Psychiatry Research 328 (2023) 115428

Contents lists available at ScienceDirect

Psychiatry Research

journal homepage: www.elsevier.com/locate/psychres

# Effectiveness of an intervention to reduce stigma towards people with a mental disorder diagnosis in university students of healthcare careers

Pamela Grandón [a,*], Daisy Vidal [b], Alexis Vielma-Aguilera [c], Claudio Bustos [a], Yolanda Contreras [d], Gustavo Castillo [b], Patricia Cid [e], Carlos Araya [f], Raúl Flores [f]

[a] Department of Psychology, Faculty of Social Sciences, Universidad de Concepción, Concepción, Chile
[b] Department of Social Work, Faculty of Social Sciences, Universidad de Concepción, Concepción, Chile
[c] Department of Psychiatry and Mental Health, Faculty of Medicine, Universidad de Concepción, Concepción, Chile
[d] Faculty of Medicine, Department of Obstetrics, Universidad de Concepción, Concepción, Chile
[e] Faculty of Nursing, Department of Nursing Fundamentals and Public Health, Universidad de Concepción, Concepción, Chile
[f] Department of Prevention and Public Health, Faculty of Dentistry, Universidad de Concepción, Concepción, Chile

ARTICLE INFO

*Keywords:*
Social stigma
Mental disorders
Students
Health occupations
Controlled clinical trial
Attitude
Social discrimination

ABSTRACT

Students in healthcare careers present stigma towards people with psychiatric diagnoses, so the development of interventions to reduce it is essential. This study aimed to evaluate the effectiveness of an intervention to reduce stigma towards people diagnosed with mental disorders in healthcare students in Chile.

A randomized clinical trial with a before and after measurement was carried out. The intervention was part of a compulsory course and combined educational and contact strategies. A total of 244 fourth-semester students of medicine, nursing, dentistry, obstetrics, psychology, and social work participated. The intervention was effective in reducing stigmatizing attitudes and the desire for social distance. For almost all variables, the magnitude of the stigma reduction depended on the initial level of stigma, not on the profession. The intervention had positive effects on all careers. In conclusion, incorporating a stigma reduction intervention into mandatory professional training, with the active participation of the teacher in charge and experts by experience, can be a valuable tool to promote humanized and non-stigmatizing treatment.

## 1. Introduction

Individuals with mental disorders (MDs) are subjected to stigma. Stigma refers to the process of labeling, status loss, and discrimination against people who present a socially devalued characteristic (Link and Phelan, 2001). Stigma generates severe consequences for those affected; in the field of health, it becomes a barrier to healthcare access (Clement et al., 2015; Fox et al., 2018), hinders treatment adherence (Carrara and Ventura, 2018; Sickel et al., 2019), influences morbidity-mortality rates (Lawrence and Kisely, 2010; Reilly et al., 2015), and decreases the chances of recovery (Amsalem et al., 2018; Ebrahimi et al., 2017). Therefore, reducing stigma is a global challenge (World Health Organization [WHO], 2016).

Healthcare personnel tend to stigmatize individuals with MDs (Henderson et al., 2014). This stigma is expressed in various ways such as minimal recognition of the patient's physical symptoms (Vistorte et al., 2018), rejection and infantilization attitude, and erroneous beliefs about patients (Amsalem et al., 2018; Huggett et al., 2018). These ideas and attitudes are already prevalent among undergraduate students pursuing healthcare careers in Europe, Latin America, and Chile (Happell et al., 2018; Masedo et al., 2021; Youssef, 2018). So, professional training is particularly relevant for this population as these negative attitudes can be modified or conversely reinforced while the students are still studying. Correcting negative attitudes before the students have their first contact with people with MDs is essential so that they do not discriminate against or show prejudice toward such people in the future. Furthermore, developing positive attitudes toward such patients will help to promote good experiences with this population and improve their interest in mental health, which is generally not considered for professional specialization (Heim et al., 2019).

Interventions to reduce stigma among undergraduate students have been developed in three main formats: as an elective course, as a workshop not linked to any subject, and as part of a compulsory subject (Atienza-Carbonell et al., 2022; Ma and Hsieh, 2020; Strassle, 2018).

* Corresponding author.
*E-mail address:* pgrandon@udec.cl (P. Grandón).

https://doi.org/10.1016/j.psychres.2023.115428
Received 30 May 2023; Received in revised form 18 August 2023; Accepted 19 August 2023
Available online 20 August 2023

The last format can be quite useful as it includes teaching about stigma and its reduction within a formal subject, i.e., as part of the mandatory professional training curriculum.

Intervention strategies are effective in reducing stereotypes, negative attitudes, and social distancing toward individuals with MDs (Gervás et al., 2022; Martinez-Martinez, et al., 2019; Rubio-Varela, et al., 2018) and increasing help-seeking behaviors in the patients (Kruger et al., 2022). The most effective strategies are education and contact, the latter referring to interaction with people with MDs (Kosyluk et al., 2016; Yamaguchi et al., 2013). Including multiple types of contact is better as it fosters empathy in the healthcare personnel (Knaak et al., 2014). Contact should focus on the positive aspects of individuals with MDs, such as describing their accomplishments and recovery history (Yamaguchi et al., 2013). Using an active-participatory technique that encourages reflection on the existing perception of individuals with MDs has also shown positive results (Lien et al., 2021). This strategy allows the participants of the intervention to become aware of the vision and the negative consequences that stigma generates in those affected. This amounts to emotional learning, which facilitates the development of empathy toward individuals with MDs (Pursehouse, 2023).

Despite these encouraging results, studies of anti-stigma interventions in undergraduate students present some difficulties. Firstly, they have methodological problems; systematic reviews on the subject have found that the methodological quality of the research is low: there is a lack of rigor in the designs, risks of bias in the randomization, blindness to the intervention, and non-reporting of the treatment of missing data (Lien et al., 2021; Heim et al., 2019; Yamaguchi et al., 2013). Secondly, evidence demonstrates that one-off interventions over time do not yield long-term results, so more systematic and long-term interventions are required (Yamaguchi, 2020). Consequently, longer follow-ups are necessary to evaluate the effectiveness of interventions.

Studies related to stigma reduction in undergraduate students are scarce in Latin America. Lien et al. (2021) report that no such studies were conducted in this continent, while Heim et al. (2019) report that only two such studies have been conducted in Brazil so far; one used a quasi-experimental design, while the other focused on reducing stigma only in nursing students. These researchers point out the necessity of considering cultural aspects while conducting interventions, i.e., the interventions' adaptation to the particular context in which the stigma is generated. Only one research was conducted in Chile on the effectiveness of interventions to reduce stigma in undergraduate students (Rodríguez-Rivas et al., 2021). The intervention was implemented online during the COVID-19 pandemic. Although the results of this intervention indicate that it was effective, the group of students was small (Rodríguez-Rivas et al., 2021).

Chile has a primary health care (PHC) system ascribed to the family health model. Multidisciplinary health teams are assigned to comprehensively tend to the health needs, including that of mental health, of the population of the territory (MINSAL, 2013). Therefore, even healthcare students who are not specialists in mental health will have to care for individuals with MDs. So, it is essential to ensure that they do not stigmatize individuals with MDs.

It has been found that healthcare personnel with biomedical training may show more stigma than those with psychosocial training (Del Olmo-Romero et al., 2019). The biomedical model makes it difficult for healthcare personnel to have positive attitudes toward people with psychiatric diagnoses. This approach provides biogenetic explanations for MDs, which makes the disorder seem immutable and increases beliefs of dangerousness and unpredictability, inclination toward social distancing, and a pessimistic attitude about the patients' prognoses (Loughman and Haslam, 2018; Kvaale and Haslam, 2016). Thus, interventions may be less effective for future health professionals who have been trained under this model (Pursehouse, 2023). This presents a significant challenge in the area of intervention.

Based on what has been reported from previous studies, this research aimed to evaluate the effectiveness of an intervention in reducing stigma towards people diagnosed with MDs in students of health careers with a biomedical and psychosocial approach in Chile.

## 2. Methods

This study utilized an experimental design in the form of a randomized clinical trial (RCT) with before and after measurements. The aim was to measure the multilevel mixed-effects: effects of an anti-stigma intervention towards people with MDs between groups (treatment vs. control) and intragroup time effect (before-after). The control group too received the intervention at the end of the post-test evaluation. The study was registered in the Australian and New Zealand Clinical Trials Register (ANZCTR) under the code, ACTRN12622001072707p.

### 2.1. Participants

A total of 244 s-year students from the fields of nursing (36), medicine (35), obstetrics (41), dentistry (35), psychology (44), and social work (53), studying at the Universidad de Concepción in Chile participated in this study. The sample was purposive, considering students in the healthcare field, who would most probably come in contact with individuals with MDs during their professional practice.

The sample size was calculated to detect differences of $d = 0.5$ in contrast to the null hypothesis $Ho$:$\mu_{1=}\ \mu_{2,}$ using the bilateral $T$-student test for independent samples, taking into account a significance level of 0.05 and a power of 0.8. This generated a size of 128 cases—64 for the experimental group and 64 for the control group. However, considering that the assignment was conducted on an average of 20 cases in the control and experimental groups per career, assuming an $ICC = 0.05$ per group and a design effect of 1.95, the final sample size was decided to be composed of 250 cases—125 control and 125 experimental. Assignment to the control and experimental groups was randomized by blocks corresponding to the careers. The inclusion criteria were as follows: students who had not been exposed to practical curricular activities involving direct contact with people diagnosed with an MD, who agreed to participate in the study and signed the informed consent form.

### 2.2. Instruments

Two scales were used to assess the stigma in the participants.

The first scale was the *Attitudes Scale of Healthcare Professionalsťoward people with a diagnosis of mental illness (EAPS-TM)* (Vielma-Aguilera et al., 2021). This instrument is based on the Mental Illness Clinician's Attitudes (MICA) (Gabbidon et al., 2013). The EAPS-TM is a Likert-type survey that contains 18 items that assess the attitudes of professionals working in healthcare toward people with MDs. The survey consisted of two factors: "stigmatized beliefs" (12 items) and "infantilization and relational distance" (six items). The scale had six response options ranging from "strongly agree" to "strongly disagree." The higher the score, the lesser stigmatized the health professional's attitude. The reliability for the stigmatized beliefs scale in this study was $\alpha = 0.82$ in the pre-test and $\alpha = 0.89$ in the post-test, while the reliability for the infantilization scale was $\alpha = 0.74$ in the pre-test and $\alpha = 0.73$ in the post-test. This instrument was used to measure the primary outcome of the study.

The second scale used to assess stigma in this study was the *Social Distance Scale (SD)* (Grandón et al., 2015). This scale evaluates the social distance that people present toward subjects with severe MDs. The scale was adapted for use in Chile and consisted of a brief vignette followed by five items in a Likert-type response format, with five response options ranging from "totally agree" to "totally disagree." The higher the score, the lesser the stigma. This instrument had two factors: "closeness and social interaction" (three items) and "intimacy and trust" (two items). The closeness and social interaction scale presented a reliability of $\alpha = 0.76$ in the pre-test and $\alpha = 0.79$ in the post-test. The intimacy and trust

scale showed a reliability of α = 0.75 in the pre-test and α = 0.79 in the post-test.

### 2.3. Procedure

The research consisted of four stages: a) It began with design intervention, for which theoretical, conceptual, and methodological elements were considered, based on a bibliographical review. Simultaneously, didactic support material was prepared, including reading, activity-play, and audiovisual materials. b) Once the intervention was designed, its pilot application was conducted with 20 s-year students pursuing a healthcare career (speech therapy) who were not part of the sample. c) Once the necessary adjustments were made to the intervention based on the learnings from the pilot implementation, fieldwork was started with the participants pursuing the selected six healthcare careers.

The intervention was carried out within the framework of a compulsory course in the fourth semester of the degree program. It was added as a non-compulsory practical activity that contributed to the course objectives. All students of the course were invited to participate (the invitation was made within a classroom); however, only some accepted the invitation, signed the informed consent form, and completed the surveys. At the time of recruitment, the course teacher pointed out to the participants that participation in the research was not compulsory and that if students chose not to participate in the study, their grades would not be affected. The intervention was conducted at a time different from that of the regular classes to ensure that only students who were part of the sample participated in the program.

The pre-test evaluation was carried out up to seven days before the start of the intervention.

Subsequently, the participants were randomly divided into experimental and control groups within each career; the person implementing this procedure did not participate in the intervention process. A total of 12 groups were formed: six control and six experimental. The intervention was applied to the experimental groups while the control groups remained on the waiting list. d). Finally, the post-test evaluation was carried out up to 10 days after the end of the intervention. Following this, the intervention was applied to the control groups (Fig. 1).

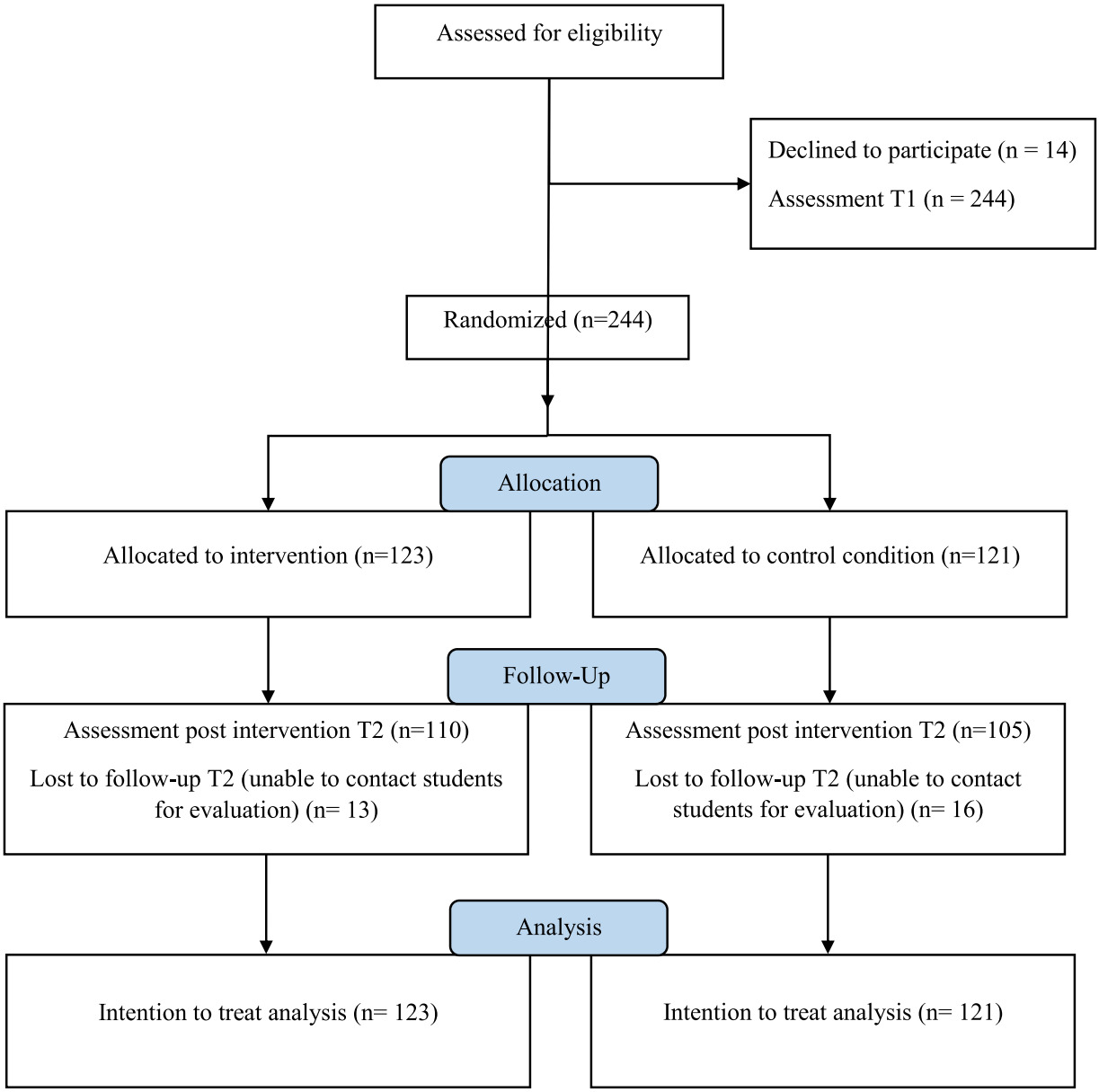


**Fig. 1.** Consort of research.

The intervention was applied by the teacher of the subject (one for each career), professional psychologists and social workers who facilitated the workshop sessions, and experts by experience (EE). EE were people with a psychiatric diagnosis who had gone through a recovery process and who assumed the role of co-facilitators in these sessions. All of these people were previously trained. Six teams were created, one for each career. Professionals and EE were assigned to the teams according to their time availability.

### 2.4. Intervention program

The intervention design was framed within the "Equal-Mind" program, which is an intervention program used to reduce stigma. In the beginning, this program focused on health personnel (Grandón et al., 2021), but now, it has been extended to other populations such as students pursuing health careers.

The design considered recommendations in terms of format and duration for working with students and included some of the critical ingredients that interventions should have, according to the *Openings Mind* program (Knaak et al., 2014).

The program used two main strategies:

Education: This approach involved providing the participants with information about MDs to modify social stereotypes. The information was transmitted through discussions on myths about MDs.

Contact: This strategy consisted of direct (face-to-face) or indirect interaction with people with MD diagnoses. The program combined direct contact through an EE co-facilitator and indirect contact through videos presenting the life stories of individuals with MDs.

The intervention program was implemented in four direct work sessions with the students as shown in Fig. 2.

The intervention began with a contextualization session in which the subject teacher spoke to the participants about the importance of addressing stigma in the training of future healthcare professionals. The teacher also explained how the intervention activity would be organized. The teacher played a fundamental role in this session, as they acted as leaders of respectful and humanized treatment of people who present psychiatric diagnoses. This session lasted for no more than 40 min.

Sessions two and three were conducted in a workshop format and lasted for 90 min. A professional facilitator and an EE co-facilitator led these two sessions. In these sessions, the facilitators spoke about the myths associated with MDs and showed videos about the recovery of individuals with MDs and the role of healthcare professionals in it. The co-facilitator contributed to the session from their experience. These sessions used an active-participative methodology to stimulate reflection in the participants.

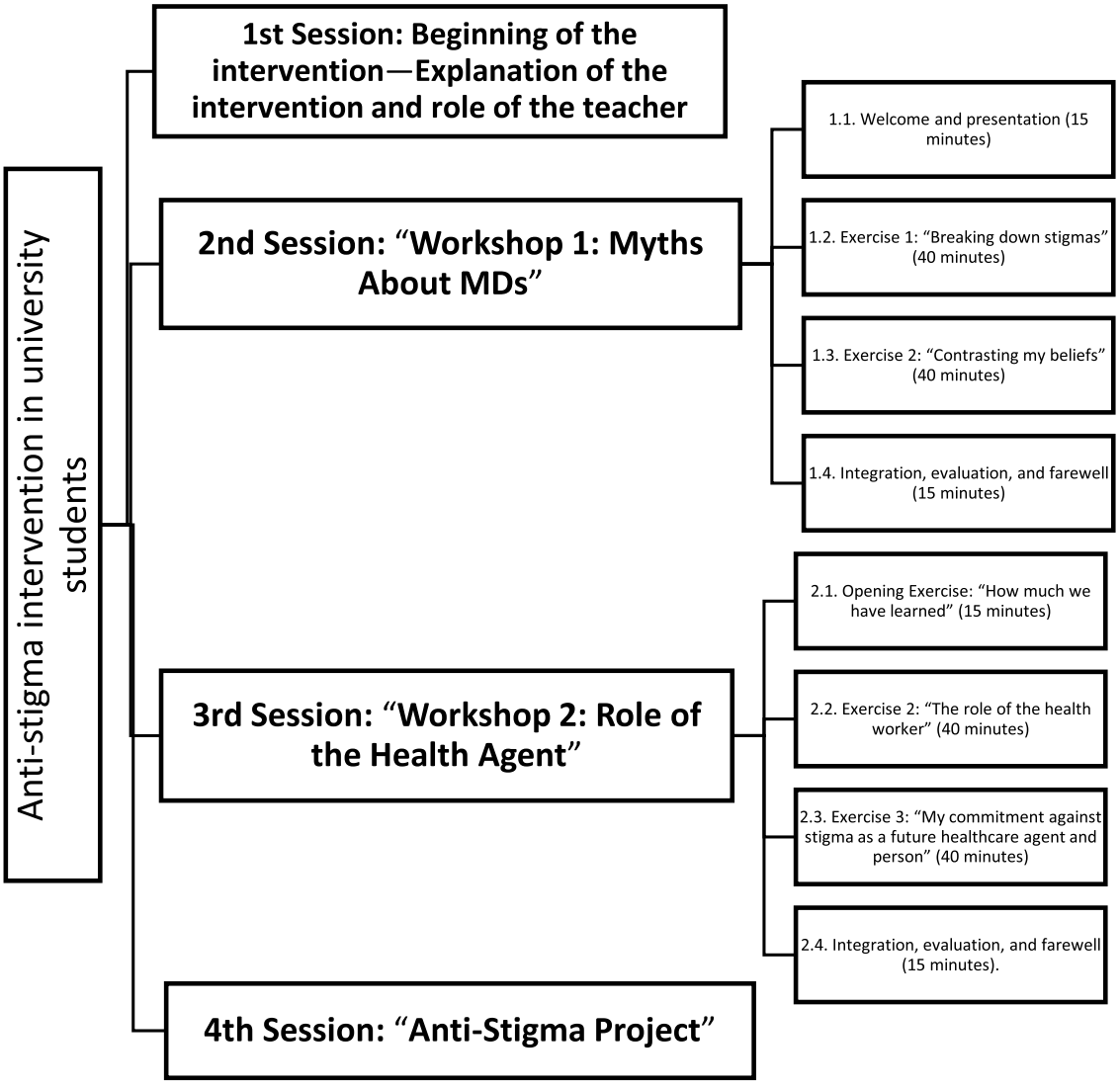


**Fig. 2.** General outline of the intervention.

In the fourth and last session, students presented a project of designing a brief intervention to raise awareness against MD-related stigma in a target group, such as other students, people from a community, or any such group. Participants worked on this project in subgroups, during the third and fourth sessions, and presented it to the whole group. The teacher and the EE provided feedback to the students on the projects. Dialog and group participation were encouraged in this session. The session lasted for approximately 90 min.

The sessions were weekly—except for the last one, which was conducted after 15 days, to give the students time to prepare their projects. Hence, 28 days passed between the first and the last session. During the entire intervention program, students were given access to a digital support platform on which they could review reading material on stigma, prepared especially for them. Additionally, a permanent communication channel was maintained to answer questions, support the design of the intervention project, and encourage session attendance.

### 2.5. Data analysis

The survey results were tabulated by double-typing, and the differences were resolved manually. Considering the missing data in the pre-test (100% of cases with information, 0.3% missing data) and in the post-test (88.1% of cases with information, 14.2% missing data), multiple imputations were performed using the fully conditional specification. In this method, the imputation model for each variable is specified separately, using a model conditioned on other variables. In this study, predictive mean matching was used to impute only the preexistent values available in each variable. This method provides unbiased estimates with proper coverage (Liu and De, 2015). The imputation was implemented using R with the mice library. Twenty imputed databases were obtained with 30 iterations. Regression analyses were performed in each imputed database, and the results were combined using a pooled Wald test (Li et al., 1991).

First, descriptive indicators were obtained for all the variables in the study. Then, differences were established between the pre- and post-test of the attitude scale and the social distance scale, using a paired samples *t*-test. Subsequently, an analysis of covariance (ANCOVA) was performed to compare the stigma levels of the participants in the post-test, controlling for the pre-test values. Relevant literature states that this analysis reduces the variability in the data and increases the precision of conclusions in randomized studies (Khamar et al., 2020). In addition to the pre-test, block (career) effects and other covariates, such as sex, age, marital status, and contact were controlled. It should be considered that while intervention groups are usually modeled as random effects, in this case, it was modeled as a fixed effect since the division into groups was based on a small number of specific careers that were intentionally selected.

When performing the ANCOVA analysis, the assumption of parallel lines was established for the effect of the pre-test and the careers, i.e., the differences between the experimental group and the control group were assumed to be independent of the values of the pre-test and the career analyzed. For this purpose, two models were analyzed, one with an interaction effect between the intervention group and the pre-test and another with an interaction effect between the intervention group and the career. The corresponding moderation analysis was performed if one of these models was significant. All the models are available for inspection on the OSF.IO site (https://osf.io/7a8vy/?view_only=064ffdbbc4404d73baa3ede3f77ed943).

### 2.6. Ethical considerations

Following the principle of beneficence, once the intervention was completed in the experimental group, it was replicated in the control group. The confidentiality of the information and identity of the participants were protected. The Ethics, Bioethics, and Biosafety Committee of the Vice-Rectory of Research and Development of the Universidad de Concepción approved the study with code N 2020.000.137-MUL.

## 3. Results

### 3.1. Sociodemographic characteristics of the participants

The majority of the participants were women (74.2%). The average age of the participants was 20.9 years (SD = 1.97). The careers with the most participants were social work (21.7%) and psychology (18%).

The sample consisted mainly of students in their fourth semester (94.7%). About 53.3% of the participants reported having contact with people with psychiatric diagnoses i.e., interacting with them.

The distribution of contact time, which was recorded as average hours per month, was observed to have a high positive skewness, as the median was 24 h per month, but the average was 108.6 h per month (SD = 158.62) (Table 1).

### 3.2. Effects of the intervention

A significant difference was observed between the pre and post-test in four outcome variables in the experimental group (stigmatizing beliefs, infantilization and relational distance, closeness and social interaction, and intimacy and trust). This indicates that the students' attitudes improved and their intention to maintain social distance from people with psychiatric diagnoses decreased. The control group showed a small but significant reduction in stigmatized beliefs between the pre- and post-test (Table 2).

The results obtained for each dimension of the EAPS-TM scale indicate the following:

In the dimension of stigmatizing beliefs, an interaction was observed between the intervention group and the pre-test on post-test values, indicating that the intervention's effect depends on the pre-test values ($F[1, 1593.2] = 12.48, p < 0.001$). On the other hand, no interaction effect was observed on the career values ($F[5, 5666.4] = 1.59$, $p = 0.161$). Therefore, a moderation analysis had to be performed only for the pre-test effect.

The moderation coefficient of the pre-test on the effect of the intervention was negative ($b = -0.42$), indicating that the higher the pre-test score (less presence of stigma), the smaller the intervention effect.

For the students in the sample who obtained an average value in the variable stigmatizing beliefs ($M = 3.65$) in the pre-test, the effect of the intervention was strong ($d = 0.95$).

An interaction effect was also observed in the dimension of infantilization and relational distance, depending on the pre-test ($F[1, 1923.7] = 12.44, p < 0.001$). A run moderation analysis was conducted, which indicated no significant interaction effect ($F[5,6227.2] = 2.158$, $p = 0.056$). For the pre-test, the moderation coefficient was negative ($b = -0.34$), which indicates that the higher the pre-test score (less presence of stigma), the smaller the intervention effect.

For students in the sample who obtained an average pre-test value on the infantilization and relational distance variable ($M = 4.90$), the effect of the intervention was moderate to strong ($d = 0.75$).

The results obtained for the closeness and social interaction dimension of the social distance scale indicate, as in the previous dimensions, an interaction in the effect depending on the pre-test ($F[1, 742.6] = 18.55, p < 0.001$). Additionally, an interaction effect by career was also observed ($F[5, 7151.938] = 3.729$, $p = 0.002$). Therefore, the differences between the pre-test and the career in the interaction effect had to be analyzed.

When analyzing the effect of the pre-test on the intervention, its coefficient was observed to be negative ($b = -0.43$), which indicates that the higher the levels of the pre-test variable, the lower the effects of the interaction. Controlling for the effect of career, for students who obtained an average value in the closeness and social interaction variable ($M = 4.93$) in the pre-test, the effect of the intervention was

**Table 1**
Sociodemographic Characteristics.

| | Control Group ($n$ = 121) | | | | Experimental Group ($n$ = 123) | | | | Total ($n$ = 244) | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *n* | % | *M* | *SD* | *n* | % | *M* | *SD* | *n* | % | *M* | *SD* |
| Sex | | | | | | | | | | | | |
| Male | 33 | 27.3 | | | 30 | 24.4 | | | 63 | 25.8 | | |
| Female | 88 | 72.7 | | | 93 | 75.6 | | | 181 | 74.2 | | |
| Marital Status | | | | | | | | | | | | |
| Single | 118 | 97.5 | | | 122 | 99.2 | | | 240 | 98.4 | | |
| Married | 1 | 0.8 | | | 0 | n/a | | | 1 | 0.4 | | |
| Cohabiting | 2 | 1.7 | | | 1 | 0.8 | | | 3 | 1.2 | | |
| Career | | | | | | | | | | | | |
| Nursing | 18 | 14.9 | | | 18 | 14.6 | | | 36 | 14.8 | | |
| Medicine | 17 | 14 | | | 18 | 14.6 | | | 35 | 14.3 | | |
| Obstetrics | 20 | 16.5 | | | 21 | 17.1 | | | 41 | 16.8 | | |
| Odontology | 17 | 14 | | | 18 | 14.6 | | | 35 | 14.3 | | |
| Psychology | 21 | 17.4 | | | 23 | 18.7 | | | 44 | 18 | | |
| Social Work | 28 | 23.1 | | | 25 | 20.3 | | | 53 | 21.7 | | |
| Semester in College | | | | | | | | | | | | |
| 2nd | 2 | 1.7 | | | 4 | 3.3 | | | 6 | 2.5 | | |
| 3rd | 1 | 0.8 | | | 3 | 2.4 | | | 4 | 1.6 | | |
| 4th | 117 | 96.7 | | | 114 | 92.7 | | | 231 | 94.7 | | |
| 5th | 0 | n/a | | | 1 | 0.8 | | | 1 | 0.4 | | |
| 6th | 1 | 0.8 | | | 1 | 0.8 | | | 2 | 0.8 | | |
| Contact with Person with MD | | | | | | | | | | | | |
| Yes | 63 | 52.1 | | | 67 | 54.5 | | | 130 | 53.3 | | |
| No | 58 | 47.9 | | | 56 | 45.5 | | | 114 | 46.7 | | |
| Contact Hours | | | | | | | | | | | 108.6 | 158.62 |
| Age | | | | | | | | | 126 | | 20.9 | 1.97 |

**Table 2**
Descriptive Pre and Post-Intervention of Each Variable.

| | *Experimental Group* | | | | | | *Control Group* | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | *Pre intervention* | | *Post intervention* | | *t* | *p* | *Pre intervention* | | *Post intervention* | | *t* | *p* |
| | *M* | *SD* | *M* | *SD* | | | *M* | *SD* | *M* | *SD* | | |
| EAPS-TM Factor 1 Stigmatizing beliefs | 3.66 | 0.75 | 4.69 | 0.85 | 12.243 | ** | 3.65 | 0.79 | 3.81 | 0.83 | 2.493 | * |
| EAPS-TM Factor 2 Infantilization and relational distance | 5.01 | 0.67 | 5.46 | 0.51 | 7.150 | ** | 4.84 | 0.77 | 4.86 | 0.76 | 0.369 | |
| SD Factor 1 Closeness and social interaction | 4.21 | 0.69 | 4.59 | 0.51 | 6.068 | ** | 4.14 | 0.68 | 4.13 | 0.69 | 0.162 | |
| SD Factor 2 Intimacy and trust | 2.57 | 0.89 | 3.27 | 1.01 | 8.063 | ** | 2.53 | 0.96 | 2.54 | 0.91 | 0.100 | |

Higher values indicate a more positive outcome.
* $p = 0.05$.
** $p = 0.01$.

moderate ($d = 0.64$). When analyzing the effects by career, controlling the effect of all variables, considering the pre-test, it was observed that the intervention significantly affected all careers except those of dentistry students.

Finally, for the intimacy dimension, no dependent effects of pre-test scores ($F$[1, 476.229] = 0.746, $p = 0.383$) or career ($F$[1, 6024.5] = 1.383, $p = 0.227$) were observed. Therefore, a positive and moderate effect was observed for all intervention participants in the experimental group ($d = 0.70$) (Table 3).

## 4. Discussion

To our knowledge, this is the first research that has used an RCT in Latin America to evaluate the effectiveness of an intervention to reduce stigma in students of different health careers.

The study results indicate that the intervention effectively reduced stigmatized beliefs, infantilization, and relational distance and decreased the inclination toward social distancing expressed through closeness, social interaction, intimacy, and trust.

In all variables, except for intimacy and trust, an interaction effect was observed between the pre- and post-test, i.e., the effect of the intervention depended on the initial level of stigma. When students presented few stigmatized beliefs, low infantilization, and greater closeness and interaction with individuals with MDs, the effect of the intervention was lower. This result was expected because if stigma was already less, the possibility of lowering it further was less, due to the ceiling effect on the variables.

On the other hand, in the dentistry career, the intervention did not affect closeness and social interaction. This result may be because the professor of the subject partially participated in the training for the intervention's correct application. It was expected that the teacher would be a leader of good treatment. Still, as he did not have all the guidelines, he could do so only partially, which influenced the closeness and social interaction he displayed toward individuals with MDs. In future research replicating this study, it would be necessary to establish which aspects of the teaching role influence the different ways stigma manifests.

According to the literature, the careers with the greatest stigma are those most closely linked to the biomedical model (Del Olmo-Romero

**Table 3**
Covariance Analysis (ANCOVA).

| | Parallels curves test (pretest) | | | Effect on pretest mean | | |
|---|---|---|---|---|---|---|
| | *F* | *df* | *p* | *b_mod* | *est* | *d* |
| EAPS-TM Scale | | | | | | |
| Factor 1: Stigmatizing beliefs | 12.48 | 1;1593.2 | < 0.001** | −0.42** | 0.90 | 0.95** |
| Factor 2: Infantilization and relational distance | 12.44 | 1;1923.7 | < 0.001** | −0.34** | 0.53 | 0.75** |
| Social Distance Scale | | | | | | |
| Factor 1: Closeness and social interaction | 18.55 | 1;742.6 | < 0.001** | −0.43** | 0.41 | 0.64** |
| Nursing | | | | | 0.36 | 0.56* |
| Medicine | | | | | 0.54 | 0.85** |
| Obstetrics | | | | | 0.78 | 1.19** |
| Odontology | | | | | −0.16 | −0.25 |
| Psychology | | | | | 0.38 | 0.59* |
| Social Work | | | | | 0.58 | 0.9** |
| Factor 2: Intimacy and trust | 0.76 | 1;476.2 | 0.38 | – | 0.70 | 0.69** |

* $p = 0.05$.
** $p < 0.01$.

et al., 2019; Economou et al., 2020); in this case, they would be medicine, dentistry, nursing, and obstetrics. However, the effects of the intervention do not differ by career, including those with more psychosocial training, such as in psychology and social work. This may be because the family health model prevailing in the country has integrated the contents linked to psychosocial aspects in the health-disease process in the training of health professionals (Muñoz-Samaín et al., 2021), which has nuanced the teaching from the biomedical model, enriching the vision of future healthcare professionals.

This research sought to overcome the main shortcomings in the literature on interventions to reduce stigma among college students. The study used a rigorous methodological design of an RCT. The randomization and intervention process was blinded, and the imputation procedures and data analysis details were provided. Additionally, the strategies that have the most evidence of effectiveness were used: education and contact. The latter was done directly through interaction with the EE and indirectly through videos showing individuals with MDs relating their experience in health care. Finally, an active-participatory methodology was used based on didactic material, games, and group discussions. This work modality was used because it has been seen to generate reflective processes questioning the beliefs and attitudes toward individuals with MDs (Knaak et al., 2014; Pursehouse, 2023). These elements are probably related to the positive results observed in the study.

This intervention had two advantages. First, it was conducted for students who were in the fourth semester, when they were in the second year of their professional education. It has been seen that as they evolve in their training, their attitudes toward individuals with MDs tend to worsen (O'Ferrall-González et al., 2020), so intervening early would prevent this negative attitudinal change. Second, unlike many interventions carried out as an extracurricular activity to decrease stigma in undergraduate university students (Kosyluk et al., 2016; Ma and Hsieh, 2020; Rubio-Varela et al., 2018), this one was carried out within a compulsory subject, in each of the participating majors. The teachers in charge of the subject were sensitized and trained on stigma and its consequences on health care. The objective of this approach was to ensure that the teacher was seen by the students as a leader in treating people with psychiatric diagnoses. The assumption is that this work modality would have positive effects beyond the end of the specific intervention as the teacher would be maintaining contact with the students throughout the semester. Short- and medium-term follow-up evaluations are necessary to measure these possible effects. This study had the limitation that the results were not followed up, so there is a risk that the changes are only temporary. Nevertheless, as the teacher teaching the subject was part of the intervention, we believe that this could help sustain the changes over time, but this should be evaluated.

Finally, it would have been necessary to elucidate which aspects of the intervention had a greater weight in reducing stigma: the role of the teacher, the workshop activities with the facilitators and the EE, the design of the awareness-raising activity by the students or the use of online resources.

In summary, anti-stigma interventions included in mandatory professional training, which also consider intervention strategies proven to be effective, can become valuable tools for health professionals to humanize and de-stigmatize people with MDs.

## Author statement

Pamela Grandón and Daisy Vidal designed the research; Pamela Grandón and Alexis Vielma-Aguilera designed the intervention; Claudio Bustos analyzed the data; Yolanda Contreras, Gustavo Castillo, Patricia Cid, Carlos Araya and Raúl Flores performed the intervention; and Pamela Grandón, Daisy Vidal, Alexis Vielma and Claudio Bustos Writing- Reviewing and Editing. All the authors approved paper`s final version.

## Funding

This study was financed by the Vice-Rectory of Research of the Universidad de Concepción, VRID Project N° 202000137.

## Declaration of Competing Interest

None.

## References

Amsalem, D., Hasson-Ohayon, I., Gothelf, D., Roe, D., 2018. Subtle ways of stigmatization among professionals: the subjective experience of consumers and their family members. Psychiatr. Rehabil. J. 41 (3), 163–168. https://doi.org/10.1037/prj0000310.

Atienza-Carbonell, B., Hernández-Évole, H., Balanzá-Martínez, V., 2022. A "patient as educator" intervention: reducing stigmatizing attitudes toward mental illness among medical students. Front. Public Health 10, 1020929. https://doi.org/10.3389/fpubh.2022.1020929.

Carrara, B.S., Ventura, C.A.A., 2018. Self-stigma, mentally ill persons and health services: an integrative review of literature. Arch. Psychiatr. Nurs. 32 (2), 317–324. https://doi.org/10.1016/j.apnu.2017.11.001.

Clement, S., Schauman, O., Graham, T., Maggioni, F., Evans-Lacko, S., Bezborodovs, N., Morgan, C., Rüsch, N., Brown, J.S., Thornicroft, G., 2015. What is the impact of mental health-related stigma on help-seeking? A systematic review of quantitative and qualitative studies. Psychol. Med. 45 (1), 11–27. https://doi.org/10.1017/S0033291714000129.

Del Olmo-Romero, F., González-Blanco, M., Sarró, S., Grácio, J., Martín-Carrasco, M., Martinez-Cabezón, A.C., Perna, G., Pomarol-Clotet, E., Varandas, P., Ballesteros-Rodríguez, J., Rebolleda-Gil, C., Vanni, G., González-Fraile, E., INTER NOS group, 2019. Mental health professionals' attitudes towards mental illness: professional and cultural factors in the INTER NOS study. Eur. Arch. Psychiatry Clin. Neurosci. 269 (3), 325–339. https://doi.org/10.1007/s00406-018-0867-5.

Ebrahimi, H., Jafarabadi, M.A., Areshtanab, H.N., Pourabbas, M., Dehghan, A., Vahidi, M., 2017. Comparing mental illness stigma among nurses in psychiatric and non-psychiatric wards in tabriz university of medical sciences. Acta Facult. Med. Naissensis 34 (1), 13–22. https://doi.org/10.1515/afmnai-2017-0002.

Economou, M., Peppou, L.E., Kontoangelos, K., Palli, A., Tsaliagkou, I., Legaki, E.M., Gournellis, R., Papageorgiou, C., 2020. Mental health professionals' attitudes to severe mental illness and its correlates in psychiatric hospitals of attica: the role of workers' empathy. Community Ment Health J. 56 (4), 614–625. https://doi.org/10.1007/s10597-019-00521-6.

Fox, A.B., Smith, B.N., Vogt, D., 2018. How and when does mental illness stigma impact treatment seeking? Longitudinal examination of relationships between anticipated and internalized stigma, symptom severity, and mental health service use. Psychiatry Res. 268, 15–20. https://doi.org/10.1016/j.psychres.2018.06.036.

Gabbidon, J., Clement, S., van Nieuwenhuizen, A., Kassam, A., Brohan, E., Norman, I., Thornicroft, G., 2013. Mental Illness: clinicians' Attitudes (MICA) scale-psychometric properties of a version for healthcare students and professionals. Psychiatry Res. 206 (1), 81–87. https://doi.org/10.1016/j.psychres.2012.09.028.

Gervás, R., García-Ullán, L., Amor, V., Bullon, A., Vicente Galindo, P., Roncero, C., 2022. Effectiveness and types of interventions to reduce mental illness-related stigma among Medical university students: a literature review (1997-2020). Actas Esp. Psiquiatr 50 (2), 106–113.

Grandón, P., Cova, F., Saldivia, S., Bustos, C., 2015. Análisis psicométrico y adaptación de la Escala de Distancia Social (DS) en una muestra chilena. Salud Ment. 38 (2), 117–122.

Grandón, P., Saldivia, S., Cova, F., Bustos, C., Vaccari, P., Ramírez-Vielma, R., Vielma-Aguilera, A., Zambrano, C., Ortiz, C., Knaak, S., 2021. Effectiveness of an intervention to reduce stigma towards people with a severe mental disorder diagnosis in primary health care personnel: programme Igual-Mente. Psychiatry Res. 305, 114259 https://doi.org/10.1016/j.psychres.2021.114259.

Happell, B., Platania-Phung, C., Bocking, J., Scholz, B., Horgan, A., Manning, F., Doody, R., Hals, E., Granerud, A., Lahti, M., Pullo, J., Ellilä, H., Annaliina, V., van der Vaart, K.J., Allon, J., Griffin, M., Russell, S., MacGabhann, L., Bjornsson, E., Biering, P., 2018. Nursing students' attitudes towards people diagnosed with mental illness and mental health nursing: an international project from Europe and Australia. Issues Ment. Health Nurs. 39 (10), 829–839. https://doi.org/10.1080/01612840.2018.1489921.

Heim, E., Henderson, C., Kohrt, B.A., Koschorke, M., Milenova, M., Thornicroft, G., 2019. Reducing mental health-related stigma among medical and nursing students in low- and middle-income countries: a systematic review. Epidemiol. Psychiatr. Sci. 29, e28. https://doi.org/10.1017/S2045796019000167.

Henderson, C., Noblett, J., Parke, H., Clement, S., Caffrey, A., Gale-Grant, O., Schulze, B., Druss, B., Thornicroft, G., 2014. Mental health-related stigma in health care and mental health-care settings. Lancet Psychiatry 1 (6), 467–482. https://doi.org/10.1016/S2215-0366(14)00023-6.

Huggett, C., Birtel, M.D., Awenat, Y.F., Fleming, P., Wilkes, S., Williams, S., Haddock, G., 2018. A qualitative study: experiences of stigma by people with mental health problems. Psychol. Psychother. 91 (3), 380–397. https://doi.org/10.1111/papt.12167.

Kosyluk, K.A., Al-Khouja, M., Bink, A., Buchholz, B., Ellefson, S., Fokuo, K., Goldberg, D., Kraus, D., Leon, A., Michaels, P., Powell, K., Schmidt, A., Corrigan, P.W., 2016. Challenging the stigma of mental illness among college students. J. Adolescent Health 59 (3), 325–331. https://doi.org/10.1016/j.jadohealth.2016.05.005.

Khammar, A., Yarahmadi, M., Madadizadeh, F., 2020. What is analysis of covariance (ANCOVA) and how to correctly report its results in medical research? Iran. J. Public Health 49 (5), 1016–1017.

Knaak, S., Modgill, G., Patten, S.B., 2014. Key ingredients of anti-stigma programs for health care providers: a data synthesis of evaluative studies. Can. J. Psychiatry 59 (10 Suppl 1), S19–S26. https://doi.org/10.1177/070674371405901s06.

Kruger, E., Pitts, S.C., Denenny, D., DeLuca, J.S., Schiffman, J., 2022. Efficacy of contact intervention videos on college students' intentions toward mental health help-seeking. J. Am. Coll. Health 70 (7), 2033–2041. https://doi.org/10.1080/07448481.2020.1842417. J of ACH.

Kvaale, E.P., Haslam, N., 2016. Motivational orientations and psychiatric stigma: social motives influence how causal explanations relate to stigmatizing attitudes. Pers. Individ. Dif. 89, 111–116. https://doi.org/10.1016/j.paid.2015.09.044.

Lawrence, D., Kisely, S., 2010. Inequalities in healthcare provision for people with severe mental illness. J. Psychopharmacol. 24 (4 Suppl), 61–68. https://doi.org/10.1177/1359786810382058 (Oxford).

Li, K.H., Raghunathan, T.E., Rubin, D.B., 1991. Large-sample significance levels from multiply imputed data using moment-based statistics and an F reference distribution. J. Am. Stat. Assoc. 86 (416), 1065–1073. https://doi.org/10.2307/2290525.

Lien, Y.Y., Lin, H.S., Lien, Y.J., Tsai, C.H., Wu, T.T., Li, H., Tu, Y.K., 2021. Challenging mental illness stigma in healthcare professionals and students: a systematic review and network meta-analysis. Psychol. Health 36 (6), 669–684. https://doi.org/10.1080/08870446.2020.1828413.

Link, B.G., Phelan, J.C., 2001. Conceptualizing stigma. Annu. Rev. Soc. 27, 363–385. https://doi.org/10.1146/annurev.soc.27.1.363.

Liu, Y., De, A., 2015. Multiple imputation by fully conditional specification for dealing with missing data in a large epidemiologic study. Int. J. Stat. Med. Res. 4 (3), 287–295. https://doi.org/10.6000/1929-6029.2015.04.03.7.

Loughman, A., Haslam, N., 2018. Neuroscientific explanations and the stigma of mental disorder: a meta-analytic study. Cogn. Res. Princ. Implic. 3 (1), 43. https://doi.org/10.1186/s41235-018-0136-1.

Ma, H.I., Hsieh, C.E., 2020. An anti-stigma course for occupational therapy students in taiwan: development and pilot testing. Int. J. Environ. Res. Public Health 17 (15), 5599. https://doi.org/10.3390/ijerph17155599.

Martínez-Martínez, C., Sánchez-Martínez, V., Sales-Orts, R., Dinca, A., Richart-Martínez, M., Ramos-Pichardo, J.D., 2019. Effectiveness of direct contact intervention with people with mental illness to reduce stigma in nursing students. Int. J. Ment. Health Nurs. 28, 735–743. https://doi.org/10.1111/inm.12578.

Masedo, A., Grandón, P., Saldivia, S., Vielma-Aguilera, A., Castro-Alzate, E.S., Bustos, C., Romero-López-Alberca, C., Pena-Andreu, J.M., Xavier, M., Moreno-Küstner, B., 2021. A multicentric study on stigma towards people with mental illness in health sciences students. BMC Med. Educ. 21 (1), 324. https://doi.org/10.1186/s12909-021-02695-8.

Ministerio de Salud [MINSAL] (2013). Orientaciones para la implementación del Modelo de Atención integral en salud familiar y comunitaria. Dirigido a Equipos de Salud. https://www.minsal.cl/portal/url/item/e7b24eef3e5cb5d1e0400101650128e9.pdf.

Muñoz-Samaín, M.E., Illesca-Pretty, M., Gallegos-Soto, J.I., Cabezas-González, M., Hernández-Díaz, A., Godoy-Pozo, J., 2021. Experiencia de aprendizaje mediante el modelo integral de salud familiar y comunitario: opiniones de estudiantes de Enfermería de Chile. FEM Rev. Fund. Educ. Méd. 24 (5), 263–269. https://doi.org/10.33588/fem.245.1147. Epub 15 de noviembre de 2021.

O'Ferrall-González, C., Almenara-Barrios, J., García-Carretero, M.Á., Salazar-Couso, A., Almenara-Abellán, J.L., Lagares-Franco, C., 2020. Factors associated with the evolution of attitudes towards mental illness in a cohort of nursing students. J. Psychiatr. Ment. Health Nurs. 27 (3), 237–245. https://doi.org/10.1111/jpm.12572.

Pursehouse, L., 2023. Health-care undergraduate student's attitudes towards mental illness following anti-stigma education: a critical review of the literature. J. Ment. Health Train. Educ. Pract. 18 (2), 111–122. https://doi.org/10.1108/JMHTEP-09-2021-0112.

Reilly, S., Olier, I., Planner, C., Doran, T., Reeves, D., Ashcroft, D.M., Gask, L., Kontopantelis, E., 2015. Inequalities in physical comorbidity: a longitudinal comparative cohort study of people with severe mental illness in the UK. BMJ Open 5 (12), e009010. https://doi.org/10.1136/bmjopen-2015-009010.

Rodríguez-Rivas, M.E., Cangas, A.J., Fuentes-Olavarría, D., 2021. Controlled study of the impact of a virtual program to reduce stigma among university students toward people with mental disorders. Front. Psychiatry 12, 632252. https://doi.org/10.3389/fpsyt.2021.632252.

Rubio-Valera, M., Aznar-Lou, I., Vives-Collet, M., Fernández, A., Gil-Girbau, M., Serrano-Blanco, A., 2018. Reducing the mental health–related stigma of social work students: a cluster RCT. Res. Soc. Work Pract. 28 (2), 164–172. https://doi.org/10.1177/1049731516641492.

Sickel, A.E., Seacat, J.D., Nabors, N.A., 2019. Mental health stigma: impact on mental health treatment attitudes and physical health. J. Health Psychol. 24 (5), 586–599. https://doi.org/10.1177/1359105316681430.

Strassle, C.G., 2018. Reducing mental illness stigma in the classroom: an expanded methodology. Teach. Psychol. 45 (4), 351–357. https://doi.org/10.1177/0098628318796922.

Vielma-Aguilera, A., Bustos, C., Saldivia, S., Grandón, P., 2021. Psychometric properties of the attitudes scale of health care professionals' toward people with a diagnosis of mental illness (EAPS-TM). Curr. Psychol. 1–13. https://doi.org/10.1007/s12144-021-01911-4.

Vistorte, A.O.R., Ribeiro, W.S., Jaen, D., Jorge, M.R., Evans-Lacko, S., Mari, J.J., 2018. Stigmatizing attitudes of primary care professionals towards people with mental disorders: a systematic review. Int. J. Psychiatry Med. 53 (4), 317–338. https://doi.org/10.1177/0091217418778620.

WHO (2016). mhGAP Intervention Guide for Mental, Neurological and Substance Use Disorders in Non-Specialized Health Settings: mental Health Gap Action Programme (mhGAP).

Yamaguchi, S., 2020. Editorial: evaluation of co-productive, student-led, and college-based anti-stigma intervention. J. Am. Acad. Child Adolesc. Psychiatry 59 (4), 506–507. https://doi.org/10.1016/j.jaac.2019.08.479.

Yamaguchi, S., Wu, S.I., Biswas, M., Yate, M., Aoki, Y., Barley, E.A., Thornicroft, G., 2013. Effects of short-term interventions to reduce mental health-related stigma in university or college students: a systematic review. J. Nerv. Ment. Dis. 201 (6), 490–503. https://doi.org/10.1097/NMD.0b013e31829480df.

Youssef, F.F., 2018. Attitudes toward mental illness among Caribbean medical students. Educ. Health 31 (1), 3–9. https://doi.org/10.4103/1357-6283.239029 (Abingdon).