into three primary subscales: attitudes toward social exclusion, feelings of benevolence and tolerance, and support for community MH care. The instrument comprises 26 general statements, plus one additional item regarding job-related attitudes. Answers are given on a 5-point Likert scale, ranging from 1 ('Strongly agree') to 5 ('Strongly disagree'). The total score is achieved by summing the answers: the higher the value, the less the stigmatising attitude of the community. The two parts of the Portuguese version have the following Cronbach's α values: 'Prejudices and Exclusion': $\alpha = 0.70$; 'Tolerance and Support in the Community': $\alpha = 0.63$ (Lopes et al., 2022; Simões de Almeida et al., 2023).

Regarding RIBS (Doumit et al., 2019; Evans-Lacko et al., 2010; Freitas, 2020; Simões de Almeida et al., 2023), it is an 8-item instrument divided into two sets of four questions each. The first set assesses past or current behaviour concerning people with mental illnesses, specifically about living with, working with, living near, or having a relationship with such individuals. The second set, on the other hand, inquires about future intentions of contact with mentally ill individuals in the exact domains. The Portuguese version covers the first four items in a 'yes/no' manner, whereas the last four use the 5-point Likert scale, and each scale item receives a rating between 1 ('strongly disagree ') and 5 ('Strongly agree'). An option entitled 'Don't know' should be taken neutrally. An elevated rating reflects a higher degree of favourable attitude against persons with mental illnesses and thus reduces stigmatisation. This instrument, in its Portuguese version, presents a Cronbach's α index of 0.81 (Freitas, 2020; Simões de Almeida et al., 2023).

Finally, the 26-item Portuguese version of the MHLM instrument (Chen, 2018; Jung et al., 2017; Simões de Almeida et al., 2023) is divided into three components: Knowledge (12 questions), Beliefs (10 questions), and Resources (4 questions). Of the 26 multiple-choice questions, 22 are rated according to a Likert-type scale, ranging from 1 ('Strongly Disagree') to 5 ('Strongly Agree'). The total consists of: for the first 12 questions, the last two options (4 and 5) receive 1 point each, and 0 points are given otherwise;

for the following 10 questions, 1 point is given to the first two options (1 and 2), while 0 points are given to the others. The score of the final four questions corresponds to a 'yes' (1 point) or 'no' (0 points) type. The global score ranges from 0 to 26, with higher scores indicating greater MHL and lower scores indicating poorer literacy. Internal consistency values for the Portuguese population were: Knowledge (α = 0.71); Beliefs (α = 0.79); and Resources (α = 0.64) (Chen, 2018; Simões de Almeida et al., 2023).

3.3. Procedures

The study protocol was approved by the Ethics Committee of the Escola Superior de Saúde do Politécnico do Porto (approval number CE1748). Before project initiation, all participants provided informed consent under the Declaration of Helsinki (IBM Corp., 2021).

Data collection and intervention delivery took place between March and June 2024 across three healthcare facilities: *WeCare Saúde* (WCS), *A Beneficente* (BFT), and *Santa Casa da Misericórdia da Póvoa de Varzim* (SCM). Before the intervention, the survey was developed in Microsoft Forms and distributed online, with an average completion time of approximately 20 minutes.

The intervention consisted of a one-day (6-hour) workshop integrating psychoeducation, sociodrama, and VR, facilitated by occupational therapists. The first part of the workshop addressed key concepts related to mental illness, MHL, and stigma. Initial activities promoted group cohesion and assessed participants' baseline knowledge, contact with mental illness, and stigmatising attitudes. Subsequent components focused on symptom identification, risk factors, and practical caregiving strategies, incorporating both caregiver and lived experience perspectives.

Each topic was then contextualised to specific MH conditions relevant to the institutions involved, including depression, dementia, schizophrenia, and other illnesses chosen by participants to align with their clinical populations. Additionally, VR technology was incorporated to simulate auditory and visual hallucinations associated with schizophrenia, to enhance empathy and understanding.

Following the baseline assessment, participants received informational materials detailing the characteristics and management of mental illnesses addressed by the "*Bicho 7 Cabeças*" project, including autism spectrum disorder (ASD), attention deficit hyperactivity disorder (ADHD), depression, digital dependency, anxiety disorder, bipolar disorder, schizophrenia, and dementia.

3.4. Statistical Analysis

Following the intervention, the data gathered during the final assessment were analysed using the Statistical Package for the Social Sciences (SPSS) software version 28 (IBM Corp., 2021). All statistical

tests employed a significance level (α= 0.05). The sample was characterised using descriptive statistics, employing measures of central tendency and dispersion, including the mean and standard deviation for continuous or discrete variables, and absolute (n) and relative (%) frequencies for nominal or ordinal variables (Marôco, 2018).

Although normality tests, such as the Kolmogorov-Smirnov and Shapiro-Wilk tests, indicated that the variables analysed did not follow a normal distribution ($p < 0.05$), this study employed parametric methods. This decision has been taken based on the robustness of the tests used throughout the statistical analysis, a principle widely recognised in the literature (Blanca et al., 2017; Schmider et al., 2010). This becomes particularly relevant in cases involving larger samples, where violations of normality assumptions are more likely to occur. The values for asymmetry and kurtosis were within acceptable limits according to the literature (REF), except for the kurtosis of the MHLM instrument at the post-test, which was 10.188. It is well-documented that tests such as ANOVA and Pearson's correlation are robust against violations of normality, provided that sample sizes are large and equal (Blanca et al., 2017; Schmider et al., 2010). It is well-documented in the literature that for sample sizes larger than 30 elements, deviations from normality have little influence on the validity of parametric test results (Blanca et al., 2017; Field, 2013; Schmider et al., 2010).

Descriptive analyses were also done for the means, standard deviations, and ranges of the variables. For the comparison between groups, an ANOVA was performed, complemented by the post-hoc Bonferroni test to identify significant differences between pairs of groups ($p < 0.05$). The latter is widely accepted as an appropriate method for controlling Type I errors in multiple comparisons while maintaining statistical precision. Pearson's correlations were also applied to examine linear associations between continuous variables. It should be noted that, despite the assumption of normality inherent in this test, studies have demonstrated its robustness to moderately non-normal distributions, particularly when sample sizes are sufficiently large (Bishara & Hittner, 2012).

Additionally, Repeated Measures were carried out to compare changes in the instrument scores of different groups over time, both before and after the intervention. Furthermore, instruments were correlated against each other to explore the relationships between the variables measured, underlining how the different constructs assessed are interrelated.

4. Results

4.1. Sociodemographic characterisation

The sample consisted of 76 participants, mostly female (93.4%), with a mean age of 41 years. The majority resided in Póvoa de Varzim (63.2%), were married or in a de facto union (60.5%), and had completed higher education (63.1%). Participants were recruited from three healthcare institutions — Santa Casa da Misericórdia (35.5%), WeCare Saúde (34.2%), and A Beneficente (30.3%) — and represented a range of professional categories, including Health Professionals (42.1%), Health Associated Professionals (30.3%), and Health Management and Support Personnel (27.6%) (Table 1).

Table 1 Sociodemographic characterisation of the sample.

Variables		
		$\bar{x}$ ± SD
Age (years)		40 (± 10.7)*
		N (%)
Gender	Female	71 (93.4)
	Male	5 (6.6)
Marital Status	Single/Divorced	30 (39.5)
	Married/De facto union	46 (60.5)
Education level	9th	10 (13.2)
	12th	18 (23.7)
	Superior	48 (63.1)
Occupation	Health Professionals	32 (42,1)
	Health Associated Professionals	23 (30.3)
	Health Management and Support Personnel	21 (27,6)
Institution	WeCare Saúde (WCS)	26 (34,2)
	A Beneficente (BFT)	23 (30,3)
	Santa Casa da Misericórdia (SCM)	27 (35,5)

*$\bar{x}$ – Mean; ± SD – Standard Deviation; N – Number of Participants; * Three missing entries due to the absence of birth year information.*

Table 2 Distribution of occupations across different institutions.

	BFT	**WCS**	**SCM**	
	N	**N**	**N**	**p-Value**
Health Professionals	–	15	17	
Health Associated Professionals	17	5	1	< 0.001
Health Management and Support Personnel	6	6	9	

BFT – Beneficente; WCS – WeCare Saúde; SC – Santa Casa da Misericórdia; N – Number of Participants; BFT – A Beneficente; WCS – WeCare Saúde; SCM – Santa Casa da Misericórdia.

4.2. Mental health literacy and stigma measures

Table 3 indicates that participants showed improvement across all four measures following the intervention, with statistically significant gains observed in each instrument ($p < .005$). The most notable

improvements were observed in CAMI and MHLM scores, indicating positive shifts in attitudes towards mental illness and increased MHL. These changes suggest that the intervention influenced not only participants' knowledge but also their approach to and engagement with the topic, particularly in relation to social perceptions and applied understanding.

The MAKS results, however, indicate a more limited effect. Although the difference was statistically significant, the actual change in mean scores was marginal, rising from 44.76 to 44.80. This could indicate a ceiling effect or reflect limitations in the scale's sensitivity to more nuanced knowledge gains. Nevertheless, the reduction in variability across participants' scores may imply greater alignment in baseline knowledge, which could be interpreted as conceptual consolidation, though not necessarily a deepening of understanding.

When results were examined based on participants' familiarity with mental illness, no consistent trends were observed. Those who reported knowing someone with MH difficulties did not differ significantly from those who did not. The only significant difference emerged among participants with a family member affected by mental illness, who scored higher on the MAKS (p = .007). However, this association did not extend to CAMI, RIBS, or MHLM scores, suggesting that while close personal experience may enhance factual knowledge, it does not necessarily translate into more positive attitudes or intended behaviours. This disconnect highlights the complexity of translating lived experience into attitudinal change — a challenge that educational interventions may need to address more directly.

Table 3 Mental health measures pre- and post-test and according to mental health familiarity.

Variables		MAKS		CAMI		RIBS		MHLM	
		$\bar{x}$ ± SD	p-Value	$\bar{x}$ ± SD	p-Value	$\bar{x}$ ± SD	p-Value	$\bar{x}$ ± SD	p-Value
	Pre-test	44,76 ±6,47	.005	108,82 ±12,08	<.001	16,76 ±2,73	<.001	20,55 ±5,07	<.001
	Post-test	44,8 ±2,98		114,83 ±7,67		17,79 ±1,7		23,47 ±2,4	
Knows Someone with Mental Health Problems	No	45.53 ±7.72	.626	108.67 ±11.88	.413	17.20 ±3.00	.115	20.07 ±6.53	.581
	Yes	44.55 ±6.65		108.68 ±13.13		16.64 ±2.88		20.47 ±5.02	
Family Member with Mental Health Problems	No	43.24 ±7.22	.007	107.71 ±13.57	.997	16.33 ±2.99	.528	20.24 ±5.38	.798
	Yes	47.92 ±4.97		110.46 ±11.94		17.50 ±2.60		21.00 ±5.35	

$\bar{x}$ – Mean; ± SD – Standard Deviation; N – Number of Participants.

When comparing outcomes across institutions (Table 4), participants from SCM consistently recorded higher scores in the pre-test phase, particularly on the MAKS, CAMI, and MHLM measures. SCM also had the most significant proportion of Health Professionals, a group that, as detailed in Table 5, exhibited elevated scores across most instruments at baseline. Although the study did not explicitly analyse educational levels by institution, the observed occupational structure may partially account for these initial discrepancies.

All three institutions demonstrated improvements post-intervention, although the degree of change varied. Participants from BFT — who began with the lowest pre-test scores — exhibited the most significant increases, particularly in CAMI and MHLM. In contrast, SCM recorded smaller gains despite achieving the highest overall scores. In MAKS, for instance, SCM's scores increased from 46.89 to 47.43, while BFT rose from 42.07 to 46.22. This indicates that the intervention may have had a more observable impact where baseline scores were lower.

RIBS scores followed a more uniform pattern across institutions, with modest increases that did not reach statistical significance. Given that this instrument focuses on behavioural intentions rather than attitudes or knowledge, any changes may be less immediately detectable following a brief intervention.

Table 4 Mental health literacy and stigma measures according to the healthcare institution.

		BFT $\bar{x}$ ± SD	WCS $\bar{x}$ ± SD	SMC $\bar{x}$ ± SD	p-Value
MAKS					
	Pre-test	42.07 (±8.80)	44.94 (±5.32)	46.89 (±4.12)	.029
	Post-test	46.22 (±1.70)	46.66 (±3.91)	47.43 (±2.78)	.347
CAMI					
	Pre-test	100.57 (±13.45)	112.00 (±7.71)	112.78 (±11.15)	<0.001
	Post-test	111.87 (±8.79)	115.38 (±9.21)	116.81 (±3.27)	.067
RIBS					
	Pre-test	15.63 (±3.02)	17.29 (±2.14)	17.22 (±2.80)	.057
	Post-test	17.09 (±2.09)	18.04 (±1.80)	18.15 (±0.99)	.058
MHLM					
	Pre-test	17.91 (±6.35)	21.50 (±2.78)	21.89 (±4.87)	.009
	Post-test	23.00 (±3.29)	23.46 (±2.39)	23.89 (±1.28)	.433

$\bar{x}$ – Mean; ±SD – Standard Deviation; BFT – Beneficente; WCS – WeCare Saúde; SCM – Santa Casa da Misericórdia.

As shown in Table 5, the intervention led to statistically significant improvements across all instruments assessing MHL and stigma (p_a < .005). However, the magnitude and nature of these changes differed

across occupational and educational subgroups. Health Professionals began the intervention with the highest scores across most measures, particularly MAKS and CAMI. Their post-intervention scores remained high but exhibited only marginal improvements — for example, MAKS scores increased by just 0.02 points ($\bar{x}$_pre = 47.25; $\bar{x}$_post = 47.27). This near-plateau may suggest a ceiling effect, but it also raises the question of whether generalised interventions are sufficiently challenging for individuals already familiar with the subject.

By contrast, participants identified as Health Associated Professionals demonstrated larger gains, particularly in MHLM and RIBS. This group, starting from lower baseline scores, showed more visible shifts in perceived literacy and intended behaviour. The Support Personnel group, though more heterogeneous, also improved notably in MHLM. These patterns align with the idea that interventions may yield more substantial effects among individuals with less prior exposure or foundational knowledge — a point supported, though modestly, by the significant time × group interaction in the MAKS (p_b = .025). Interaction effects in the other instruments did not reach statistical significance, and in some cases, statistical power was low, making it difficult to draw firm conclusions about differential responsiveness.

Stratification by educational level revealed a similar gradient. Participants with only 9th-grade education demonstrated the most substantial improvements — for instance, MHLM scores rose from 16.60 to 21.30. In contrast, those with higher education exhibited more stable performance, showing smaller gains. Although interaction effects between time and educational level were not statistically significant (e.g., MHLM p_b = .177), the direction of change aligned with occupational trends. This convergence between professional role and academic background — even if not directly measured by institution — supports the idea that baseline familiarity meaningfully shapes responsiveness.

These findings suggest that, although the intervention was generally effective, its most substantial impact was seen in participants with lower initial scores — whether due to educational background, professional role, or both. The absence of statistically robust interaction effects does not diminish this pattern; instead, it emphasises the complexity of measuring nuanced change, particularly in small subgroups.

Table 5 Descriptive statistics and inferential results for mental health literacy and stigma measures – according to occupation group and academic qualifications

Variable		MAKS		CAMI		RIBS		MHLM	
		Pre-test $\bar{x} \pm SD$	**Post-test $\bar{x} \pm SD$**	**Pre-test $\bar{x} \pm SD$**	**Post-test $\bar{x} \pm SD$**	**Pre-test $\bar{x} \pm SD$**	**Post-test $\bar{x} \pm SD$**	**Pre-test $\bar{x} \pm SD$**	**Post-test $\bar{x} \pm SD$**
Occupation Group	Health Professionals	47.25 ± 4.33	47.27 ± 3.38	113.50 ± 11.59	118.34 ± 4.79	17.31 ± 2.76	18.06 ± 1.29	21.75 ± 4.68	24.50 ± 0.76
	Health Associated Professionals	41.10 ± 8.34	46.03 ± 2.16	100.70 ± 13.76	109.17 ± 9.58	15.80 ± 2.87	16.78 ± 2.15	17.43 ± 6.28	21.91 ± 3.53
	Health Management and Support Personnel	44.99 ± 5.13	46.91 ± 3.05	110.57 ± 4.13	115.67 ± 5.21	16.99 ± 2.36	18.48 ± 1.21	22.14 ± 1.71	23.62 ± 1.60
	p-value$_a$	.003		.002		<.001		< .001	
	Observed Power$_a$	.853		.882		.926		1.000	
	p-value$_b$	.025		.852		.618		.105	
	Observed Power$_b$	.685		.074		.126		.457	
Academic Qualifications	9th Grade	40.05 ± 7.04	45.64 ± 2.37	97.20 ± 13.67	105.60 ± 10.19	15.25 ± 2.60	16.70 ± 2.00	16.60 ± 8.04	21.30 ± 3.02
	12th Grade	43.81 ± 8.93	46.38 ± 1.76	104.83 ± 11.91	114.00 ± 8.21	16.53 ± 2.75	17.39 ± 2.23	18.94 ± 4.30	22.89 ± 3.45
	Higher Education	46.11 ± 4.65	47.20 ± 3.38	112.73 ± 9.78	117.06 ± 5.12	17.17 ± 2.69	18.17 ± 1.28	21.98 ± 3.94	24.15 ± 1.26
	p-value$_a$	.001		<.001		.004		<.001	
	Observed Power**	.908		.991		.826		1.000	
	p-value$_b$	.144		.278		.852		.177	
	Observed Power**	.399		.274		.074		.360	

*$\bar{x}$ – Mean; ±SD – Standard Deviation; [a] within-groups p-value; [b] interaction p-value; * within-groups observed power; ** interaction oberserved power.*

As shown in Table 6, a strong and statistically significant positive correlation was found between MHLM and CAMI scores ($r = .66$, $p < .001$), indicating that higher perceived MHL is associated with more favourable attitudes towards mental illness. A moderate correlation was also observed between MHLM and RIBS ($r = .43$, $p < .001$), suggesting a similar trend regarding intended behaviours.

By contrast, correlations involving the MAKS were weaker. Its association with CAMI was small and not statistically significant ($r = .13$, $p = .25$), and although the correlation with RIBS reached significance ($r = .26$, $p = .025$), the effect size remained modest. These findings may reflect differences in the constructs measured by each instrument. While MHLM includes elements such as self-perceived competence and access to resources, MAKS focuses more on factual knowledge, which may be less directly linked to attitudes or behavioural intentions.

Overall, the results suggest that MHLM may be more sensitive to the attitudinal and behavioural aspects of MHL. However, further research would be necessary to explore the nature and direction of these associations more fully.

Table 6 Association between mental health literacy and stigma.

	CAMI		RIBS	
	Coefficient	p-Value	Coefficient	p-Value
MHLM	.66	< 0.001 (1)	.43	< 0.001 (1)
MAKS	.13	.25 (1)	.26	.025 (1)

(1) Pearson's correlation coefficient

5. Discussion

This section critically discusses the results of the multicomponent intervention—psychoeducation, virtual reality (VR), and sociodrama—implemented in a real-world service setting and evaluated using four validated measures: MAKS (knowledge), MHLM (practical literacy), CAMI (attitudes), and RIBS (behaviour/intention). The objective is to compare the observed results with what the literature predicts, identifying plausible mechanisms and implications for training. Research questions organise the analysis: **(RQ1)** What is the overall effect in the four domains? **(RQ2)** To what extent do the effects vary according to participant/organisational characteristics? **(RQ3)** How do knowledge and literacy relate to attitudes and behavioural intentions? In each subtopic, we present the mean post-pre difference (and its magnitude), interpret the findings considering recent evidence, and point out the gap that the present study helps to fill in the context of health services in Portugal.

Regarding the four domains in this study, it is imperative to understand what the results were and where they head. The results point to a differentiated profile of change between domains, consistent with what the literature describes for brief multicomponent interventions in professionals (Table 3). In MAKS (declarative knowledge), a mean post-pre difference of +0.04 points was observed (Mpre=44.76; SD=6.47; Mpost=44.80; SD=2.98; p=0.005; d≈0.01), i.e., a statistically detectable but practically null variation in terms of magnitude. This pattern is to be expected in samples with a high baseline level of factual knowledge, reflecting a ceiling effect often reported when the target audience already masters notions of recognition, treatment, and recovery (Evans-Lacko et al., 2010; Henderson et al., 2014). In addition, because MAKS captures mainly declarative content, it is less sensitive to qualitative changes in applied competence in experienced professionals (Evans-Lacko et al., 2010).

In contrast, in MHLM (practical literacy), there was an average difference of +2.92 points (Mpre=20.55; SD=5.07; Mpost=23.47; SD=2.40; p<0.001; d≈0.74), reflecting a clear improvement in the perceived ability to recognise signs, decide how to act and navigate resources after training. This profile aligns with Nutbeam (2000) conceptual framework of health literacy — functional, interactive, and critical — and with reviews that show superior gains when psychoeducation is combined with active/experiential methodologies that favour transfer to action and self-efficacy (O'Connor & Casey, 2015; Thornicroft et al., 2022; Wei et al., 2015). In other words, information corrects ignorance, but it is guided experience that transforms knowledge into operational capacity.

The results obtained in the MHLM in this study reinforce the effectiveness of these documented approaches, suggesting that participants developed a greater ability to recognise warning signs and

symptoms and respond appropriately. The literature suggests that programmes that integrate VR with other strategies, such as group reflection, can maximise the impact of educational interventions, as highlighted by (Tay et al., 2023; Valmaggia et al., 2016). This observation aligns with findings from similar interventions: for instance, interactive MH training typically enhances knowledge about mental illness and reduces prejudices in the short term (Jorm et al., 1997; Kutcher et al., 2016; Tok & Kesgin, 2024). Foster et al. (2022) described reflective practice and educational approaches that may have played a significant role in achieving the positive outcomes. The findings from the MHLM provide additional evidence for participants' enhanced ability to recognise signs and symptoms of psychopathology, thereby emphasising the effectiveness of structured occupational interventions. Recent advancements in MH OT highlight that practitioners have unique skills to create inclusive educational environments that combat stigma and improve MHL (Hegde et al., 2025). Comparable findings have emerged in other training contexts: training involving 'creative drama' with nursing students resulted in notably greater improvements in MHL compared to conventional classroom education, highlighting enhanced recognition of illness signs and a diminished perception of stigma (Tok & Kesgin, 2024). Similarly, well-designed anti-stigma educational programmes for health professionals result in enhanced knowledge and attitude scores shortly after implementation (Friedrich et al., 2013; Guerrero et al., 2024). This combination aligns with current recommendations that MHL programmes should be comprehensive and based on scientific evidence, favouring participatory methods over merely expository ones (Meilsmeidth et al., 2024).

The same logic helps explain what was observed in CAMI (attitudes), where the mean difference was +6.01 points (Mpre=108.82; SD=12.08; Mpost=114.83; SD=7.67; $p<0.001$; $d\approx0.59$). The attitudinal change is consistent with meta-analyses that document moderate to robust effects when the educational component is accompanied by meaningful social contact (direct or vicarious) and active learning (P. W. Corrigan et al., 2012; Thornicroft et al., 2022). The Lancet Commission is explicit: education alone has little impact on reducing prejudice, whereas meaningful contact is the cornerstone of change (Thornicroft et al., 2022). In the present programme, vicarious/immersive contact via virtual reality and staged contact via sociodrama will have activated empathy and perspective, reinforcing relational self-efficacy — mechanisms that evidence associates with less social distance and greater openness (Freeman et al., 2017; Tay et al., 2023, 2025)

In RIBS (behaviour/intention), a mean post-pre difference of +1.03 points was found (Mpre=16.76; SD=2.73; Mpost=17.79; SD=1.70; $p<0.001$; $d\approx0.45$). Although positive, the change is more modest than in the previous domains — a typical pattern in short-term assessments, given that behaviours and

intentions tend to change slowly and require contextual reinforcement (Clement et al., 2015; Henderson et al., 2014). It is also important to note that the RIBS includes historical items (e.g., having friends/colleagues with mental illness) that do not change with training, which reduces sensitivity to immediate variations (Evans-Lacko et al., 2011). Nevertheless, the shift observed is consistent with the chain "better attitudes → greater intention to contact", plausibly mediated by self-efficacy (safe rehearsal in sociodrama) and empathic normalisation (immersion in VR).

Viewed as a whole, the overall effect is internally and externally consistent: robust gains in practical literacy and attitudes, positive (albeit moderate) shifts in behavioural intention, and minimal variation in declarative knowledge. This pattern is consistent with interventions that combine psychoeducation, immersive/active experience, and guided reflection: information aligns beliefs, experience humanises and empowers, and reflection consolidates transferable skills for practice (P. W. Corrigan et al., 2012; Nutbeam, 2000; Thornicroft et al., 2022). From a translational perspective, the data add evidence in Portuguese services that, in a single session, practical literacy acts as a central link that anchors stigma reduction and favours behavioural openness, with the combination of VR and sociodrama emerging as a viable and effective pedagogical driver.

In the matter of the characteristics of each individual (from workplace to past experiences), the results indicate notable differences depending on the institution where the intervention was implemented. It was found that participants from one of the institutions (e.g., *Santa Casa da Misericórdia*) had higher initial scores in literacy and attitudes (MAKS, CAMI), possibly because they included a higher proportion of highly qualified professionals, while another institution showed lower baseline values in knowledge and attitudes. After the intervention, improvements were observed in all institutions, but to varying degrees: the institution with the lowest initial literacy scores recorded the greatest gains, especially in terms of attitudes (CAMI) and practical literacy (MHLM), while the institution with the best starting scores showed more modest progress. This pattern suggests a possible ceiling effect in contexts with higher baseline levels – where considerable literacy and openness already exist, the intervention adds relatively less – and greater potential for change in contexts with more pronounced initial needs. This trend is consistent with the literature, which indicates that anti-stigma interventions can produce more pronounced changes in groups or contexts with higher initial stigma or lower literacy (Zhamaliyeva et al., 2025). For example, in primary health care, although both doctors and nurses improve with anti-stigma training, some studies have noted that professionals with more negative baseline attitudes tend to show relatively greater improvements after the intervention (Zhamaliyeva et al., 2025). These institutional differences may reflect not only the profile of professionals (and their prior literacy levels), but also contextual factors

within each organisation (such as institutional culture towards MH and leadership support). Indeed, evidence suggests that the effectiveness of MHL programmes varies depending on the implementation setting, emphasising the importance of adapting the intervention to the local context. In summary, the findings by institution reinforce the need to consider the structural and cultural characteristics of each service when interpreting the impact of the intervention.

At the same time, the professional group and academic background of the participants also moderated the effect of the intervention. In the present study, health professionals with higher education (e.g., doctors, nurses) exhibited higher baseline levels of literacy and less stigmatising attitudes and therefore recorded only modest post-intervention increases - suggesting a plateau possibly resulting from a ceiling effect, i.e., there was little room for further improvement. In contrast, professionals in associated and support categories, typically with less formal training in the area, achieved more significant gains in knowledge (MAKS) and practical literacy (MHLM), as well as notable improvements in behavioural intentions (RIBS). For example, participants with lower education levels (up to 9th grade) showed substantial increases in practical literacy, while those with higher education maintained high but virtually stable performance – the intervention's impact reveals that higher education is correlated with less stigmatising attitudes and a greater ability to interpret and use health information (Rowlands et al., 2015; Schomerus et al., 2019; Walters et al., 2020).

This result is echoed in previous research. It is known that higher educational levels tend to be associated with greater MHL and less stigmatising and un e attitudes (Goda et al., 2025). A recent Portuguese population study found that individuals with higher levels of education show less stigma towards mental illness, possibly because education increases knowledge and empathy, reducing fears and misconceptions (Goda et al., 2025). Thus, participants with higher education in our study already had more knowledge and less baseline prejudice, leaving them with less room for improvement.

In contrast, those with less education benefited more from the psychoeducational content, reinforcing the idea that general interventions may have limited impact on professionals who are already experienced or previously informed. This interpretation is in line with international evidence: in a recent trial with MH professionals, participants with higher academic degrees achieved more positive post-intervention attitudes and a significant reduction in stigma compared to their less qualified colleagues. In addition, systematic reviews highlight differences in response depending on professional category - for example, nurses often show greater improvements in empathy and attitudes, while doctors tend to achieve more marked gains in clinical knowledge (Goda et al., 2025). These findings underscore the need to tailor teaching strategies to the profile of trainees: uniform interventions may be sufficient to increase

literacy in less experienced groups, but already literate professionals may need more advanced or specific content to challenge remaining beliefs. In practical terms, this suggests that training programmes should stratify objectives by level of prior knowledge, ensuring that more experienced participants are equally challenged and engaged in the learning process.

Finally, we assessed whether participants' prior experience with people with mental illness (e.g., having close family members or friends with mental illness, or prior professional experience in the field) modulated the effects of the intervention. In light of the contact hypothesis (Allport, 1954), it was expected that individuals already exposed to people with mental illness would have fewer stigmatising attitudes and greater openness to the topic. The literature corroborates this premise: health professionals with previous experience or frequent contact with mental patients generally exhibit less prejudice and greater empathy, and this prior familiarity can positively influence receptivity to training activities. In the present study, it was found that participants with prior contact were more likely to have higher initial levels of literacy and less stigma, which means that they showed more subtle improvements after the intervention. In contrast, those without any previous experience in this area were able, through sociodrama and virtual reality, to experience a first indirect "encounter" with mental illness, which possibly catalysed more evident changes in their attitudes and perceptions. Although the quantitative data for this moderation may not have been robust (due to the limited size of the subgroups), the observed trend suggests that the novelty of the contact (even in simulated form) had a marked impact among participants with no previous experience, while for those already familiar with the subject, the intervention served more to reinforce and deepen existing knowledge than to radically change attitudes that were already relatively positive.

This interpretation is supported by several studies. For example, a trial with university students revealed that having or not having friends/close relatives with mental illness modulated changes in attitudes towards seeking help after a brief anti-stigma intervention (Shahwan et al., 2020). This indicates that prior contact can alter how individuals respond – those who have never interacted with people with mental illness may benefit differently (often more profoundly in terms of attitude) when exposed to indirect contact strategies, such as virtual testimonials or role-play activities. Additionally, national research has observed that close contact with people with mental illness is associated with a lower desire for social distancing (i.e., less public stigma). Similarly, a recent Portuguese study concluded that living or dealing closely with someone with mental illness not only improves MHL but also reduces the stigma felt towards these illnesses (Goda et al., 2025). On the contrary, the lack of such contact tends to correlate with more negative or fearful attitudes.

Thus, prior contact emerges as an important moderator of the effect: participants already exposed to MH bring a different level of understanding and sensitivity to the training (which may limit the measurable additional gain, given that they start from a more favourable base), while those without previous experience receive the intervention almost as a first step in awareness-raising, often with more dramatic changes in the short term. It is important to note that the multi-component format of the intervention - combining information, immersive experiences (VR) and elements of interpersonal contact (sociodrama) - likely maximised the impact for both participant profiles. Recent evidence shows that strategies that include components of meaningful contact (direct or indirect) tend to generate stronger and more lasting effects in reducing stigma (Goda et al., 2025). In particular, well-structured and positively perceived contact interventions can benefit even experienced professionals by providing new perspectives or personal narratives that challenge remaining stereotypes. In other words, even for those already experienced in MH, contact with real or simulated testimonials (e.g., through VR) adds an experiential dimension that enriches traditional training. Finally, the present results reinforce the consensus in the literature that psychoeducational programmes that combine informative content with contact strategies (stories of lived experience, role-playing, simulation of symptoms via technology, etc.) are more effective in promoting significant attitudinal changes. This multi-component approach has proven effective in international contexts, including in Europe, resulting not only in knowledge gains but also in more comprehensive and sustainable improvements in attitudes and empathy (Goda et al., 2025). In short, considering the trainees' previous contact history and incorporating experiential contact components are key strategies for enhancing MHL and anti-stigma interventions, ensuring that different subgroups - from the most to the least experienced - derive maximum benefit from the training.

From the perspective of post-intervention data, it may reveal a coherent pattern post-intervention data reveal a coherent pattern in line with the literature: practical MHL (MHLM) correlates strongly with attitudes (CAMI; $r = 0.66$, $p < 0.001$) and moderately with behavioural intentions (RIBS; $r = 0.43$, $p < 0.001$), whereas declarative knowledge (MAKS) shows weak links (CAMI $r = 0.13$, $p = 0.25$; RIBS $r = 0.26$, $p = 0.025$). This aligns with Nutbeam (2000) model, where interactive and critical literacy—communication, decision-making, effective use of resources—are the proximal drivers of attitudinal and behavioural change, which helps explain why an instrument capturing applied competence (MHLM) associates more strongly than a factual test (MAKS). The low MAKS associations are also consistent with the Lancet Commission's conclusion that education alone is necessary but not sufficient to reduce stigma (Thornicroft et al., 2022): mere correction of misinformation rarely produces attitudinal shifts without contact-based or experiential components. Conversely, the MHLM pattern converges with evidence that

immersive/active formats promote empathy and self-efficacy (e.g., VR simulations that enhance understanding of psychosis: Freeman et al. (2017); dramatic/role-play methods that improve MHL and reduce stigma: Tok & Kesgin (2024), which is exactly the profile observed—stronger attitudinal links and a moderate tie to intention.

At the same time, cross-national findings caution that knowledge-focused approaches can be limited or even counterproductive in some contexts. Ciciurkaite & Pescosolido (2024) show that emphasising mental illness as "an illness like any other" does not reliably reduce stereotypes of dangerousness/unpredictability and may reinforce otherness; similarly, biological explanations can reduce blame yet increase pessimism about recovery and perceived danger (Schomerus et al., 2019). This tension maps onto the present pattern—weak MAKS links despite a small MAKS–RIBS correlation ($r = 0.26$, $p = 0.025$)—suggesting that factual gains may support intention through limited pathways but are insufficient to shift attitudes meaningfully without interactive/relational elements. Finally, the magnitude of the MHLM associations is compatible with the programme's multimodal design (discussions, simulations, indirect contact), while variability between individuals remains plausible given prior-contact effects noted in the literature (fewer stigmatising attitudes with previous exposure; larger benefits for those without prior experience when contact is well structured) (Al Saif et al., 2019; Cerully et al., 2018). Overall, the data and the literature converge on the same mechanism: practical/interactive literacy anchors change; factual knowledge alone does not.

There are limitations to this study that warrant consideration; the most significant issue is the absence of a randomised control group. Although the post-intervention improvements are statistically significant, external influences (e.g., increased public awareness of MH during the study period) and response biases such as social desirability cannot be ruled out. Ideally, future research should prioritise controlled designs, such as randomised trials or active comparison groups, to isolate the specific effects of the *'Bicho 7 Cabeças'* intervention (Guerrero et al., 2024; Henderson et al., 2014; Thornicroft et al., 2016). The project's pragmatic scope is reflected in the limited generalisability due to the small sample size and focus on a single municipality. To test the robustness of the effects in different cultural and organisational contexts, the study should be replicated across multiple centres and regions.

Another limitation is the short follow-up period: measures were collected immediately after the intervention, so it is unclear whether knowledge gains and attitudinal shifts persist or regress after 6–12 months. The literature underlines the importance of longitudinal assessment to confirm sustained impact and detect possible rebound effects (Guerrero et al., 2024). Accordingly, medium- and long-term follow-

ups should be incorporated, including indicators of real-world transfer (e.g., observable behaviours or feedback from patients/clients).

Methodologically, the reported experiences point to promising avenues for evolution. VR showed potential and could be extended beyond psychosis to conditions such as depression, dementia, and autism. Scalable formats—online tools and blended delivery—may widen access. Notably, the school arm of 'Bicho de 7 Cabeças' successfully tested a b-learning approach (Meilsmeidth et al., 2024); a parallel e-learning component for professionals could be integrated with face-to-face role-play and interaction (Meilsmeidth et al., 2024). Digital platforms would also allow periodic, tailored reinforcement—e.g., quarterly micro-modules via an app—to counter the natural decay of training effects.

Future work should also clarify which components drive which outcomes. Multi-arm designs that compare direct contact with people with mental illness, VR, and sociodrama would help determine essential versus synergistic elements and optimise programmes accordingly.

It is important to note that the quasi-experimental single-group pre–post design was not merely a logistical compromise, but a methodological choice conditioned by the Recovery and Resilience Plan (PRR), which predetermined the target population. Introducing a control arm would have undermined the project's real-world implementation. In such contexts, this design is well-suited to measuring change over time, especially when validated in previous applied studies (Ahmed et al., 2024; Goertzen, 2017; Ruzafa-Martínez et al., 2024). However, without a control group, confounding and maturation effects remain a possibility, so any causal claims must be treated with caution. Even so, consistent and statistically significant changes across validated instruments (MAKS, CAMI, RIBS, MHLM) strengthen the inference of impact given the short assessment interval and convergent trend of results. Although these methodological constraints temper generalisability, the intervention's alignment with internationally recognised best practices and its measurable outcomes support its relevance as a replicable, scalable educational strategy—while also underscoring that durable shifts in attitudes and behaviours require pedagogical designs that go beyond information delivery alone.

6. Conclusion

By combining psychoeducation, sociodrama, and VR, this intervention demonstrated that meaningful changes in MHL and stigma are possible, even within the short timeframe of a single training session. The most significant effects were found in attitudes and behaviours, suggesting that emotionally engaging and participatory formats may reach further than traditional approaches based on knowledge delivery.

Participants with less formal education or weaker exposure to MH concepts demonstrated the greatest gains. This variation underscores the need to customise training in MH to learners' backgrounds, experiences, and cognitive starting points — generic approaches tailored to average learners risk disengaging those who stand to benefit the most.

Aside from transferring knowledge, this intervention fostered conditions for reflection, empathy, and restructuring assumptions. Participants' comprehension and appreciation of the relevance of MH elements in their professional and personal spheres were made possible by the incorporation of interactive features, including role-playing and immersive simulations.

In this regard, the research helps document evidence supporting the change from passive training formats to a more participative and contextual approach. Although the scope of the impact that was analysed is limited, it underlines the promise of such initiatives to transform the ongoing educational enterprise from one that ensures regulatory compliance to one that provokes profound change.

These initial changes should serve as a foundation for broader and more sustained efforts. Training should not be viewed as a one-off intervention, but rather as a component of a wider cultural shift within healthcare systems. To achieve this, future programmes should be grounded in robust design, include diverse professional profiles, and incorporate tools for long-term impact assessment.

Redesigning training in MH is not only a practical necessity but also an ethical imperative. Dismantling the metaphor of mental illness as a 'seven-headed monster' requires coordinated, multi-level strategies grounded in evidence and guided by empathy — across all levels of care.

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