BJPsych Open (2025)
11, e227, 1–11. doi: 10.1192/bjo.2025.10843

Unguided self-help to bridge waiting time for face-to-face therapy in a university student mental health service: interrupted time series analysis

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Background

Marked increases in mental health services utilisation across university settings mean that students often spend long periods waiting for evaluation and treatment.

Aims

To assess whether digital unguided self-help delivered while waiting for face-to-face therapy could reduce anxiety and depression and improve functioning in university students.

Method

We retrospectively analysed routinely collected data from the student mental health service at the University of Padua, Italy. From June 2022, all students waiting for clinical evaluation and treatment received a self-help stress management booklet (The World Health Organization's *Doing What Matters in Time of Stress* (DWM)). The clinical evaluation included depression (Patient Health Questionnaire-9), anxiety (Generalised Anxiety Disorder-7) and functional impairment (Work and Social Adjustment Scale). Single-group interrupted time series (ITS) analyses compared outcomes in users contacting the service between October 2021 and 23 June 2022 (pre-intervention) and, respectively, between 24 June 2022 and 18 November 2023 (post-intervention).

Results

Seven hundred and forty-nine Italian students (77% women, median age 23 years) were included; of these, 411 (55%) received the intervention and 338 (45%) did not. ITS indicated that the intervention introduction coincided with immediate and sharp decreases in depression (level change, $\beta = -2.26$, 95% CI −3.89, −0.64), anxiety ($\beta = -1.50$, 95% CI −3.89, −0.65) and impaired functioning ($\beta = -2.66$, 95% CI −4.64, −0.60), all largely maintained over time.

Conclusions

In the absence of a control group, no causal inferences about intervention effects could be drawn. DWM should be studied as a promising candidate for bridging waiting time for face-to-face treatment.

Keywords

University students; student mental health; self-help; interrupted time series; waiting list.

Mental disorders are prevalent among university students. The World Health Organization (WHO) World Mental Health (WMH) surveys, a series of cross-national community epidemiological surveys, estimated a 12-month prevalence of any mental disorder, defined according to the DSM-IV, of 20.3% in a representative sample of 1572 college students across 21 countries.[1] Anxiety disorders were most common as a class (11.7%), followed by mood disorders (6%). Only around 15% of students with DSM-IV disorders received minimally adequate care (defined as at least 4 visits with any type of treatment provider, at least 2 visits and taking medication for emotional problems or being in treatment at the time of the interview) in the year preceding the interview. The WHO WMH International College Student (WMH-ICS) initiative, which used web-based surveys and convenience samples of first-year university students, reported a 12-month prevalence of 31% for all mental disorders.[2] The most common disorders were major depressive disorder (18.5%) and generalised anxiety disorder (16.7%). Severe role impairment, assessed with the Sheehan Disability Scale across 4 domains (home management/chores, university-related and other work, close personal relationships, social life) was reported in a fifth of the sample, with a dose-dependent relationship between the number of disorders and impairment.[3] In Italy, currently part of the WHO WMH-ICS consortium, a systematic review of studies among students seeking help through university counselling services indicated prevalence rates ranging between 21 and 43% for mood disorders, between 9 and 49% for high levels of depressive symptoms and around 26% for severe anxiety.[4] The included studies were highly variable in terms of sample size, period covered and design, and no study used a representative sample.

Mental health services utilisation across university settings has been increasing markedly over recent decades. For example, the Healthy Minds study, an annual web-based survey, showed an upward trend in the use of mental health treatment by US college students, from 19% in 2007 to 34% in 2017.[5] The growing number of students seeking treatment implies that university services often resort to waitlists,[6] which could lead to delayed or insufficient care and discourage students from seeking help.[7] A systematic review of student mental health services identified a heterogeneous range of services available to students, but highly variable numbers of students accessing them across settings.[8] Overall, around a third of the students used services while attending university, with findings

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https://doi.org/10.1192/bjo.2025.10843 Published online by Cambridge University Press

also suggesting that use increased with greater availability of support.

One meta-analysis[9] of randomised controlled trials (RCTs) showed that unguided (also called self-guided) psychological interventions, defined as interventions without therapist support, were moderately effective in reducing depressive symptoms in university students, with a pooled effect size, Hedges'$g = 0.65$ and 95% CI 0.39–0.91). Another meta-analysis[10] showed that unguided self-help stress management interventions also had a small but significant effect on depression, anxiety and stress (Hedges' g ranging from 0.11 to 0.25). Of relevance to the current study, several RCTs[11,12] also tested guided self-help among patients on the waitlist for face-to-face therapy, to assess whether a low-intensity intervention reduces symptoms, and even the necessity for treatment, before starting a more intensive intervention ('bridging' waiting time). One such trial[11] showed that both an internet-based guided intervention and an unguided self-help book reduced symptoms of depression in individuals waiting for face-to-face psychotherapy.

We report the results of a retrospective, observational study of routinely collected data (RCD) on bridging waiting time for face-to-face therapy in a university student mental health service at the University of Padua, a large Italian university. From June 2022, the service, confronted with long waiting lists, started to provide all students who sought treatment with a digital self-help stress management booklet (*Doing What Matters in Times of Stress* (DWM)[13]), developed by the World Health Organization (WHO) and available in Italian.[14] We used interrupted time series analysis (ITS), a strong quasi-experimental design,[15] to assess whether DWM, delivered with minimal resource allocation in an unguided format, could reduce anxiety and depression and improve functioning over the period of waiting for face-to-face therapy in the student mental health service.

Method

Setting

The University Clinical Psychology Service (SCUP) within the University of Padua, Italy, established in 2017, comprises various mental health services for students, employees and the public. The service remains open throughout the year, except during holidays, but the number of users typically decreases in June and July. The Psychological Assistance to Students – Psychological Consultation (SAP-CP), a component service of SCUP, provides free-of-charge diagnostic assessment and psychological consultation to students from the University of Padua who refer with psychological issues. These interventions may involve short- and medium-term individual or group sessions utilising cognitive-behavioural or psychodynamic approaches. A detailed description of SCUP and SAP-CP is included in the supplementary materials (description of the SAP-CP service). Requests to SAP-CP increased from 631 in 2021 to 656 in 2022 and 775 in 2023 (increase of 23% between 2021 to 2023). Average waiting times, i.e. between request for access and first contact, over the study period ranged from 2 to 6 weeks. For reference, the student population increased from 65 936 in the 2021/2022 academic year to 68 701 in 2022/2023, a relative increase of 4% (https://www.unipd.it/dati-statistici-iscritti).

Study design

We conducted a retrospective, single-group, ITS of RCD from the student mental health service at the University of Padua, SAP-CP, part of the integrated university mental health service, SCUP. The goal was to assess whether provision of an unguided self-help intervention while on the waiting list for clinical evaluation and face-to-face counselling or therapy could reduce depression and anxiety, and improve functioning, at the start of treatment. Specific reporting guidelines for ITS designs are under development (https://www.equator-network.org/library/reporting-guidelines-under-development/reporting-guidelines-under-development-for-observational-studies/#CARITS). Therefore, the study was reported according to the STROBE checklist for cohort studies.[16]

Consent statement

Users contacting SAP-PC sign an informed consent form for personal data processing, agreeing to have their data processed for service evaluation and research. Because we used these pre-existing real-world data from individuals who had previously consented to the use of their data for research, no additional ethical board approval was sought.

Participants

Participants were recruited from the 797 Italian students (67% women, $n = 534$) who voluntarily requested access to SAP-CP psychological services between December 2019 and September 2023.

We excluded users who had spent fewer than 5 or more than 150 days on the waiting list, i.e. time elapsed between receiving the DWM booklet and completing the outcome measures. The threshold of 5 days was chosen to ensure that users had enough time to read through the booklet; the limit of 150 days was chosen to exclude participants with very long waiting times, during which symptoms might have remitted on their own. We excluded 47 participants (27 spent fewer than 5 and 20 spent more than 150 days on the waiting list). We also excluded one user who requested earlier access compared with others (in December 2019, whereas all others gained access from February 2021). With these exclusions, the sample included 749 Italian students (77% women, $n = 499$) who requested access to the service between February 2021 and September 2023, and who had completed the three routinely collected assessment scales between October 2021 and November 2023. The sample consisted of users who either received DWM (55%, $n = 411$) or did not (45%, $n = 338$) before completing the scales. A CONSORT-type flowchart of the selection of study participants is shown in Fig. 1. The number of participants completing the outcome measures in each month during the study period is presented in Supplementary Table S1 available at https://doi.org/10.1192/bjo.2025.10843.

Procedure

Mental service access and timeline

Accessing SAP-CP follows a standard procedure. Students can request access to the service via email, after which they complete the entry module, with basic demographic information and the nature of the request, and consent to the use of their personal data. Subsequently, students are placed on a waiting list and a preliminary clinical interview conducted with a clinician is scheduled, with collection of three outcome measures described below. This preliminary clinical interview aims to gain a better understanding of the motivation behind the request, and to determine which of the interventions offered by SAP-CP are most suitable.

Waiting time until the interview varies, depending on the service availability and volume of requests. Following the preliminary clinical interview, students are offered one of several options, including consultation (four or five sessions), psychological counselling or psychotherapy, individually or in groups. Users may withdraw their request at any time and can re-access the

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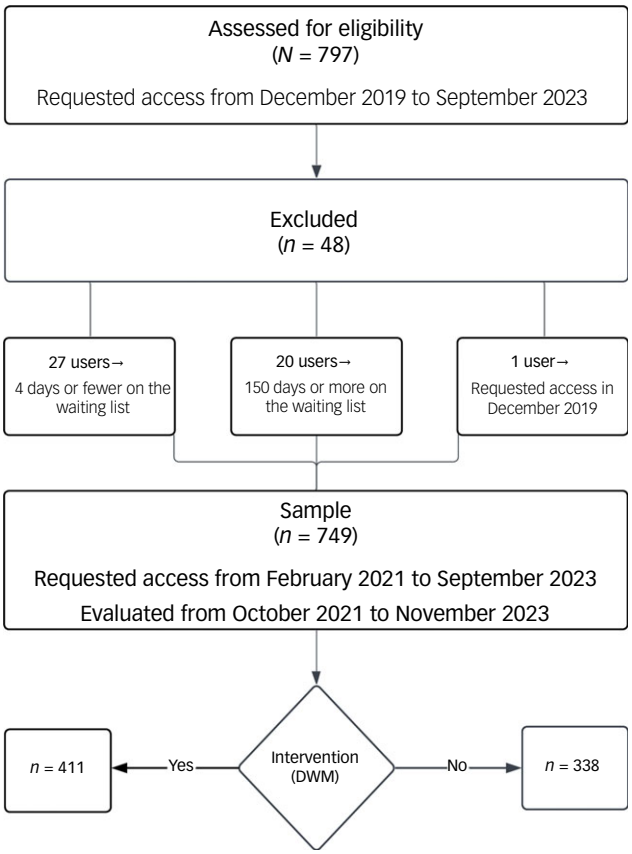

Fig. 1 Flowchart showing the selection of study participants. DWM, *Doing What Matters in Times of Stress*.

service even if they have already concluded a course of treatment. From 23 June 2022, users waiting for the preliminary clinical interview were emailed a digital copy of the self-help DWM booklet.[13]

General access to the service underwent some changes during the study period. Initially, users could request access at any time during the year. After 5 September 2022, an 'access window' system was introduced, where users could request access during specific periods, typically 1 week. The access windows during the study period are presented in the timeline shown in Supplementary Fig. S1. Starting with the 19 November 2023 access window, there was an overhaul of the entire waitlist system, with users completing the outcome measures at the point of access and then being prioritised on the basis of severity. Because this major change could have confounded intervention effects, we did not include any participants who accessed the SAP-CP from 19 November 2023 onwards.

ITS

ITS is considered a reliable quasi-experimental design when it is not possible to implement RCTs.[17] It is suitable when a single unit (i.e. dependent variable) is being studied progressively on an ordered time series that has been interrupted once or multiple times due to the introduction of a generic intervention.[18–20] ITS is considered a powerful tool for evaluating the impact of social or public health interventions,[21] and also when applied retrospectively on pre-existing data (e.g. [22]). The effect of the intervention is estimated accounting for the pre-intervention trend, testing potential step changes immediately after the intervention (i.e. level change or intercept change), and on its progression over time following the introduction of the intervention (i.e. slope change[23]). This is computed with a so-called 'segmented regression' describing two regression lines, each with a different intercept and slope, for before and after the intervention.[17] The post-intervention line is then compared with the counterfactual scenario, representing what we expect would have happened if the intervention had never taken place.

Outcome measures

The Patient Health Questionnaire-9 (PHQ-9) is a self-report questionnaire, with items indexing the 9 diagnostic criteria for major depression,[24] and was translated into Italian.[25] Scores range from 0 to 27, with each item rated on a 4-point Likert scale from 0 ('not at all') to 3 ('almost every day'). Generally, a cut-off of 10 is used to indicate moderate depressive symptoms.[26]

The Generalised Anxiety Disorder-7 (GAD-7) is a 7-item, self-report questionnaire initially developed to index the diagnostic criteria for generalised anxiety disorder (GAD),[27] validated on an Italian sample.[28] The items are valued on a 4-point Likert-type scale from 0 ('not at all') to 3 ('nearly every day'), with scores ranging from 0 to 21. GAD-7 has been validated as a screener of anxiety not linked to a specific diagnosis in the general population in a nationally representative sample of German adults[29] and one of Finnish adolescents,[30] as well as in various studies on community samples. A cut-off of 8 was shown as indicative of an anxiety disorder.[31]

The Work and Social Adjustment Scale (WSAS) is a 5-item, self-report measure of functional impairment attributable to a specific problem.[32] Scores range from 0 to 40, and every item can be rated from 0 ('no impairment') to 8 ('severe impairment'). Scores between 10 and 20 were associated with significant functional impairment but less severe psychopathology, while scores above 20 indicate moderately severe or worse functional impairment and psychopathology.[32]

Typically, assessment scales were completed during the preliminary clinical interview at SAP-CP, either manually or digitally.

Intervention

DWM

DWM is an illustrated, self-help stress management course developed by the WHO[13] and available in Italian.[14] The course aims to strengthen individual coping strategies with self-help techniques by the participant dedicating only a few minutes per day. It is based on the principles of acceptance and commitment therapy (ACT), a distinct form of cognitive-behavioural therapy. ACT shifts the emphasis on identifying one's values and proactively looking for ways to live according to those, while learning to accommodate and not trying to change unwanted thoughts and emotions.[33] The contents of DWM focus on emotional management, organised into five sections (grounding, unhooking, acting on your values, being kind and making room). The contents are explained with vignettes and audio files for the exercises, both of which are available in Italian.

DWM can be delivered either as a guided self-help intervention, which includes the booklet and a few short sessions with minimally trained non-specialised helpers, or as an unguided intervention. DWM has been tested in different population groups, with promising results – for example, in distressed healthcare workers in a crisis setting[34] and in migrant population groups.[14] In the current study, DWM was delivered as an unguided intervention, by providing users with a digital copy of the booklet without the audio files.

https://doi.org/10.1192/bjo.2025.10843 Published online by Cambridge University Press

Data analysis

As data preparation, questionnaires completed were manually inserted, while individual responses were downloaded in separate monthly data files from the data collection software, custom made by OpenView for SAP-CP. The data were then compiled into a single database, along with sociodemographic information and details about the duration of treatment. Descriptive analyses were conducted using the gtsummary R package[35] in RStudio (version 4.3.2, Posit PBC, Boston, Massachusetts, USA; see http://www.posit.co/) for macOS, to assess differences in outcome measures, sample and subsequent treatment characteristics between users who received the intervention ($n = 411$) and those who did not ($n = 338$). The analysis included the mean, standard deviation, median, range and statistical tests. Pearson's chi-squared (χ^2) test analysed differences in gender, and the Wilcoxon rank-sum test was used to evaluate differences between groups regarding age, number of psychological sessions attended and days spent on the waiting list.

Single-group ITS analysis was performed on each of the three outcome measures for evaluation of the effect of DWM on depression, anxiety and functioning in users that progressed to psychological face-to-face intervention in SAP-CP between October 2021 and 23 June 2022 (before DWM was introduced), and between 24 June 2022 and 18 November 2023 (after DWM was introduced). Individual answers from October 2021 to November 2023 ($n = 749$) were aggregated at the level of the month, computing total score means and standard deviation for each time point. Three pairs of adjacent months (April and May 2022, July and August 2023, September and October 2023) were gathered in single time points, because of the small number of overall users accessing SAP-CP in each of these months (see Supplementary Table S1 for details). While the limited number of users in summer might be expected, the autumn 2023 fluctuation could be explained by the fact that the academic year had not yet begun. The limited number of users accessing the service in the spring of 2022 could have been due to the Easter holidays, during which many students were off campus.

Consequently, 8 pre-intervention and 14 post-intervention time points were considered in the final analysis. Single-group ITS was carried out for each scale with linear modelling using generalised least squares ('gls' function in the nlme R package[36]), which allows accounting for potential autocorrelation of data,[37] and also maximum likelihood estimation. For each scale, the uncorrelated model was first fitted, setting the following variables as main predictors: time (a numeric variable representing the order of time points), intervention (a dummy variable indicating whether the intervention has taken place) and post-intervention time (a numeric variable indicating the time elapsed since the beginning of the intervention). The risk of seasonality, non-stationary, autocorrelation (ACF) and partial autocorrelation (PACF) was controlled both graphically, with the use of 'Acf' and 'Pacf' functions on model residuals from the forecast R package,[38] and inferentially through the Durbin–Watson test for autocorrelation[39] and Augmented Dickey–Fuller Test for non-stationarity.[40] To improve model fit, a number of autocorrelated models with different autoregressive orders (p) and moving average (q) (i.e. ARMA) were compared using the 'auto.arima' function in the forecast R package. This function searches for a range of p and q values, after fixing the stationarity differencing index (d) by the Kwiatkowski–Phillips–Schmidt–Shin test. Finally, the function returns the model with the lowest Akaike information criterion score. If suggested by the function, the resulting generalised ARMA correlation structure was then specified for fitting the improved gls model, which was then compared with the counterfactual model of equivalent ARMA structure. The same procedure was performed for each of the three scales.

As a robustness check for the main ITS analysis, we tested differences between pre- and post-intervention trends in time by estimating the slope of each time series using the Kendall–Theil–Sen estimator (zyp R package[41]). This is a robust, non-parametric method that minimises the influence of outliers, useful for limited datasets and residuals not normally distributed.[42,43] To ensure reliable inference, we applied bootstrap resampling (100 000 iterations) to estimate confidence intervals for the slopes in the two periods (boot R package[44]). A one-sided Wilcoxon rank-sum test was performed on the bootstrapped slope distributions to test whether the pre-intervention slope was significantly greater than the post-intervention. Additionally, we visualised the distributions of the bootstrapped slopes to compare trends before and after the intervention (Fig. 2).

Results

Descriptive characteristics

Table 1 shows the characteristics of the final sample ($N = 749$) and of their subsequent face-to-face treatment, including participants who did ($n = 411$) and did not ($n = 338$) receive the intervention (DWM). The median age was 23 years. No significant differences were found for gender and age.

Considering the final sample ($N = 749$), the median waiting time was 76 days and participants attended a median of 8 psychological sessions. The waiting time decreased (median 66 days) following the introduction of the intervention compared with before (median 116 days), with a statistically significant difference (Wilcoxon rank-sum test 88 025, $P = 0.001$). Participants took part in fewer treatment sessions following the introduction of DWM (median 5) than before (median 10, Wilcoxon rank-sum test 45 556, $P < 0.001$).

Findings

Main outcomes

Mean scores and standard deviations for each of the three outcome measures (total score) per each time point are given in Supplementary Table S2.

Table 2 shows results of the generalised least squares linear model for each of the three outcome measures.

Figure 2 displays the distributions of the bootstrapped slopes comparing trends before and after the intervention. Across the three tests, evidence confirms the impact of intervention via significantly changing slopes from positive to null, or even negative (WSAS), beta parameters.

The time trends of mean total scores for each measure in relation to reference time are reported in Fig. 3.

Figure 4 shows the interrupted time series from the factual model (i.e. observed total scores, in blue) together with the regression line from the counterfactual one (i.e. expected total scores without the introduction of the intervention, in red), estimated on the pre-intervention time points, for depression (panel a), anxiety (panel b) and functioning (panel c).

Depression

No evidence of seasonality or stationarity was detected for the PHQ-9 time series. The ARMA model comparison suggested fitting an autoregressive model with an autocorrelation–moving average correlation structure of the order ($p = 1$, $q = 0$). Results from the

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Table 1 Characteristics of participants in Psychological Assistance to Students – Psychological Consultation (gender, age) and of their subsequent face-to-face treatment

Variable	Final sample, $N = 749$	Intervention: Not received, $n = 338$	Intervention: Received, $n = 411$	Statistical test	*P*-value
Gender				χ^2 (1, $N = 749$) = 0.06	0.79
Female	499 (67%)	223 (66%)	276 (67%)		
Male	250 (33%)	115 (34%)	135 (33%)		
Age (years)				W = 73 108	0.21
Mean (s.d.)	23.12 (2.70)	23.21 (2.50)	23.04 (2.85)		
Median	23	23	23		
Range	19–52	19–36	19–52		
Psychological sessions (*n*)				W = 93 362	<0.001
Mean (s.d.)	10.25 (8.91)	12.82 (9.49)	8.13 (7.79)		
Median	8	10	5		
Range	0–54	0–51	0–54		
Waiting time (days)				W = 88 025	<0.001
Mean (s.d.)	111.93 (83.39)	132.62 (90.40)	94.90 (72.98)		
Median	76	116	66		
Range	15–506	15–506	16–427		

W, Wilcoxon rank-sum test.

Table 2 Summary of generalised least squares linear models for the three outcome measures

Scale	Parameter	Estimate	s.e.	95% CI	*P*-value
PHQ-9	(Intercept)	9.10	0.69	[7.63 to 10.57]	0
	Time	0.40	0.14	[0.11 to 0.69]	0.010
	Intervention	−2.26	0.77	[−3.89 to −0.64]	0.009
	Post-int. time	−0.35	0.15	[−0.67 to −0.04]	0.029
GAD-7	(Intercept)	7.62	0.78	[5.98 to 9.27]	0
	Time	0.47	0.15	[0.14 to 0.79]	0.007
	Intervention	−1.50	0.86	[−3.31 to 0.31]	0.099
	Post-int time	−0.41	0.17	[−0.76 to −0.05]	0.026
WSAS	(Intercept)	9.83	0.87	[7.99 to 1.67]	0
	Time	1.06	0.17	[0.69 to 1.43]	0
	Intervention	−2.62	0.96	[−4.64 to −0.60]	0.014
	Post-int. time	−1.14	0.18	[−1.52 to −0.75]	0

PHQ-9, Patient Health Questionnaire-9; GAD-7, Generalised Anxiety Disorder-7; WSAS, Work and Social Adjustment Scale; Post-int. time, post-intervention time – the effect of time on the dependent variable following introduction of the intervention.

fitted model are displayed in Table 2. Before the intervention, a progressive increase in PHQ-9 total scores was evidenced ($\beta = 0.40$, 95% CI = 0.11, 0.69). The introduction of the intervention was associated with a sharp and immediate drop in depression ($\beta = -2.26$, 95% CI = −3.89, −0.64). A progressive statistically significant reduction in PHQ-9 total scores was detected following the intervention ($\beta = -0.35$, 95% CI = −0.67, −0.04), albeit that the post-intervention time indicates a stabilisation of depression scores (Fig. 2, Fig. 4(a)). Thiel–Sen slope estimation via bootstrap resampling confirmed the reduction and stabilisation of PHQ-9 scores following the intervention, evidencing a significantly greater slope before the intervention than after its introduction (median $\beta_{Pre} = 0.445$, median $\beta_{Post} = 0.044$, Wilcoxon rank-sum test 9 493 168 763, $P < 0.001$).

Anxiety

No evidence of seasonality or stationarity was detected for the GAD-7 time series. The validity of the uncorrelated model was confirmed by the automatic ARMA model comparison for different (p, q) structures. Consequently, no ARMA structure was specified for fitting the gls model on GAD-7 total scores ($p = 0$, $q = 0$). Results from the fitted model are given in Table 2. Before the intervention, a progressive increase in GAD-7 total scores was evidenced ($\beta = 0.47$, 95% CI = 0.14, 0.79). The intervention was associated with a sharp and immediate reduction in anxiety ($\beta = -1.50$, 95% CI = −3.89, −0.65). A progressive reduction in GAD-7 total scores was statistically detected following the intervention ($\beta = -0.41$, 95% CI = −0.76, −0.05), but the post-intervention time indicates stabilisation of anxiety scores (Fig. 2, Fig. 4(b)). Thiel–Sen slope estimation via bootstrap resampling confirmed the reduction and stabilisation of GAD-7 scores following the intervention, indicating a significantly greater slope before the intervention than after its introduction (median $\beta_{Pre} = 0.426$, median $\beta_{Post} = 0.051$, Wilcoxon rank-sum test 9 480 822 467, $P < 0.001$).

Functioning

No statistical evidence of seasonality or stationarity was detected for the WSAS time series, although there was a higher risk of autocorrelation and stationarity, as evidence by the Durbin–Watson test (1.49, $P = 0.069$) and, respectively, the Dickey–Fuller test (−3.57, $P = 0.054$). The ARMA model comparison suggested fitting an autoregressive model with an autocorrelation–moving average correlation structure of the order ($p = 1$, $q = 0$). Results from the fitted model are displayed in Table 2. Before the intervention, a progressive increase in WSAS total scores was detected ($\beta = 1.06$, 95% CI = 0.69, 1.43). As with depression and anxiety, the introduction of the intervention was associated with a sharp drop in impairment of functioning ($\beta = -2.66$, 95% CI = −4.64, −0.60). A progressive reduction in WSAS total scores

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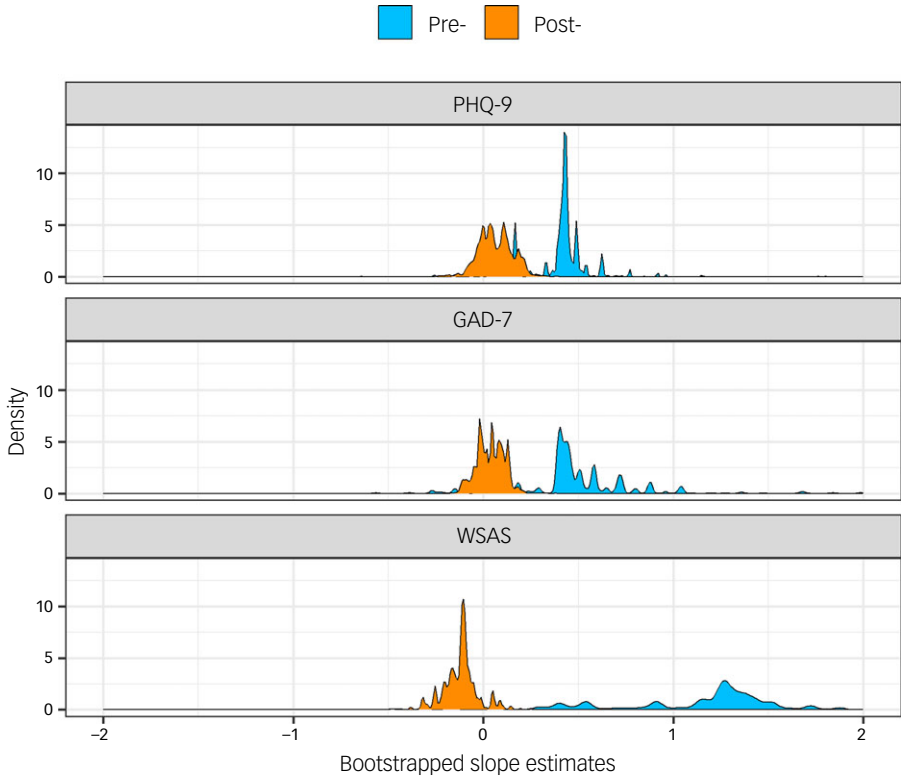

Fig. 2 Density distribution of bootstrapped slope estimates for Patient Health Questionnaire-9 (PHQ-9), Generalised Anxiety Disorder-7 (GAD-7) and Work and Social Adjustment Scale (WSAS) total scores (by horizontal facet) in the pre-intervention phase (blue) and in the post-intervention phase (orange).

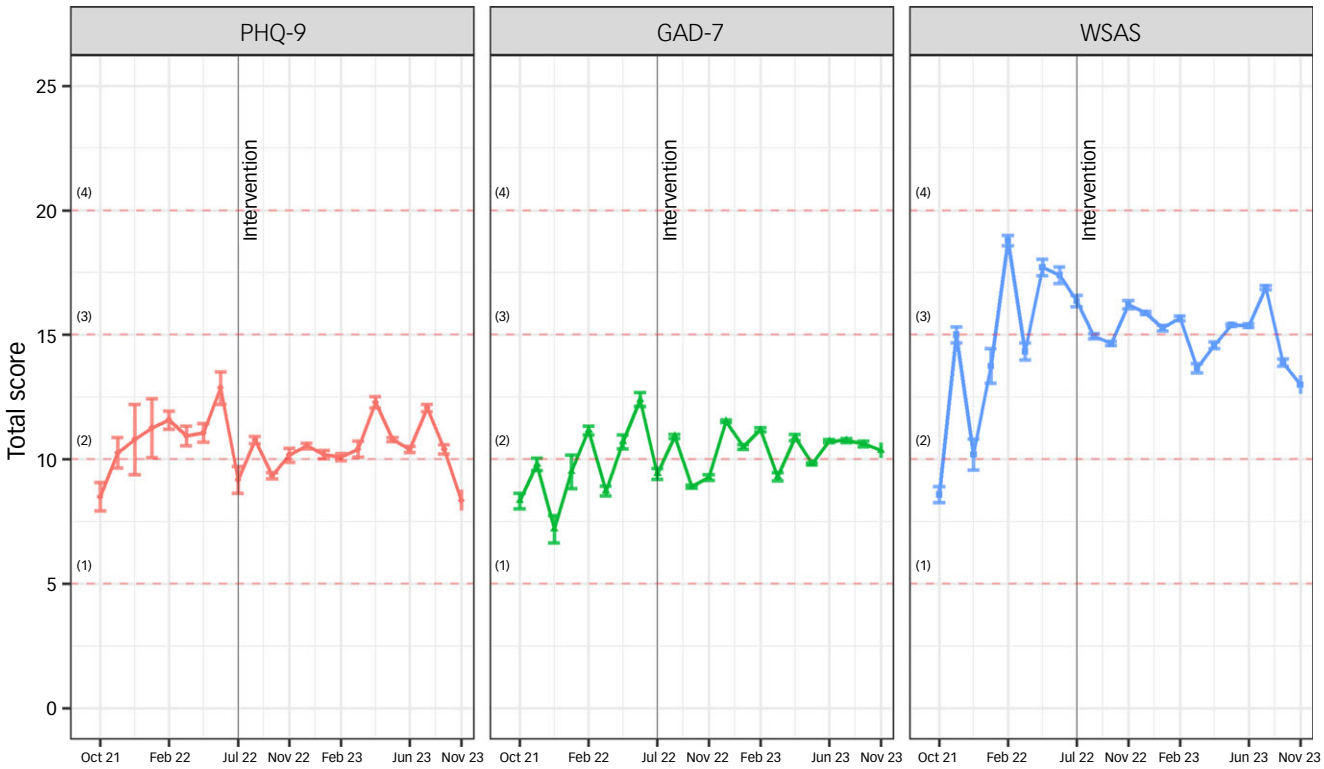

Fig. 3 Mean raw total score and standard error for each time point and for the three psychological scales (in vertical facets). Black solid vertical lines represent the beginning of the intervention. red dashed horizontal lines represent gravity thresholds for the three scales: Patient Health Questionnaire-9 (PHQ-9)[24]: (1) = mild, (2) = moderate, (3) = moderately severe, (4) = severe depression; Generalised Anxiety Disorder.7 (GAD-7)[27]: (1) = mild, (2) = moderate, (3) = severe anxiety; Work and Social Adjustment Scale (WSAS)[32]: (2) = significant functional impairment but less severe clinical symptomatology, (4) = moderately severe or worse psychopathology.

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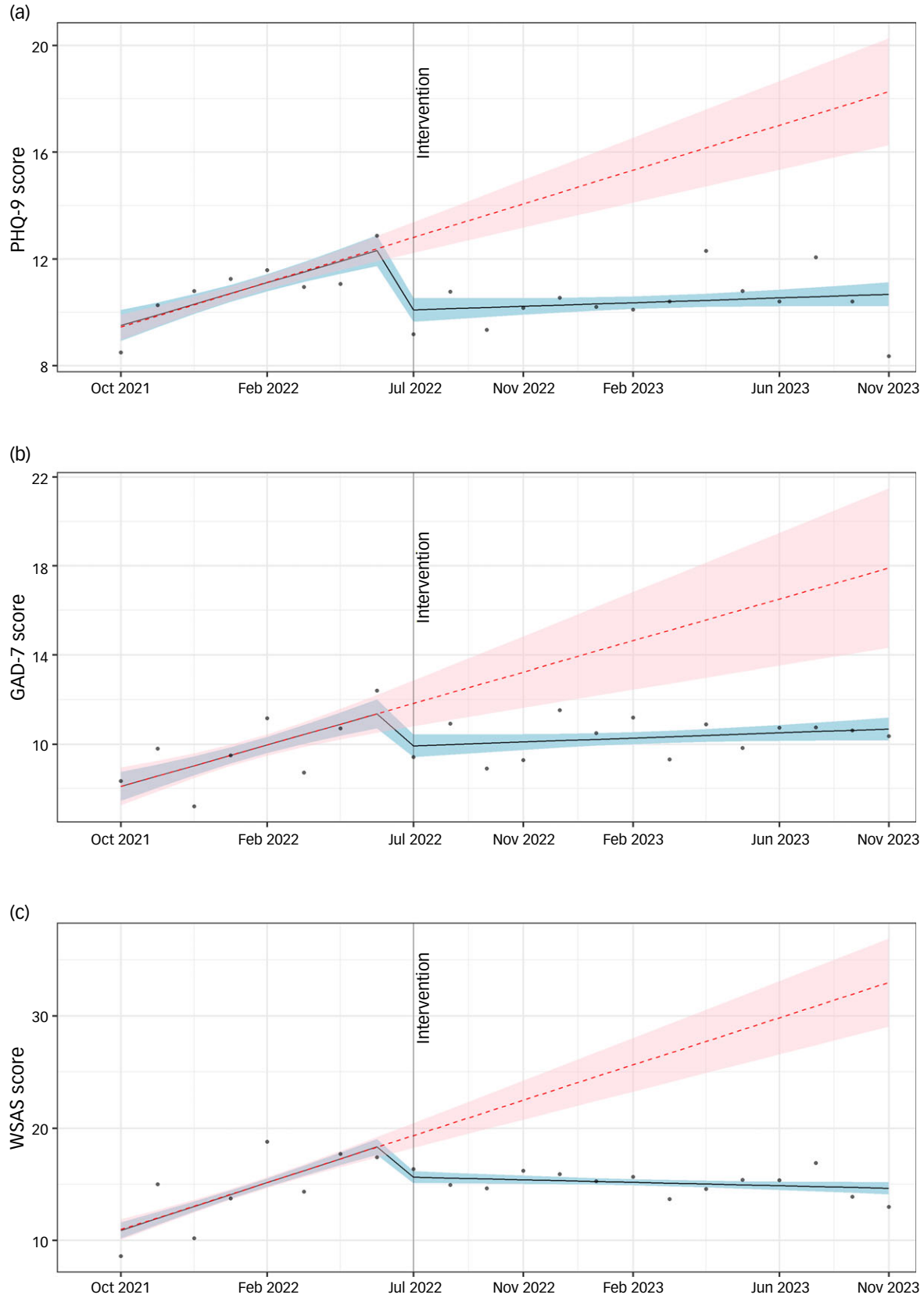

Fig. 4 Single-group time series for (a) Patient Health Questionnaire-9 (PHQ-9), (b) Generalised Anxiety Disorder-7 (GAD-7) and (c) Work and Social Adjustment Scale (WSAS) total scores described by the segmented regression line fitted with the correlated model (solid black line, blue confidence interval) and compared with the counterfactual model (red dashed line, pink confidence interval). For each facet, the horizontal black line indicates the beginning of the intervention. Time points denote analytical units rather than strictly individual months.

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Table 3 Relative differences between factual and counterfactual estimates at different time points (1–22)

q	(1) Oct 2021	(5) Feb 2022	(8) Jun 2022	(9) Jul 2022	(12) Nov 2022	(15) Feb 2023	(19) Jun 2023	(22) Nov 2023
GAD-7	0	0	0	−1.909	−3.135	−4.361	−5.995	−7.221
PHQ-9	0.064	−0.013	−0.072	−2.712	−3.837	−4.963	−6.464	−7.590
WSAS	−0.064	0.006	0.037	−3.711	−7.082	−10.453	−14.948	−18.319

q, moving average; PHQ-9, Patient Health Questionnaire 9; GAD-7, Generalised Anxiety Disorder 7; WSAS, Work and Social Adjustment Scale.

was statistically detected following the intervention ($\beta = -1.14$, 95% CI = −1.52, −0.75), but functional impairment scores stabilised during the post-intervention period (Fig. 2, Fig. 4(c)). Thiel–Sen slope estimation via bootstrap resampling confirmed the reduction and stabilisation of WSAS scores following the intervention, indicating a significantly greater slope before the intervention than after its introduction (median $\beta_{Pre} = 1.260$, median $\beta_{Post} = -0.112$, Wilcoxon rank-sum test 9 723 441 322, $P < 0.001$).

For specific time points, the relative differences between the estimated and counterfactual regression lines can be found in Table 3. This information quantifies the progressive reduction in total scores between the observed data and the counterfactual scenario, supporting the hypothesis of a positive impact of the intervention over time.

Discussion

Confronted with long waiting lists, the student mental health service at the University of Padua (SAP-CP) provided participants waiting for clinical evaluation and face-to-face treatment with a digital self-help booklet on stress management (DWM) from June 2022. DWM was delivered with minimal resource allocation, in an unguided format. Unguided self-help is an option with minimal costs and there is evidence that it is efficacious for depression in this population.[9] We used interrupted time series analysis to assess whether DWM was associated with improvement in depression, anxiety and functioning over the period of waiting for face-to-face treatment. These measures are routinely collected by the service. ITS is one of the strongest, 'next best' approaches[15] to evaluating intervention effects when randomisation is not feasible. In our case, self-help was provided primarily because of pragmatic concerns, since participants were spending a considerable amount of time on waiting lists. For this reason, it was not possible to have a control group, which significantly limited the possibility of drawing causal inferences.

Our findings indicate that, in a sample of 749 treatment-seeking students, the provision of this transdiagnostic, low-intensity, unguided, digital self-help intervention during the waiting period for face-to-face treatment was associated a progressive reduction over time in the levels of depression, anxiety and impairment of functioning at clinical evaluation preceding the start of treatment. Overall, this downward trend became evident in July 2022, consistent with the dissemination of the intervention on 23 June 2022. The reduction became progressively more pronounced for all outcomes, with post-intervention trends remaining stable and supporting a signal of efficacy. This signal was also confirmed in complementary robust non-parametric analysis, which highlighted a significant and steady reduction in depression and anxiety and an increase in functioning total scores during the post-intervention period. However, in the absence of a control group under observation during the same period, we cannot reliably discern whether factors other than the intervention were responsible for the trend detected. Although the study period was selected to ensure there were no other noteworthy changes in the functioning of the service, it is possible that other confounds unrelated to the service – related, for example, to the academic, political or economic context – influenced this post-intervention trend. Therefore, our findings are limited to documenting a trend to be explored in a randomised controlled trial or, if not possible, an ITS design with a control group and further time points.

The high prevalence of mental disorders, particularly depression and anxiety, in university students,[1] and the associated severe role impairment,[3] imply that university mental health services will continue to receive a growing influx of treatment requests. In the case of the University of Padua, while the student body grew by roughly 4% between 2021 and 2023, requests for psychological assistance grew sixfold more, by roughly 23%. Upward trends were alarming even before the COVID-19 pandemic. A study from the Center for Collegiate Mental Health, which included data from 86 US institutions over 6 academic years (2009–2015), indicated an average increase in the number of students accessing counselling centres of 28%, more than four times higher than the rate of enrolment in the respective institutions (6.3%).[6] More recently, in university students, the COVID-19 pandemic was associated with a small and non-significant increase in mental health problems (including depression, anxiety and post-traumatic stress disorder) from pre- to the early phase of the pandemic.[45] Even with larger budgets, more trained personnel and a larger array of interventions offered, university mental health services cannot reasonably keep up with this growing trend and long waiting lists are inevitable. Therefore, solutions need to be found to maximise time spent on waiting lists, potentially even reducing the duration and requirement for subsequent intensive interventions. Using a transdiagnostic, brief, low-intensity intervention with minimal costs during the waiting period is a promising alternative that could be further investigated in randomised trials, to ascertain whether it reduces the need for treatment or time spent in therapy.

Furthermore, along with the great influx of students seeking treatment, students who might need treatment but do not access university mental health services represent another challenge. Only around 25% of first-year students in the WHO WMH-ICS expressed certainty that they would seek help in the case of a future emotional problem.[46] The most important barrier to seeking help was wanting to handle the problem alone, endorsed by almost half of the sample.[46] For these students, web-based self-help approaches might be acceptable alternatives,[46] particularly DWM, which allows participants to practise the exercises even following the end of the intervention. Moreover, although DWM is transdiagnostic, it has been developed as a stress-management course and is thus relevant for student population groups.[13,33] Moreover, DWM was recently adapted for unguided web-based use (https://www.dwmatters.eu/), further streamlining dissemination.

A large survey of over 6000 community college students in the USA indicated that, among those with treatment needs, around 60% were willing to use web-based services but few (around 3%) had ever used such services.[47] Using simulations on clusters identified through latent class analyses, another survey of US college students identified that around 23% would trade standard

https://doi.org/10.1192/bjo.2025.10843 Published online by Cambridge University Press

face-to-face counselling with a 6-month waiting list for an e-mental health option with an immediate start.[48] University mental health services could consider having a suite of web-based guided and unguided self-help tools available as stand-alone first option treatments, waitlist enhancement options or add-ons to standard treatment. However, not all self-help tools are useful[49,50] and, before practice implementation, randomised trials would be necessary to assess efficacy.

Our study adds to a small but growing literature on the use of low-intensity, self-help interventions as a way of maximising the time spent by individuals waiting for treatment. For example, a randomised trial on patients with bulimic spectrum disorders showed that a web-based self-help intervention delivered during the waiting period for outpatient treatment led to greater and more rapid symptom reduction compared with control.[51] However, the intervention did not significantly impact the proportion of patients who progressed to face-to-face therapy or the time to therapy onset. Similarly, DWM, as a booklet or web-based, could be tested in a randomised trial for university students accessing university mental health services. Maximising waitlist time is also important, as some meta-analyses suggest that being randomised to a waitlist for psychological treatment might have negative effects on symptoms.[52] It is presumed that many participants on waiting lists refrain from searching other solutions that could alleviate their symptoms or improve functioning.

Our findings are qualified by several important limitations. First, although ITS is a strong design in terms of causal inferences, it is not randomised, and a control group was not possible in our case because there was a pragmatic need to provide all participants experiencing long waiting times with resources. Thus, confounders other than the intervention might account for the observed trend in anxiety, depression and functioning. We carefully examined and reported all changes in practice undergone by the mental health service during the study period, and were not able to identify other potentially consequential changes. Second, due to considerations related to the functioning of the service, the number of data points available in pre-intervention (8) is lower than that for post-intervention (14). Prior to 2021, anxiety, depression and functioning were not routinely measured as outcomes. Coursework and other student activities were limited in 2021 and 2022 due to extended restrictions related to the COVID-19 pandemic, which meant that fewer students accessed university mental health services. Wagner and colleagues[53] suggest a minimum of 12 data points to adequately check for seasonality in monthly time series data. A smaller number of data points could conceal seasonality effects and contribute to large confidence intervals in the counterfactual models, as seen for example for generalised anxiety (GAD-7) scores. Third, some data points are underrepresented, particularly in the pre-intervention phase. For this reason, in three instances (April and May 2022, July and August 2023, September and October 2023) we aggregated users from adjacent time points to avoid relying on periods with limited data points. However, this practical solution impacts the comparability of the size of the data points, potentially limiting the investigation of season- or month-specific features. Fourth, the realism of the counterfactual model is questionable. For instance, it is unrealistic to assume that, in the absence of the intervention, the impairment of functioning indexed by WSAS total score would have risen to 35 points in November 2023. The assumption of continuously increasing trends in the absence of intervention is unlikely, and it is probable that all outcome measures would have reached a ceiling over time. This may suggest that the relative differences, particularly in November 2023, may have been overestimated. To partially account for this limitation, we also compared differences in pre- and post-intervention trends, which confirmed the reduction and stabilisation of scores, supporting the likelihood of efficacy.

In conclusion, *Doing What Matters in Times of Stress*, a self-help stress management intervention available as a booklet or digitally, is a potential candidate for bridging waiting times for face-to-face treatment, by reducing anxiety and depression and improving functioning. Our findings should be further explored in a pragmatic randomised controlled trial comparing, for example, guided with unguided self-help. Both groups could receive the booklet or be given access to the digital version of the intervention, but one group would also have access to a few short online or phone-delivered sessions with a minimally trained non-specialized facilitator, as originally intended by the WHO.[14] Alternatively, an ITS design with a control group and more data points in both the pre- and post-intervention periods could confirm whether the trend of symptom reduction and functioning improvement we observed in this study is more likely to reflect genuine intervention effects or other confounds.

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First received 24 Sep 2024, final revision 14 Jul 2025, accepted 12 Aug 2025

Supplementary material

The supplementary material is available online at https://doi.org/10.1192/bjo.2025.10843

Data availability

The individual participant data are available upon request, following pseudo-anonymisation, for research purposes including verification of the replicability of the findings. The data are not made publicly available due to their sensitive nature, due to the inclusion of individuals with mental health problems and concerns about identification of study participants.

Acknowledgements

The authors thank Roberta Rizzato and Roberta Marchiori, the coordinators of the SAP-CP service, for their support and collaboration during the carrying out of the study and preparation of the paper.

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Conceptualisation: I.A.C., C.G., M.P. Data curation: M.F., G. Bruno, I.C., G. Bottesi, S.S. Formal analysis: G. Bruno, A.S. Methodology: I.A.C., G. Bruno, A.S. Supervision: I.A.C., C.G., A.S. Writing – original draft: M.F., G. Bruno, I.A.C. Writing – review and editing: all authors.

Funding

I.A.C. and M.P. are supported by Fondo per il Programma Nazionale di Ricerca e Progetti di Rilevante Interesse Nazionale (PRIN), through research grant no. 20224XSWRH, from the Italian Ministry of University and Research (MUR). M.F. is funded by a grant (Ministerial Decree 118/2023), financed by the National Recovery and Resilience Plan (PNRR) of the European Union (NextGeneration EU).

Declaration of interest

I.A.C. is a member of the *BJPsych Open* editorial board. She did not take part in the review or decision-making process of this paper.

https://doi.org/10.1192/bjo.2025.10843 Published online by Cambridge University Press

Transparency declaration

I.A.C. affirms that the manuscript is an honest, accurate and transparent account of the study being reported; that no important aspects of the study have been omitted; and that any discrepancies from the study as planned have been explained.

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