Effects of a stigma reduction intervention on help-seeking behaviors in university students: A 2019-2021 randomized controlled trial

Virgínia da Conceição [a,b,*], Edgar Mesquita [a,b], Ricardo Gusmão [a,b,c]

[a] EPIUnit - Institute of Public Health, University of Porto, Portugal
[b] Laboratory for Integrative and Translational Research in Population Health (ITR), Porto, Portugal
[c] Department of Public Health and Forensic Sciences, and Medical Education, Faculty of Medicine, University of Porto, Portugal

ABSTRACT

Introduction: Stigma is one of the most frequently identified help-seeking barriers, but there is a lack of research on the effects of stigma reduction interventions on actual mental health help-seeking behaviors during crucial academic years. This research explores the effects of stigma on university students' mental health care help-seeking behaviors before and during the pandemic.
Methods: A randomized control trial spanned from 2019 to 2021 at the University of Porto, along five evaluation moments, with students into one control group and two intervention groups—the interventions aimed to reduce depression stigma.
Results: Among the 702 participants (mean age 18.87, 59.4 % female), the intervention groups significantly increased help-seeking behaviors. In 2020, the intervention groups, having reduced stigma, continued to demonstrate to be more prompt to seek mental health help. In 2021, 22 months, the effects of the intervention on help-seeking were no longer significant; however, participants in the intervention groups showed less severe symptomatology.
Conclusion: Stigma reduction interventions have a pronounced effect on enhancing help-seeking behaviors among university students, even during times of crisis. This study advocates for prioritizing stigma reduction in academic settings, highlighting its value in promoting mental health access during crucial academic and life challenges.

1. Introduction

University and college life entail several psychosocial risk factors, such as homesickness, accommodation problems, and pressure to succeed academically, coinciding with the mean age of onset for various psychiatric disorders (Woof et al., 2021). Moreover, university students' poor mental health is strongly associated with the risk of low academic functioning and dropout (Bruffaerts et al., 2019).

Research on help-seeking behaviors suggests a marked reluctance to request professional help when the need arises, posing a fundamental challenge to implementing effective early interventions (Bruffaerts et al., 2019; Lipson et al., 2019; McLafferty et al., 2017; Rickwood et al., 2007). The most frequently identified help-seeking barriers are person-level attitudes and behaviors affecting health decisions, such as stigma and embarrassment about help-seeking and poor mental health literacy (Bonabi et al., 2016; Clement et al., 2015; Gulliver et al., 2010).

In a recent systematic review abridging 35 digital intervention studies designed to promote help-seeking for mental health problems, merely half were successful. Effectiveness was higher for intentions than actual help-seeking behaviors, which changed significantly in only 29 % of the studies, mainly when developed explicitly for targeted populations. The most prolonged intervention effect lasted six months (Evans-Lacko et al., 2022).

Given known help-seeking barriers and underlying mechanisms amongst college students, stigma reduction interventions could become strategic for help-seeking promotion for depression (Lilly et al., 2020; Ruud et al., 2020). Shahwan and colleagues (Shahwan et al., 2020) investigated the effects of an anti-stigma intervention on university students' help-seeking attitudes, revealing significant improvements post-intervention no longer significant at a 3-month follow-up. Notwithstanding, a research gap regarding the tangible effects of stigma on actual help-seeking behaviors remains (Roberts et al., 2018).

Whereas 35.8 % of the Portuguese adult population with mental health disorders had access to mental health care (Silva et al., 2020), only 23.1 % of university students from high-income countries, including Portugal, afflicted by mental health disorders received adequate treatment (Auerbach et al., 2016). The identified primary obstacles hindering the general population in Portugal from accessing mental health care were a perceived lack of need (46.9 % of respondents), issues related to the system's structure (43.7 %), and negative attitudes towards mental health care (36.5 %) (Silva et al., 2020).

In 2020, the global COVID-19 pandemic massively impacted everyone, with no exception, critically amplifying the previously high reported rates of mental illness among university students (Auerbach et al., 2018) with quarantine strategies harming students' mental health and increasing anxiety and depressive symptomatology (Elmer et al., 2020; Johansson et al., 2021; Kohls et al., 2021; Lee et al., 2021; Meda et al., 2020; Zhou et al., 2021). Paradoxically, during times of disaster or continued exposure to trauma, individuals question whether depression and anxiety are conditions severe enough to seek medical assistance and lower access to mental health care services is usually observed (Tambling et al., 2022).

After 2020, multiple institutions developed online resources for mental health promotion, such as manuals, multimedia, mobile apps, and websites (Chew et al., 2020). Most of these developments were driven by the anticipated benefits of digital mental health services as tools to promote continuity and equitable access to healthcare (Crawford and Serhal, 2020) and respond to the feared increased rates of mental health-related COVID-19 issues. These mental health internet interventions targeted the general population and specific groups, such as children, parents, COVID-19-infected patients, informal caregivers, and health professionals. However, the results of these programs are still scarce (Przybylko et al., 2021; Renfrew et al., 2021; Tsai et al., 2021).

On the other hand, mental health promotion interventions became more complex due to the insufficient reach of scientifically backed public mental health interventions before COVID-19. After the beginning of the pandemic, they became further reduced because of quarantine and lockdown procedures (Campion et al., 2020).

A systematic review published in June 2023 (Ahmed et al., 2023) included 22 studies with information concerning mental services in primary care and community mental health and outpatient services (13 with adults of working age and 7 with children and adolescents); to be noted that none of these studies used pre- and post-pandemic information within the same population. In general, the pandemic led to a significant decrease in the usage of mental health services. This effect began to fade out towards the end of 2020 and into 2021, even though the levels remained below those seen pre-pandemic.

Building on our previous work in this domain, which examined the effects of anti-stigma interventions on depression stigma and help-seeking attitudes (Conceição et al., 2022b), the present study aims to explore further the longitudinal effects of such interventions on actual help-seeking behaviors.

Recognizing time constraints in a university setting, the interventions were brief yet selected according to the most effective evidence: indirect-based contact intended to challenge and potentially alter students' depression stigma-related attitudes, fostering a more conducive environment for help-seeking.

Specifically, we aimed to evaluate (a) the effects of a depression stigma reduction intervention on university students' help-seeking behaviors from 2019 to 2021, (b) the effects of the intervention on mental-health access care, specifically examining how this access varied based on the severity of their depressive and anxiety symptoms, and if (c) the expected effects changed with the beginning of the pandemic.

2. Methods

2.1. Participants

Participants were recruited from the first-year University of Porto student population through email contact. Interested students were screened for eligibility criteria, which included being currently enrolled in the university and aged between 18 and 24 years, resulting in 969 participants. We then created a random allocation sequence, which was generated using a computerized random number generator, ensuring an equal distribution of participants across the control group and the two intervention groups. The allocation was concealed using sequentially numbered, sealed envelopes, ensuring the sequence remained hidden until the interventions were assigned. More information about the baseline sample (collected in Feb 2019, M0) and the randomization process can be found in a previous publication (Conceição et al., 2022a).

In May 2019 (M1), participants in the intervention groups received the due intervention. We immediately evaluated them after the intervention. We also simultaneously assessed participants in the control group (CG), with no intervention. Participants were again evaluated in October 2019 (M2), June 2020 (M3), and March 2021 (M4), after the life changes brought by the COVID-19 pandemic.

In the present study, we only included participants with completed answers at baseline and on the second assessment (M1) when the intervention occurred, resulting in 702 participants.

2.2. Study design

The study followed an experimental single-blind randomized control trial design with the CONSORT Statement recommendations (Schulz et al., 2010) (Table 10 of the sup. file) and designed the flow diagram (Fig. 1 of the sup. file) describing the progress of all participants throughout the trial.

When designing this study, we hypothesized that varying the intensity or type of intervention might exhibit a dose-response relationship. Consequently, two distinct intervention groups were employed to explore this possibility: At M1, we asked intervention group 1 (IG-1) participants to watch a 3-min-long video containing people sharing their personal experiences with depression. Participants in intervention group 2 (IG-2) watched the same video, plus a second video, also about 3 min long, composed of narrated animations illustrating psychoeducational information. Detailed information about the intervention can be found in a previous publication focusing on the effects of the described intervention on depression stigma levels before the pandemic (Conceição et al., 2022b).

This study protocol was registered in ISRCTN. The RCT has the identification number ISRCTN970936, and an observational study to analyze the effects of COVID-19 in this cohort has the identification number ISRCTN63459073.

2.3. Measures

All participants answered the following structured questionnaires administered at every evaluation moment, including (a) a sociodemographic questionnaire to assess sex, age, and access to mental health care in the past three months (yes or no); (b) the Portuguese version of The Patient Health Questionnaire (PHQ-9) (Monteiro et al., 2013); and (c) the Portuguese version of the Generalized Anxiety Disorder (GAD-7) (Bártolo et al., 2017; Sousa et al., 2015). We calculated the total scores for both symptomatology scales. We also created a dichotomic variable considering the 15-point cut-off in the PHQ-9 (Manea et al., 2012) scale and the 10-point cut-off in the GAD-7 scale (Johnson et al., 2019), selecting relevant moderate to severe cases of depression and anxiety.

Additionally, to understand the effects of the intervention on help-seeking attitudes, participants also answered the Attitudes Toward Seeking Professional Psychological Help (Fischer and Turner, 1970) and

the Depression Stigma Scale (Conceição et al., 2021), with the results detailed in our previous publication (Conceição et al., 2022b).

2.4. Ethical considerations

The study complies with the relevant national and institutional ethical standards on human experimentation and the Helsinki Declaration of 1975, as revised in 2008. The Institute of Public Health of the University of Porto ethics committee approved the research with the ID reference CE18096. According to the Helsinki and Oviedo Conventions, all participants signed an informed consent digital form.

2.5. Data analysis

2.5.1. Handling missing data

We conducted a modified Intention-to-Treat (mITT) analysis to enhance generalizability and reduce bias. We performed Little's MCAR test to explore the type of missing data and a sensitivity analysis using multiple imputations in SPSS.

To improve accuracy, we used the EM algorithm based on a maximum likelihood estimation for the data imputation (Schafer and Graham, 2002), with socio-demographic variables and baseline scores in the imputation model. We performed the necessary interactions for the EM algorithm's convergence to reach stable log-likelihood values.

Finally, we compared the non-imputed results with those obtained from the aggregated imputed datasets.

The imputation of missing data was only performed for the missings observed in assessments after the intervention, giving us a more precise estimation of the effects. All participants with missing data before the intervention were excluded from the study.

2.5.2. Main analysis

We described age as a mean and standard deviation of years and sex distribution as counts and proportions. To compare mean differences across groups in each evaluation point, we conducted a One-Way ANOVA.

We used the Chi-Square test in each evaluation moment to compare proportions and logistic regression analysis to assess the relationship between predictor variables and help-seeking. We did not consider the evaluation immediately after the intervention since we measured behavioral changes that could only be visible in the following assessment.

When there were no significant differences between the two intervention groups regarding help-seeking, we combined the intervention groups into a single group for subsequent analyses to increase the study's statistical power. This approach allowed us to assess the overall effect of the interventions compared to the control group while maintaining the integrity of the study design and enhancing our ability to detect meaningful differences.

We used a generalized linear mixed model (GLMM) to analyze the effects of Time, Group, Sex, PHQ-9, and GAD-7 on Help-Seeking, accounting for repeated measures and individual differences with a random intercept for participant ID. This approach provided robust estimates of predictor effects on the outcome while considering within-subject variability.

To better understand the effects of the pandemic on depressive and anxiety symptoms and its association with help-seeking according to the intervention group, using linear regression, we conducted a time-trend analysis of PHQ-9 and GAD-7 scores from 2019 to project the expected scores in 2020 and 2021 if the pandemic had not happened and identify the differences between the projected and real scores. We also performed a fixed-effects model to evaluate the effects of these changes in help-seeking, and logistic regression analysis to explore help-seeking according to the group.

We performed the statistical analysis using SPSS 29.0 and R Studio, with a 95 % confidence level.

3. Results

3.1. Missing data

Throughout the study, we observed a dropout increase to 19.23 % in the last evaluation (M4). Little's MCAR test results were statistically non-significant ($\chi^2 = 85.23$, $p = 0.215$), supporting the assumption that data was missing at random.

These dropout rates reflect the challenges inherent in longitudinal studies and underscore the importance of our sensitivity analysis. We performed three separate imputations, a number consistent with best practices in the statistical methodology (Graham et al., 2007) that showed consistent results across all imputed variables, confirming the reliability and validity of our results. The aggregated estimates for the variables of this study were very close to the original results.

In the first imputation, convergence was reached on the seventh iteration with a log-likelihood of -1048.87. The second imputation reached convergence on the fourth iteration at a log-likelihood of -1044.68. The third and last imputation reached convergence on its fifth iteration, with a log-likelihood of -1045.21.

We compared the outcomes across these imputations and found them consistent and similar to the original data. This consistency indicates that our results are robust to the presence of missing data, supporting the reliability of our findings.

The comprehensive details of our approach to handling missing data, including the application of multiple imputation techniques and their outcomes, are described in the supplementary file (Tables 1 to 9).

3.2. Participant characteristics

The study sample comprised 702 participants with a mean age of 18.87 (SD = 1.87), and 59.4 % were female. Of these 702 participants, 225 belonged to the control group (CG), 242 to intervention group 1 (IG-1), and 235 to intervention group 2 (IG-2).

The results showed significant differences in some of the evaluation moments for GAD-7 total scores according to the intervention groups; in contrast, the differences in PHQ-9 scores remained non-significant over time (Table 1).

The control group presented significantly higher anxiety symptoms in October 2019 (M2), compared to the intervention groups, and similar differences were found in March 2021 (M4).

When exploring the differences between genders in the mean scores of depressive and anxiety symptoms, we can observe that at the baseline, there were no significant differences between the intervention groups and the control group in the depressive and anxiety symptoms mean scores. Women presented higher mean scores than men, but these differences were not significant in the total sample or the control group. Immediately after the intervention (M1), we also observed no differences between depressive and anxiety symptoms between intervention groups within men or women. However, the difference between genders in each group was more evident in anxiety symptoms, with women still presenting the highest means.

In the follow-up evaluation, the differences between the intervention and control groups in depressive and anxiety symptoms were mixed. In Oct. 2019 (M2), we observed no significant differences between groups in either gender in depressive symptoms. On the other hand, anxiety symptoms were statistically different in both men and women, with the control group presenting higher means in both genders. In June 2020 (M3) and March 2021 (M4) differences between the intervention groups were no longer significant, and differences between genders were irregular.

Regarding help-seeking behaviors, there were no significant differences in the proportions of students who sought help at baseline (CG = 16.5 %, IG-1 = 16.9 %, and IG-2 = 17.5 %, $\chi^2 = 0.05_{(1)}$, $p = 0.98$).

Table 1
Depressive and anxiety symptoms scores comparison according to groups, gender, and evaluation moment.

		PHQ-9 (M, SD)				GAD-7 (M, SD)			
		Sample	Men	Women	p	Sample	Men	Women	*p*
M0	Total	9.95 (7.04)	9.34 (6.56)	10.37 (7.32)	0.06	9.65 (6.00)	8.73 (5.65)	10.27 (6.15)	<0.001
	CG	9.61 (7.29)	9.14 (7.23)	10.11 (6.57)	0.29	9.47 (6.98)	9.06 (5.68)	9.40 (6.44)	0.34
	IG-1	9.23 (6.92)	8.34 (6.36)	10.53 (7.01)	<0.05	9.76 (7.16)	8.06 (5.53)	10.24 (5.67)	<0.01
	IG-2	9.19 (5.17)	9.70 (5.73)	11.29 (7.39)	<0.001	9.39 (5.98)	9.26 (5.78)	10.96 (6.25)	<0.01
	p	0.08	0.13	0.05		0.06	0.29	0.12	
M1	Total	10.17 (7.38)	9.63 (7.14)	10.09 (7.54)	0.72	9.68 (5.94)	8.75 (5.61)	10.32 (6.08)	<0.001
	CG	10.59 (6.85)	9.72 (6.51)	11.49 (7.06)	0.14	9.25 (6.05)	9.06 (5.68)	9.45 (6.40)	0.32
	IG-1	10.00 (7.06)	9.93 (7.07)	10.07 (7.02)	0.71	9.68 (5.94)	8.09 (5.45)	10.28 (5.61)	<0.01
	IG-2	9.89 (7.44)	9.34 (7.12)	10.76 (8.58)	0.01	10.14 (6.07)	9.28 (5.70)	11.00 (6.14)	<0.05
	p	0.67	0.82	0.46		0.05	0.29	0.10	
M2	Total	10.28 (7.30)	10.31 (7.06)	10.27 (7.48)	0.94	10.11 (5.14)	10.09 (5.91)	10.17 (6.18)	0.44
	CG	10.68 (6.07)	10.47 (7.73)	10.26 (7.90)	0.77	10.82 (6.34)	10.03 (6.21)	10.40 (6.37)	0.07
	IG-1	10.53 (7.72)	9.09 (7.151)	9.97 (8.248)	0.19	9.21 (6.00)	9.11 (5.78)	9.28 (6.18)	0.41
	IG-2	10.03 (7.97)	9.75 (6.28)	9.61 (5.88)	0.86	9.39 (5.49)	9.23 (5.27)	9.52 (5.69)	0.35
	p	0.17	0.36	0.98		<0.001	<0.001	<0.01	
M3	Total	13.03 (6.79)	12.22 (6.59)	12.55 (6.92)	0.19	11.89 (6.23)	12.02 (5.96)	11.80 (6.42)	0.32
	CG	13.19 (6.78)	12.65 (6.51)	11.74 (6.80)	<0.01	12.12 (6.10)	12.82 (5.99)	11.52 (6.15)	0.06
	IG-1	12.85 (6.98)	12.16 (6.41)	13.53 (7.13)	<0.05	12.04 (6.53)	11.24 (5.96)	12.68 (6.89)	<0.05
	IG-2	12.95 (7.04)	12.77 (6.68)	12.34 (6.77)	0.06	11.51 (6.06)	12.04 (5.85)	11.27 (6.16)	0.18
	p	0.62	0.18	0.11		0.52	0.15	0.14	
M4	Total	13.52 (6.89)	13.01 (6.65)	13.48 (7.04)	0.62	12.12 (6.36)	12.22 (6.11)	12.06 (6.53)	0.36
	CG	13.77 (7.01)	12.65 (7.30)	13.41 (6.77)	<0.01	13.16 (6.16)	13.44 (5.33)	13.65 (6.30)	0.11
	IG-1	12.99 (6.62)	12.97 (6.16)	13.99 (7.11)	0.06	12.44 (6.07)	12.09 (5.72)	11.63 (6.50)	<0.05
	IG-2	13.08 (7.14)	13.16 (5.92)	13.03 (6.81)	0.46	10.70 (6.63)	11.03 (6.90)	10.43 (6.42)	0.25
	p	0.70	0.46	0.54		<0.001	<0.05	<0.001	

M0 = Baseline evaluation, in Feb 2019; M1 = 1st evaluation after the intervention, in May 2019; M2 = 2nd evaluation after the intervention, in Oct 2019; M3 = 3rd evaluation after the intervention, in June 2020; M4 = 4th evaluation after the intervention, in March 2021; CG = Control group; IG-1 = Intervention group 1; IG-2 = Intervention group 2; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; M = Mean; SD = Standard Deviation; *p* = *p*-value.

3.3. Effects of the intervention on help-seeking behavior

The Generalized Linear Mixed Model for Help-Seeking showed that all predictors included in the regression were significant, except for sex, as shown in Table 2. Among the unadjusted predictors, the strongest predictor of help-seeking behavior was group, followed by GAD-7, time, and PHQ-9, in decreasing order of magnitude.

After adjusting for confounding variables, the results showed that time, group, and PHQ-9 remained significant predictors of help-seeking, whereas sex was not a significant predictor in either model. The strongest predictor of help-seeking behavior in the adjusted model was PHQ-9, followed by the type of group and time.

The adjusted model accounted for 27.3 % of the variance in help-seeking behavior ($R^2 = 0.273$), indicating that the model explained moderate variation in the dependent variable.

When testing for the evaluation points when the behavioral help-seeking changes were expected to happen, we observed significant differences between groups at both M2 and M3, but not at M4.

Although we anticipated a dose-response relationship between the two intervention groups, our findings did not demonstrate a significant difference in help-seeking behaviors. As such, we combined the two intervention groups into a single category (cIG) for analysis. This decision was taken after post-hoc tests revealed no significant differences between IG-1 and IG-2 at any point in time, as shown in Table 3. By

Table 2
Regression analysis of help-seeking: time, group, sex, and symptom scores (PHQ-9 and GAD-7) with adjustment for confounding variables.

		B	SE	z	p	OR	95 % CI
Unadjusted	Time	-0.26	0.03	-10.13	<0.001	0.77	0.81, 0.90
	Group	0.42	0.05	8.83	<0.001	1.67	1.49, 1.84
	Sex	0.10	0.08	1.26	0.21	0.94	0.86, 1.02
	PHQ-9	0.04	0.01	7.71	<0.01	1.03	1.01, 1.08
	GAD-7	0.04	0.01	6.82	<0.001	1.03	1.01, 1.05
Adjusted	Time	-0.34	0.04	-7.89	<0.001	0.70	0.64, 0.77
	Group	0.41	0.11	3.80	<0.001	1.48	1.19, 1.83
	Sex	0.01	0.08	0.08	0.94	0.99	0.84, 1.17
	PHQ-9	0.05	0.01	6.72	<0.001	1.05	1.03, 1.06
	GAD-7	0.02	0.01	2.24	<0.05	1.02	1.00, 1.03
	Time x Group	0.01	0.03	0.19	0.85	1.01	0.95, 1.08

B = parameter estimates, SE = standard errors; z = z-values; *p* = *p*-values; OR = odds ratio; CI = confidence intervals; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; CG was the comparison in Group; Men were the comparison group in "sex".

Table 3
Chi-Square analysis of the effects of the intervention on help-seeking in October 2019, June 2020, and March 2021 (% for yes).

	CG	IG-1	IG-2	$\chi^2_{(df)}$, p	IG-1 vs IG-2
M2	15.1 %	24.8 %	25.3 %	$\chi^2 = 90.61_{(2)}$, $p < 0.001$	$\chi^2 = 1.57_{(1)}$, $p = 0.210$
M3	20.4 %	33.5 %	39.1 %	$\chi^2 = 19.63_{(2)}$, $p < 0.001$	$\chi^2 = 1.66_{(1)}$, $p = 0.197$
M4	25.8 %	26.9 %	32.8 %	$\chi^2 = 3.24_{(2)}$, $p = 0.20$	$\chi^2 = 1.99_{(1)}$, $p = 0.158$

M2 = 2nd evaluation after the intervention, in Oct 2019; M3 = 3rd evaluation after the intervention, in June 2020; M4 = 4th evaluation after the intervention, in March 2021; CG = control group; IG-1 = intervention group 1; IG-2 = intervention group 2; χ^2 = Chi-square statistic; df = degrees of freedom; *p* = *p*-value.

creating the cIG, we increased our sample size, thereby enhancing the statistical power of our study to detect differences between the intervention and other predictors. It is important to note that the findings discussed from this point forward are based on this combined intervention group unless otherwise specified.

In October 2019 (M2), the cIG scores above 15 in PHQ-9 and scores above 10 in GAD-7 indicated a model fit of 35.1 % (Nagelkerke R^2) for help-seeking and correctly classified 76.4 % of cases in the statistically significant model ($\chi^2_{(3)} = 205.60$, $p < 0.001$) presented in Table 4. In June 2020 (M3), the relationship between GAD-7 scores >10 and help-seeking were not statistically significant when adjusting for the other variables in the model. Nonetheless, the model was statistically significant, $\chi^2_{(3)} = 92.08$, $p < 0.001$, with an association strength of 17.2 % (Nagelkerke R^2), and correctly classified 68.8 % of cases. The final model for help-seeking behavior in March 2021 (M4) was also statistically significant ($\chi^2_{(3)} = 204.81$, $p < 0.001$. The model fit was 36.3 % (Nagelkerke R^2) and correctly classified 76.6 % of cases.

3.2.1. Effects of the intervention on help-seeking behavior according to post-pandemic changes in depressive and anxiety symptoms trends

Even though there was no significant difference between IG-1 and IG-2 when directly compared, they might still have different levels of effectiveness relative to the control group when considering the effects of the post-pandemic changes in depressive and anxiety symptoms. As such, we analyzed the two intervention groups separately to identify subtle nuances or differential effects that might be obscured when combined, especially in light of the pandemic's changing circumstances.

In 2020 (M3), a fixed-effects regression model estimated an increase of 2.52 points in the PHQ-9 scores when compared with preceding trends (SE = 0.38, $t_{(701)} = 6.61$, $p < 0.001$) and 1.75 points (SE = 0.34, $t_{(701)} = 5.16$, $p < 0.001$) in the GAD-7 scores. Also, binary logistic regression models showed that participants were 1.76 times (95 % CI = [1.34, 2.32], z = 4.92, $p < 0.001$) more likely to have PHQ-9 scores equal to or higher than 15 and 1.82 times (95 % CI = [1.44, 2.31], z = 5.47, $p < 0.001$) more likely to have scores equal or above 10 in GAD-7 scores compared to before the pandemic.

In 2021 (M4), we observed an increase of 3.49 points in the PHQ-9 mean scores (SE = 0.37, t = 10.887, $p < 0.001$) and 1.98 points increase in relation to pre-pandemic (M2) score trends (SE = 0.32, t =

6.04, $p < 0.001$). The odds of having a PHQ-9 equal to or higher than 15 in 2021 (M4) were 3.10 higher (95 % CI = [2.21, 4.57]) than in 2019 (M2) and 1.77 higher (95 % CI = [1.34, 2.334]) for GAD-7 scores equal or above 10 (visual representation on Fig. 2 of the Sup. File).

In Table 5, we can observe that, in 2020 (M3), symptoms and intervention group were significant predictors of help-seeking behavior. The changes in previous trends of depressive and anxiety symptoms significantly changed the odds of seeking help, increasing with the changes in PHQ-9 scores and slightly decreasing with GAD-7 scores. Individuals in both intervention groups were more likely to seek help than those in the control group, with participants in IG-2 having the highest odds of help-seeking. The model had a good fit, with a significant reduction in the residual deviance (837.1) compared to the null deviance (871.4) and a low AIC value (847.1).

In 2021 (M4), only the changes in depressive symptoms were statistically significant predictors of help-seeking. Neither changes in anxiety symptoms nor the intervention significantly changed the odds of seeking help. The model had a worse fit with residual deviance of 849.5, null deviance of 862.7 and an AIC value of 852.0.

4. Discussion

The present research examined the effects of a depression stigma reduction intervention on help-seeking behaviors in university students. We addressed three specific research objectives using an RCT design with five evaluation points from 2019 to 2021, following the students for the entire duration of the undergraduate degree: the first evaluation occurred when participants were in the first academic year, and the last one at the end of the third academic year. Our findings cover a crucial period in life when university students deal with different psychosocial risk factors (Woof et al., 2021), and their mental health greatly impacts their academic success (Bruffaerts et al., 2019). Thus, improved help-seeking behaviors among university students could significantly reduce dropout rates, fostering a healthier and more productive academic environment.

Our findings go beyond showing the direct effects of better help-seeking behaviors in lower depressive and anxiety symptoms. This suggests that interventions addressing stigma can lead students to seek help and gain important benefits, ultimately improving their mental health outcomes.

4.1. The effects of the intervention on university students' help-seeking behaviors

Our intervention has been demonstrated to be effective in promoting help-seeking behavior and concretely increasing the actual use of mental health care services among university students. This is evidenced by the affirmative responses to the direct question regarding access to mental health care services in the past three months, with an increased

Table 4

Adjusted logistic regression for help-seeking behavior in October 2019 (M2), June 2020 (M3), and March 2021 (M4).

		B	SE	Wald χ^2	p	OR	95 % CI
M2	CG vs cIG	1.743	0.198	154.60	<0.001	5.71	3.89, 8.49
	PHQ-9≥15	1.623	0.292	48.61	<0.001	5.07	2.91, 9.21
	GAD-7≥10	1.166	0.203	33.52	<0.001	3.21	2.16, 4.80
M3	CG vs cIG	0.955	0.203	22.13	<0.001	2.59	1.76, 3.91
	PHQ-9≥15	1.535	0.205	55.84	<0.001	4.64	3.12, 6.99
	GAD-7≥10	-0.092	0.214	0.19	0.659	0.31	0.19, 1.30
M4	CG vs cIG	-0.240	0.219	1.215	0.270	0.79	0.51, 1.20
	PHQ-9≥15	2.147	0.253	119.498	<0.001	8.56	5.30, 14.32
	GAD-7≥10	1.317	0.299	20.666	<0.001	3.73	2.12, 6.88

M2 = 2nd evaluation after the intervention, in Oct 2019; M3 = 3rd evaluation after the intervention, in June 2020; M4 = 4th evaluation after the intervention, in March 2021; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; CG = control group; cIG = two intervention groups combined; B = parameter estimates, SE = standard errors; p = p-values.

Table 5

Analysis of predictor variables of help-seeking behavior

		B	SE	Wald χ^2	OR	95 % CI
M3	PHQ-9	0.05	0.01	12.78	1.05	1.03, 1.08
	GAD-7	-0.03	0.01	5.11	0.97	0.94, 1.00
	IG-1	0.63	0.22	8.58	1.88	1.25, 2.83
	IG-2	0.85	0.22	15.32	2.34	1.59, 3.46
M4	PHQ-9	0.10	0.01	43.75	1.10	1.06, 1.15
	GAD-7	0.01	0.02	0.36	1.01	0.98, 1.05
	IG-1	-0.27	0.23	1.34	0.77	0.45, 1.32
	IG-2	0.06	0.23	0.07	1.06	0.62, 1.81

M3 = 3rd evaluation after the intervention, in June 2020; M4 = 4th evaluation after the intervention, in March 2021; PHQ-9 = Patient Health Questionnaire-9; GAD-7 = Generalized Anxiety Disorder-7; IG-1 = intervention group 1; IG-2 = intervention group 2; B = unstandardized regression coefficient; SE = standard error; OR = odds ratio; CI = confidence interval.

proportion of students reporting 'yes' post-intervention compared to the control group.

This success could be partially understood through the lens of the Theory of Planned Behavior (Ajzen, 1991). Accordingly, attitudes, subjective norms, and perceived control over own behavior influence a person's behavior. In the context of our intervention, these factors may have manifested in several ways. The stigma reduction observed in the intervention groups (Conceição et al., 2022b) could be seen as a change in subjective norms that encourages help-seeking. Meanwhile, our emphasis on the symptoms and consequences of depression may have affected students' attitudes toward mental health care, making them more prompt to seeking help.

Furthermore, the intervention might have increased students' perceived behavioral control by promoting the perceived and evaluated need for help and care.

The consistency of the ORs for PHQ-9 and GAD-7 scores for both ajusjted and unadjusted ORs is notable given the relatively high correlation between these two measures. One interpretation of this finding is that these scores are robust predictors of help-seeking behavior, maintaining their predictive power even when controlling for other variables. This suggests that the influence of depressive and anxiety symptoms on help-seeking behavior is strong and direct, underscoring the importance of addressing these symptoms in interventions aimed at promoting help-seeking. This aligns with the conclusions of Magaard et al. (2017) suggesting that individuals are more likely to seek help when they believe they can accurately evaluate their mental health status and understand the benefits of professional help.

The intervention's effects persisted even in the face of the COVID-19 pandemic, during which there was a general decrease in help-seeking behaviors (Ahmed et al., 2023). Despite these circumstances, students who had undergone the intervention continued to exhibit elevated help-seeking behaviors. This highlights the intervention's role in fostering long-lasting changes in attitudes and behaviors, resilient even during widespread crises.

4.2. Help-seeking behavior according to group and symptoms severity

We also found an important relationship between help-seeking behavior and self-reported depressive and anxiety symptoms. In general, and as expected because of the COVID-19 pandemic context, there was a general increase in depressive and anxiety symptoms from 2019 to 2021.

Participants within the intervention groups who displayed moderately severe and severe depressive and anxiety symptoms demonstrated an increased odds ratio for seeking help.

This is a critical finding, as it suggests that our intervention was particularly effective for those in need, enabling them to recognize their need for care and behave accordingly. Subsequently, these participants reported fewer symptoms of depression and anxiety than those in the control group. This result indicated the potential power of stigma reduction and increased help-seeking in mitigating mental health symptoms.

In contrast, the control group, who did not experience any specific stigma reduction intervention, exhibited lower help-seeking behaviors and reported higher anxiety symptoms. This emphasizes the potential harm of mental health stigma, as it may dissuade those in need from seeking assistance and worsen their mental health state (Clement et al., 2015; Corrigan et al., 2016).

In our research, we did not find differences between genders in help-seeking behaviors. We may speculate that the extraordinary circumstances of the pandemic could have affected men and women in more similar ways than usual. For instance, both genders have faced the same issues, such as fear of infection, lockdown-induced isolation, economic hardships, and grief over losing loved ones. This widespread and non-discriminatory exposure to stress could have led to a greater similarity in the perceived need for mental health care across everyone, overriding the traditionally observed gender differences.

We also consider the possibility of a cohort effect as the participants aged 18–25 in wealthier countries have greater access to education and higher literacy rates and might exhibit less pronounced gender differences in help-seeking behavior compared to previous cohorts or those in less developed contexts (UNESCO, 2016). This generation has grown up in an era with an increased focus on mental health and gender equality (World Economic Forum, 2022), which may influence their attitudes toward help-seeking. However, further research is needed to validate this hypothesis and explore the potentially complex interplay of these factors.

4.3. The expected effects changed with the beginning of the pandemic

In our original study design, we hypothesized a dose-response relationship between the two intervention groups, anticipating that the group receiving the more intensive intervention would exhibit a greater increase in help-seeking behaviors. However, this expected difference was not observed. This finding aligns with a broader understanding that the effectiveness of mental health interventions does not always increase proportionally with intensity or complexity. Considering these results, the current study focused on the collective impact of the interventions rather than the differences between them, especially considering the unique context of the COVID-19 pandemic. This approach allows us to explore how our intervention influenced mental health care access and help-seeking behaviors during this period.

Our data reveal that college students' pre-pandemic levels of access to mental health care in the control group (15.1 %) were lower than the estimated proportion for the general Portuguese population (35.8 %) (Silva et al., 2020) or the first-year students of the WHO World Mental Health International College Student Initiative: 24.6% of the participants reported that they would seek help in case of need and 23.1 % was the registered 12-month treatment prevalence for high-income countries (Bruffaerts et al., 2019; Ebert et al., 2019).

At the onset of the pandemic, our findings indicated an increase in help-seeking behavior among college students, potentially promoted by increasing of anxiety and depressive symptoms. This trend aligns with the initial decline in the use of mental health services reported in the systematic review by Ahmed et al. (2023), suggesting a broad pattern of disruption in mental health service utilization during the early phase of the pandemic across diverse populations.

As the pandemic progressed, the gap in mental health service usage between our control and intervention groups began to narrow; the intervention became less effective at encouraging help-seeking behaviors over time. This also coincides with findings from Ahmed et al. (2023), which observed that the decrease in mental health service usage started to lessen towards the end of 2020 and into 2021, even though levels were still below what was seen before the pandemic.

Our research clearly shows that the pandemic has caused considerable disturbances in mental health help-seeking behaviors, but university students with less stigma were more protected from this effect.

4.4. Limitations

Despite these compelling findings, our study bears limitations. The self-reported nature of the data may have introduced response bias. While the response rate for our study was 15.6 %, it is important to consider this within the context of online surveys in university settings. As outlined by seminal research (Nulty, 2008), response rates for online surveys in such environments are often lower than those for traditional methods, a trend observed consistently in higher education research. Additionally, comparability checks at the beginning of the experiment confirmed that all groups were similar, reducing the risk of sampling bias.

Moreover, other factors may have affected help-seeking behaviors, although the study accounted for gender, being infected with COVID-19,

losing someone close, or returning to their parent's homes during the lockdown. Nonetheless, as the sample was randomized, we may expect that these possible effects would affect all the participants similarly, independently of the research group.

4.4. Strengths

The strengths of our study include the prospective design with five evaluations at different time points, lagging from pre-pandemic until post-pandemic. To our knowledge, this is the first study in Portugal to evaluate the real mental health health-care seeking in university students and to explore the effects of a stigma reduction intervention on mental health care promotion. Even though there are two other published papers on help-seeking behaviors during the COVID-19 pandemic, they are both retrospective observational studies analyzing psychiatric emergency visits (Alves et al., 2021; Gonçalves-Pinho et al., 2021). To our knowledge, there is only one other study in Europe studying help-seeking behaviors in a prospective cohort study with data pre- and post- the beginning of the pandemic (van der Velden et al., 2022). Regarding the effects of the pandemic on university students' mental health, our research is one of two prospective cohort studies with data pre-pandemic in Europe, the other one also studies depression and anxiety as well as suicidal behavior in university students, with similar results to ours (McLafferty et al., 2021).

The robust design of our study, involving a sizeable and diverse sample from all faculties of the University of Porto, one of the most prominent institutions in Portugal, offers strong insights into the mental health and help-seeking behaviors of university students. The longitudinal nature of our research, spanning the entire duration of undergraduate studies, allows for a comprehensive understanding of the intervention's effects. These factors enhance the generalizability of our findings within the context of Portuguese higher education.

Moreover, given the global resonance of the challenges associated with mental health stigma, help-seeking behaviors, and the widespread effects of the COVID-19 pandemic, our findings may hold relevance beyond our immediate context. While the specific cultural and institutional factors of the University of Porto play a role in shaping our results, the core effects and patterns could apply to university settings elsewhere, especially those with similar academic and cultural environments. Our study's depth, scope, and rigor position it as a valuable reference for researchers and practitioners looking to understand and promote mental health in academic contexts worldwide.

4.5. Conclusions

Our research offers valuable clues on promoting mental health care in university students. In view of previous research, we consider it of particular importance as the actual use of mental health services is rarely assessed, nor is usually considered the necessity for a dynamic, nuanced, and long-term approach to reducing stigma and promoting help-seeking behavior, which we deem will prove crucial in fostering mental health wellbeing in the student population.

In conclusion, the results from our study provide substantial support for the effectiveness of depression stigma reduction interventions in improving help-seeking behaviors, facilitating better mental health care access, and maintaining these effects even during the stress-inducing period of a pandemic. This study contributes to the growing body of evidence underscoring the significance of targeted mental health stigma reduction strategies in university settings.

Role of the funding source

Through FCT - Foundation for Science and Technology, IP, national funds finance this work under UIDB / 04750/2020. The sponsor had no role in the study design, in the data collection, interpretation of data, writing of the report, or in the decision to submit the paper for publication.

CRediT authorship contribution statement

Virgínia da Conceição: Conceptualization, Methodology, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft. **Edgar Mesquita:** Data curation, Investigation, Writing – review & editing. **Ricardo Gusmão:** Conceptualization, Methodology, Validation, Supervision, Writing – review & editing.

Declaration of Competing Interest

None.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.psychres.2023.115673.

References

Ahmed, N., Barnett, P., Greenburgh, A., Pemovska, T., Stefanidou, T., Lyons, N., Ikhtabi, S., Talwar, S., Francis, E.R., Harris, S.M., Shah, P., Machin, K., Jeffreys, S., Mitchell, L., Lynch, C., Foye, U., Schlief, M., Appleton, R., Saunders, K.R.K., Baldwin, H., Allan, S.M., Sheridan-Rains, L., Kharboutly, O., Kular, A., Goldblatt, P., Stewart, R., Kirkbride, J.B., Lloyd-Evans, B., Johnson, S., 2023. Mental health in Europe during the COVID-19 pandemic: a systematic review. Lancet Psychiatry 10 (7), 537–556.

Ajzen, I., 1991. The theory of planned behavior. Organ. Behav. Hum. Decis. Process. 50 (2), 179–211.

Alves, T., Alfafar, M., Carvalho, A., 2021. The COVID-19 pandemic and its impact on the demand for mental health care. Swiss Arch. Neurol. Psychiatry Psychother. 172, 1–6.

Auerbach, R.P., Alonso, J., Axinn, W.G., Cuijpers, P., Ebert, D.D., Green, J.G., Hwang, I., Kessler, R.C., Liu, H., Mortier, P., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Aguilar-Gaxiola, S., Al-Hamzawi, A., Andrade, L.H., Benjet, C., Caldas-de-Almeida, J. M., Demyttenaere, K., Florescu, S., de Girolamo, G., Gureje, O., Haro, J.M., Karam, E. G., Kiejna, A., Kovess-Masfety, V., Lee, S., McGrath, J.J., O'Neill, S., Pennell, B.E., Scott, K., Ten Have, M., Torres, Y., Zaslavsky, A.M., Zarkov, Z., Bruffaerts, R., 2016. Mental disorders among college students in the World Health Organization World Mental Health Surveys. Psychol. Med. 46 (14), 2955–2970.

Auerbach, R.P., Mortier, P., Bruffaerts, R., Alonso, J., Benjet, C., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Murray, E., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Stein, D.J., Vilagut, G., Zaslavsky, A.M., Kessler, R.C., Collaborators, W.W.-I., 2018. WHO world mental health surveys international college student project: prevalence and distribution of mental disorders. J. Abnorm. Psychol. 127 (7), 623–638.

Bártolo, A., Monteiro, S., Pereira, A., 2017. Factor structure and construct validity of the Generalized Anxiety Disorder 7-item (GAD-7) among Portuguese college students. Cad. Saúde Pública 33 (9), e00212716.

Bonabi, H., Müller, M., Ajdacic-Gross, V., Eisele, J., Rodgers, S., Seifritz, E., Rössler, W., Rüsch, N., 2016. Mental health literacy, attitudes to help seeking, and perceived need as predictors of mental health service use: a longitudinal study. J. Nerv. Ment. Dis. 204 (4), 321–324.

Bruffaerts, R., Mortier, P., Auerbach, R.P., Alonso, J., Hermosillo De la Torre, A.E., Cuijpers, P., Demyttenaere, K., Ebert, D.D., Green, J.G., Hasking, P., Stein, D.J., Ennis, E., Nock, M.K., Pinder-Amaker, S., Sampson, N.A., Vilagut, G., Zaslavsky, A. M., Kessler, R.C., 2019. Lifetime and 12-month treatment for mental disorders and suicidal thoughts and behaviors among first year college students. Int. J. Methods Psychiatr. Res. 28 (2), e1764.

Campion, J., Javed, A., Sartorius, N., Marmot, M., 2020. Addressing the public mental health challenge of COVID-19. Lancet Psychiatry 7 (8), 657–659.

Chew, A.M.K., Ong, R., Lei, H.H., Rajendram, M., K, V.G., Verma, S.K., Fung, D.S.S., Leong, J.J., Gunasekeran, D.V., 2020. Digital health solutions for mental health disorders during COVID-19. Front. Psychiatry 11, 582007.

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.

Conceição, V., Rothes, I., Gusmão, R., 2022a. The association between stigmatizing attitudes towards depression and help seeking attitudes in college students. PLoS One 17 (2), e0263622.

Conceição, V., Rothes, I., Gusmão, R., 2022b. The effects of a video-based randomized controlled trial intervention on depression stigma and help-seeking attitudes in university students. Psychiatry Res. 308, 114356.

Conceição, V., Rothes, I., Severo, M., Griffiths, K., Hegerl, U., Gusmão, R., 2021. Psychometric properties of the Depression Stigma Scale in the Portuguese population and its association with gender and depressive symptomatology. medRxiv, 2020.2009.2014.20194167.

Corrigan, P.W., Kosyluk, K.A., Markowitz, F., Brown, R.L., Conlon, B., Rees, J., Rosenberg, J., Ellefson, S., Al-Khouja, M., 2016. Mental illness stigma and disclosure in college students. J. Ment. Health 25 (3), 224–230.

Crawford, A., Serhal, E., 2020. Digital health equity and COVID-19: the innovation curve cannot reinforce the social gradient of health. J. Med. Internet Res. 22 (6), e19361.

Ebert, D.D., Mortier, P., Kaehlke, F., Bruffaerts, R., Baumeister, H., Auerbach, R.P., Alonso, J., Vilagut, G., Martínez, K.I., Lochner, C., Cuijpers, P., Kuechler, A.M., Green, J., Hasking, P., Lapsley, C., Sampson, N.A., Kessler, R.C., 2019. Barriers of mental health treatment utilization among first-year college students: first cross-national results from the WHO world mental health international college student initiative. Int. J. Methods Psychiatr. Res. 28 (2), e1782.

Elmer, T., Mepham, K., Stadtfeld, C., 2020. Students under lockdown: comparisons of students' social networks and mental health before and during the COVID-19 crisis in Switzerland. PLoS One 15 (7), e0236337.

Evans-Lacko, S., Hahn, J.S., Peter, L.J., Schomerus, G., 2022. The impact of digital interventions on help-seeking behaviour for mental health problems: a systematic literature review. Curr. Opin. Psychiatry 35 (3), 207–218.

Fischer, E.H., Turner, J.L., 1970. Orientations to seeking professional help: development and research utility of an attitude scale. J. Consult. Clin. Psychol. 35 (1), 79–90.

Gonçalves-Pinho, M., Mota, P., Ribeiro, J., Macedo, S., Freitas, A., 2021. The impact of COVID-19 pandemic on psychiatric emergency department visits - a descriptive study. Psychiatr. Q. 92 (2), 621–631.

Graham, J.W., Olchowski, A.E., Gilreath, T.D., 2007. How many imputations are really needed? Some practical clarifications of multiple imputation theory. Prev. Sci. 8 (3), 206–213.

Gulliver, A., Griffiths, K.M., Christensen, H., 2010. Perceived barriers and facilitators to mental health help-seeking in young people: a systematic review. BMC Psychiatry 10 (113).

Johansson, F., Côté, P., Hogg-Johnson, S., Skillgate, E., 2021. Depression, anxiety and stress among Swedish university students during the second and third waves of COVID-19: a cohort study. Scand. J. Public Health, 14034948211031402.

Johnson, S.U., Ulvenes, P.G., Øktedalen, T., Hoffart, A., 2019. Psychometric properties of the General Anxiety Disorder 7-Item (GAD-7) scale in a heterogeneous psychiatric sample. Front. Psychol. 10, 1713.

Kohls, E., Baldofski, S., Moeller, R., Klemm, S.-L., Rummel-Kluge, C., 2021. Mental health, social and emotional well-being, and perceived burdens of university students during COVID-19 pandemic lockdown in Germany. Front. Psychiatry 12 (441), 1–11.

Lee, H., Park, S.J., Kim, J.E., Kong, F., Zhao, B., Nam, H., Koh, S.B., Nam, S., Yuasa, M., Aung, M.N., Medina, J.R.C., Palutturi, S., Berhe, H., Terefe, E., Nam, S., Kang, Y., Rönnebeck, N., Lee, J.H., Lee, G.R., Jung, Y., Cosme, C.R., Shin, D.E., Herrera, M., Ndombi, G.O., Mansiangi, P., Moon, S.J., Yoon, H., Chung, M.A., Lim, S.B., Lee, Y.L., Kim, D., Nam, E.W., 2021. International comparison of depression during the COVID-19 pandemic among university students in 13 countries: a web-based cross-sectional survey. Asia Pac. J. Public Health 33 (8), 928–931.

Lilly, F.R.W., Jun, H.J., Alvarez, P., Owens, J., Malloy, L., Bruce-Bojo, M., Vidal, C., 2020. Pathways from health beliefs to treatment utilization for severe depression. Brain Behav. 10 (12), e01873.

Lipson, S.K., Lattie, E.G., Eisenberg, D., 2019. Increased rates of mental health service utilization by U.S. college students: 10-year population-level trends (2007-2017). Psychiatr. Serv. 70 (1), 60–63.

Magaard, J.L., Seeralan, T., Schulz, H., Brütt, A.L., 2017. Factors associated with help-seeking behaviour among individuals with major depression: a systematic review. PLoS One 12 (5), e0176730.

Manea, L., Gilbody, S., McMillan, D., 2012. Optimal cut-off score for diagnosing depression with the Patient Health Questionnaire (PHQ-9): a meta-analysis. CMAJ 184 (3), E191–E196.

McLafferty, M., Brown, N., McHugh, R., Ward, C., Stevenson, A., McBride, L., Brady, J., Bjourson, A.J., O'Neill, S.M., Walsh, C.P., Murray, E.K., 2021. Depression, anxiety and suicidal behaviour among college students: comparisons pre-COVID-19 and during the pandemic. Psychiatry Research Communications(2772-5987 (Electronic)).

McLafferty, M., Lapsley, C.R., Ennis, E., Armour, C., Murphy, S., Bunting, B.P., Bjourson, A.J., Murray, E.K., O'Neill, S.M., 2017. Mental health, behavioural problems and treatment seeking among students commencing university in Northern Ireland. PLoS One 12 (12), e0188785.

Meda, N., Pardini, S., Slongo, I., Bodini, L., Zordan, M.A., Rigobello, P., Visioli, F., Novara, C., 2020. Students' mental health problems before, during, and after COVID-19 lockdown in Italy. J. Psychiatr. Res. 134, 69–77.

Monteiro, S., Torres, A., Pereira, A., Albuquerque, E., Morgadinho, R., 2013. Preliminary validation study of a portuguese version of the patient health questionnaire (PHQ-9). Eur. Psychiatry 28, 1.

Nulty, D.D., 2008. The adequacy of response rates to online and paper surveys: what can be done? Assess. Eval. High. Educ. 33 (3), 301–314.

Przybylko, G., Morton, D., Kent, L., Morton, J., Hinze, J., Beamish, P., Renfrew, M., 2021. The effectiveness of an online interdisciplinary intervention for mental health promotion: a randomized controlled trial. BMC Psychol. 9 (1), 77.

Renfrew, M.E., Morton, D.P., Morton, J.K., Przybylko, G., 2021. The influence of human support on the effectiveness of digital mental health promotion interventions for the general population. Front. Psychol. 12, 716106.

Rickwood, D.J., Deane, F.P., Wilson, C.J., 2007. When and how do young people seek professional help for mental health problems? Med. J. Aust. 187 (S7), S35–S39.

Roberts, T., Miguel Esponda, G., Krupchanka, D., Shidhaye, R., Patel, V., Rathod, S., 2018. Factors associated with health service utilisation for common mental disorders: a systematic review. BMC Psychiatry 18 (1), 262.

Ruud, N., Løvseth, L.T., Isaksson Ro, K., Tyssen, R., 2020. Comparing mental distress and help-seeking among first-year medical students in Norway: results of two cross-sectional surveys 20 years apart. BMJ Open 10 (8), e036968.

Schafer, J.L., Graham, J.W., 2002. Missing data: our view of the state of the art. Psychol. Methods 7 (2), 147–177.

Schulz, K.F., Altman, D.G., Moher, D., the, C.G., 2010. CONSORT 2010 statement: updated guidelines for reporting parallel group randomised trials. BMC Med. 8 (1), 18.

Shahwan, S., Lau, J.H., Goh, C.M.J., Ong, W.J., Tan, G.T.H., Kwok, K.W., Samari, E., Lee, Y.Y., Teh, W.L., Seet, V., Chang, S., Chong, S.A., Subramaniam, M., 2020. The potential impact of an anti-stigma intervention on mental health help-seeking attitudes among university students. BMC Psychiatry 20 (1), 562.

Silva, M., Antunes, A., Azeredo-Lopes, S., Cardoso, G., Xavier, M., Saraceno, B., Caldas-de-Almeida, J.M., 2020. Barriers to mental health services utilisation in Portugal - results from the National Mental Health Survey. J. Ment. Health 31 (4), 453–461.

Sousa, T.V., Viveiros, V., Chai, M.V., Vicente, F.L., Jesus, G., Carnot, M.J., Gordo, A.C., Ferreira, P.L., 2015. Reliability and validity of the Portuguese version of the Generalized Anxiety Disorder (GAD-7) scale. Health Qual. Life Outcomes 13, 50.

Tambling, R.R., Russell, B.S., Fendrich, M., Park, C.L., 2022. Predictors of mental health help-seeking during COVID-19: social support, emotion regulation, and mental health symptoms. J. Behav. Health Serv. Res. 50 (1), 68–79.

Tsai, C.L., Tu, C.H., Chen, J.C., Lane, H.Y., Ma, W.F., 2021. Efficiency of an online health-promotion program in individuals with at-risk mental state during the COVID-19 pandemic. Int. J. Environ. Res. Public Health 18 (22), 1–12.

UNESCO, 2016. Global education monitoring report 2016: education for people & planet - creating sustainable futures for all. United Nations Educational, Scientific and Cultural.

van der Velden, P.A.O., Marchand, M., Das, M., Muffels, R., Bosmans, M., 2022. The prevalence, incidence, and risk factors of mental health problems and mental health service use before and 9 months after the COVID-19 outbreak among the general Dutch population. A 3-wave prospective study. PLoS One(1932-6203 (Electronic)).

Woof, V.G., Hames, C., Speer, S., Cohen, D.L., 2021. A qualitative exploration of the unique barriers, challenges and experiences encountered by undergraduate psychology students with mental health problems. Stud. High. Educ. 46 (4), 750–762.

World Economic Forum, 2022. Global gender gap report 2022.

Zhou, S.J., Wang, L.L., Qi, M., Yang, X.J., Gao, L., Zhang, S.Y., Zhang, L.G., Yang, R., Chen, J.X., 2021. Depression, anxiety, and suicidal ideation in Chinese university students during the COVID-19 pandemic. Front. Psychol. 12, 669833.