



# Evaluating the Feasibility of a Guided Culturally Adapted Internet-Delivered Mindfulness Intervention for Indonesian University Students Experiencing Psychological Distress

Ratih Arruum Listiyandini<sup>1,2</sup> · Annisa Andriani<sup>3</sup> · Nyda Afsari<sup>4</sup> · Prawestri Bayu Utari Krisnamurthi<sup>5</sup> · Michelle L. Moulds<sup>1</sup> · Alison E. J. Mahoney<sup>6,7</sup> · Jill M. Newby<sup>1,8</sup>

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## Abstract

**Objectives** Psychological distress is common among university students globally. A culturally relevant internet-based mindfulness intervention could be a potential solution for addressing students' distress in low- and middle-income countries (LMICs), including Indonesia. However, internet-based mindfulness interventions are new in Indonesia. In this study, we evaluated the feasibility, acceptability, and mental health outcomes of a counsellor-guided, culturally adapted, internet-delivered mindfulness intervention for Indonesian university students experiencing psychological distress.

**Method** This open pilot trial used a single-arm pre-post-test design. Indonesian university students with elevated distress ( $n = 40$ ) enrolled in a 4-week counsellor-guided internet-delivered mindfulness intervention. Participants completed the Indonesian adaptation of the Depression Anxiety Stress Scales (DASS-21) at screening, baseline, and post-treatment. They also completed the Indonesian version of Kessler's Psychological Distress Scale (K-10) prior to each lesson, Five Facet Mindfulness Questionnaire (FFMQ) and Indonesian Well-Being Scale (IWBS) at baseline and post-treatment, and questionnaires to evaluate the feasibility, acceptability, and treatment satisfaction.

**Results** Results showed the feasibility and acceptability of our guided culturally adapted Indonesian internet-delivered mindfulness intervention, with good completion rates (70%). We also found large and significant improvements in distress, mindfulness, and well-being (Hedges'  $g = 0.85$ – $1.68$ ) from pre- to post-treatment. Participants reported that the program was satisfactory.

**Conclusions** This study suggested that a counsellor-guided culturally adapted internet-based mindfulness intervention was feasible, acceptable, and associated with improvements in psychological distress, well-being, and mindfulness among university students in Indonesia. A randomized controlled trial with follow-up is needed to evaluate the intervention's effectiveness.

**Preregistration** This trial was preregistered on the Australian New Zealand Clinical Trial Registry (ACTRN12620000135910).

**Keywords** Distress · Mindfulness · Culture · Internet · Students · Indonesia

✉ Ratih Arruum Listiyandini  
r.listiyandini@unsw.edu.au

<sup>1</sup> School of Psychology, The University of New South Wales, Sydney, NSW 2052, Australia

<sup>2</sup> Faculty of Psychology, Universitas YARSI, Central Jakarta, DKI Jakarta 10510, Indonesia

<sup>3</sup> Faculty of Psychology, Universitas Jambi, Jambi 36361, Indonesia

<sup>4</sup> Faculty of Psychology, Universitas Islam Indonesia, Sleman, Yogyakarta 55584, Indonesia

<sup>5</sup> Tiga Generasi Psychology Clinic Brawijaya, South Jakarta, DKI Jakarta 12730, Indonesia

<sup>6</sup> School of Psychiatry, The University of New South Wales, Sydney, NSW 2052, Australia

<sup>7</sup> Clinical Research Unit for Anxiety and Depression, St Vincent's Hospital, Sydney, NSW 2010, Australia

<sup>8</sup> Black Dog Institute, Randwick, NSW 2031, Australia

Psychological distress (i.e., depression, anxiety, and stress) among university students is prevalent globally (Auerbach et al., 2018), including in low- and middle-income countries (LMICs), like Indonesia (Kaloeti et al., 2018). Untreated, high psychological distress can adversely affect students' physical health, academic achievement, and quality of life (Jessop et al., 2020). In Indonesia, most distressed students do not seek or receive treatment (Setiawan, 2006), and the limited number of trained mental health professionals are in urban rather than sub-urban or rural areas (Tristiana et al., 2018). Negative cultural beliefs about emotional problems and mental health create additional barriers to accessing mental health services in Indonesia (Hartini et al., 2018).

Internet-based psychological interventions can be accessed with relative anonymity and may help overcome barriers to accessing care, including cost, transportation, availability of services, and wait times (Herrero et al., 2019; Muñoz, 2010). Studies showed that such interventions reduce psychological distress among university students (Farrer et al., 2013, 2019; Harrer et al., 2018). However, research in LMICs remains limited (Fu et al., 2020). Particularly among Indonesian populations, only one randomized controlled trial (RCT) has been conducted to evaluate internet-delivered behavioral activation for treating depression in adults (Arjadi et al., 2018). Two uncontrolled feasibility studies (Juniar et al., 2022; Rahmadiana et al., 2021) have been conducted to test internet-delivered cognitive behavioral therapy for treating stress, depression, and anxiety among university students. These studies have reported promising results (Juniar et al., 2022; Rahmadiana et al., 2021).

However, to the best of our knowledge, there has been no research examining the utility of alternate internet-delivered psychological therapies in Indonesia, such as mindfulness-based interventions. Mindfulness involves the practice of paying attention on purpose, in the present moment, and nonjudgmentally to the unfolding of experience moment by moment (Kabat-Zinn, 2003a). Creswell (2017) suggested that over the past two decades, there has been a dramatic increase in RCTs of mindfulness interventions. Mindfulness-based interventions (MBIs) appear highly compatible with global public health initiatives because the concept and practice of mindfulness are relatively simple to grasp, empower the individual, and once acquired, can be continuously utilized without extra money or conditions (Palitsky et al., 2023).

Indonesia has a diverse population consisting of different cultural backgrounds and religions, with the dominant practice of Islam. A previous study in Indonesia suggested that despite being derived from Buddhist meditation practice, mindfulness-based interventions may represent a culturally relevant treatment for university students' distress in Indonesia (Listiyandini et al., 2023). Previous studies have found that in-person mindfulness-based treatments bring

benefits among Indonesian samples. For example, in-person mindfulness-based treatment has been associated with reduced insomnia (Wijayaningsih et al., 2022) and improved emotional regulation among Indonesian university students (Yusainy et al., 2018).

The most recent meta-analysis found that internet-based mindfulness interventions produced reductions in depression, anxiety, and stress severity compared to control condition within small to medium effect sizes (Sommers-Spijkerman, et al., 2021). However, of the 97 RCTs included in this meta-analysis, most were conducted in Western and high-income countries. Only six studies involved participants from LMICs and Eastern, collectivistic cultural backgrounds. All the six studies were conducted in China, and only two studies included university students (Sommers-Spijkerman et al., 2021). Therefore, further research is needed to evaluate the utility of internet-based mindfulness interventions for university students from other LMICs and Eastern-collectivistic cultural backgrounds, such as Indonesia.

Oman (2023) argued that from a public health perspective, evaluating the benefits of cultural adaptation of a mindfulness intervention is imperative to examine its broader application among different populations from diverse cultural backgrounds. Unfortunately, studies of culturally adapted mindfulness interventions remain scarce (Creswell, 2017). A meta-analytic study by Castellanos et al. (2020) showed the potential effectiveness of culturally adapted mindfulness-based interventions in improving mental health among Hispanic populations (Castellanos et al., 2020). Recent studies have also investigated culturally adapted mindfulness interventions in LMICs and other regions, such as Uganda (Musanje et al., 2023) and Pakistan (Sarfraz & Siddiqui, 2023), as well as among migrants living in Australia (Blignault et al., 2021), and indigenous university students in Canada (Beshai et al., 2023). However, to date, no published studies have examined the benefits of culturally adapted mindfulness intervention for people in LMICs in Southeast Asian regions, such as Indonesia.

Internet mindfulness interventions are novel approaches in Indonesia. Thus, it is imperative to conduct a pilot study to examine the feasibility of the intervention before conducting a randomized controlled trial (RCT) to test the effectiveness of the program for Indonesian university student's distress. According to Leon et al. (2011), the fundamental purpose of conducting a pilot study is to examine the feasibility of an approach that is intended to ultimately be used in a larger scale study. It is a necessary first step in exploring novel interventions and novel applications of interventions (Leon et al., 2011).

In this study, we aimed to test the feasibility and acceptability of *PSIDAMAI* (Listiyandini et al., 2023), a recently developed Indonesian internet-based mindfulness program, that had been culturally adapted from an Australian

internet-delivered mindfulness intervention (Li et al., 2022). Based on our end-user consultation in *PSIDAMAI* (Listiyandini et al., 2023), Indonesian university students reported they preferred the program to be guided rather than self-help. This is relevant as previous meta-analyses of internet-based psychological interventions have found that guided programs may be more effective than self-help programs (Baumeister et al., 2014; Spek et al., 2007) and increased adherence among participants (Musiat et al., 2022). Given the setting and limited resourcing of our study, we decided that counsellor guidance would be administered by psychology or counselling students or graduates (under the supervision of an experienced psychologist), rather than fully licensed mental health professionals. The responsibilities of counsellors were primarily to encourage program completion and foster regular mindfulness practice. Furthermore, support was provided through communication channels that are accessible and preferred by Indonesian students, such as email, WhatsApp, SMS text messages, or phone calls. In cases requiring more extensive clinical assistance, students were referred to licensed psychologists. This stepped-care or task-sharing approach has been proven advantageous in prior research on internet-based behavioral activation for depression in Indonesia (Arjadi et al., 2018).

The main objective of the present pilot study was to determine whether a counsellor-guided Indonesian culturally adapted internet-based mindfulness intervention was feasible and acceptable before we conducted a further large-scale trial. Using a single-arm pre-post design, we examined the feasibility of the intervention, in terms of participant's adherence and retention, and gained feedback on the program to inform improvements before conducting a RCT. Second, we assessed the acceptability of the intervention in terms of satisfaction as well as its perceived benefits and challenges based on feedback from participants. Additionally, we aimed to test the potential effectiveness of the intervention for improving mental health of Indonesian university students experiencing psychological distress. The primary outcome was the psychological distress based on the total score of the 21-item version of the Depression Anxiety Stress Scales (Lovibond & Lovibond, 1995a) or DASS-21. Secondary outcomes included depression, anxiety, and stress severity based on subscales of the DASS-21, general psychological distress based on Kessler Psychological Distress Scale (K-10, Kessler et al., 2002), and the level of mindfulness and well-being. This study was the first conducted among people from LMICs in Southeast Asia to evaluate an internet-delivered culturally adapted mindfulness intervention.

Based on the results of the latest meta-analysis of the effectiveness of the internet mindfulness interventions in other countries (Sommers-Spijkerman et al., 2021), we hypothesized that our Indonesian guided culturally adapted

internet-based mindfulness intervention would be (1) feasible to deliver (as indicated by adherence and completion rates), (2) acceptable (in terms of participants' program engagement, level of satisfaction, and credibility ratings), and (3) associated with significant reductions in general psychological distress based on the DASS-21 total score (as primary outcome), along with improvements in the DASS-21 depression, anxiety, and stress subscales; K-10 psychological distress scale; well-being; and mindfulness (as secondary outcomes). We predicted that these improvements would occur with medium effect sizes from pre- to post-treatment. A study from Li et al. (2022) that evaluated the uptake and outcome of online self-help mindfulness intervention in Australia pre and during pandemic showed that around 20–30% of participants completed the full four-lesson program. In this study, since our program was a guided intervention, we predicted higher completion rates compared to their unguided program. We predicted that at least 50% of participants would complete the program.

## Method

Pilot studies, feasibility studies, and proof of concept studies are terms that have been used somewhat interchangeably in the literature and henceforth are referred to as “pilot studies” (Leon et al., 2011). Eldridge et al. (2016a, b) stated that “A feasibility study asks whether something can be done, should we proceed with it, and if so, how. A pilot study asks the same questions but also has a specific design feature: in a pilot study, a future study or part of a future study is conducted on a smaller scale.” (p. 1). Pilot results can inform feasibility and identify modifications needed in the design of a larger, ensuing hypothesis testing study (Leon et al., 2011). There are several aspects of feasibility that can be examined during pilot study, including screening, recruitment, randomization, retention, treatment adherence, treatment fidelity, or assessment process. In addition, Lancaster and Thabane (2019) describe some types of feasibility or pilot studies that can be done by researchers. Based on Lancaster and Thabane's (2019) types of pilots and feasibility studies, in this pilot study, we aimed to piloting several components of the trial and test the preliminary hypothesis of associated outcome for the future larger trial (RCT).

In this paper, we describe the process and results of our pilot study based on Consolidated Standards of Reporting Trials (CONSORT) extension to randomized pilot and feasibility trials (Eldridge et al., 2016a, b; Lancaster & Thabane, 2019). However, based on the recommendation from Lancaster and Thabane (2019), we did not follow items about randomization, allocation sequence, or blinding, since they were not applicable to our before-after/pre-post single-arm study design.

## Participants

Inclusion criteria were as follows: (1) Indonesian university students studying and living in Indonesia; (2) aged  $\geq 18$  years; (3) fluent in the Indonesian language; (4) elevated psychological distress at least on one of the subscales of the DASS-21 (Stress score  $\geq 15$ , Anxiety score  $\geq 8$ , and/or Depression score  $\geq 10$ ); and (4) having access to a digital device (computer, laptop, smartphone), internet, and phone.

Applicants were excluded if they (1) self-reported a current diagnosis of psychosis, substance dependence, post-traumatic stress disorder (PTSD), and/or a bipolar disorder; (2) were currently undertaking mindfulness-based or other psychological treatment; and (3) had active current suicidal ideation, intention/plan, and/or recent deliberate self-harm (reported during telephone risk assessment) with severe depression based on the DASS-21 ranges reported in Lovibond and Lovibond (1995b, DASS-21 depression scores  $\geq 21$ ).

During recruitment and screening, 72 university students provided electronic informed consent and completed an application by reporting their demographic and contact information. They also completed eligibility questions and the DASS-21. After screening, 40 participants completed baseline questionnaires and were enrolled in the intervention (see Fig. 1 for CONSORT diagram for participant flow).

Participants ( $n = 40$ , 80% female, mean age (SD) = 23.78 (5.55) years) typically lived in the Java Island (75%), with others living in Sumatra (20%), Kalimantan/Borneo (2.5%), and East Nusa Tenggara (2.5%). Most participants (34/40, 85%) were single and/or never married, five were married, and one participant was divorced.

## Procedure

This study was an open pilot trial using single-arm pre-post-test design. In this pilot study, we aimed to recruit at least 30 participants. The trial's sample size was determined in accordance with the widely accepted pilot trial size of  $n = 12$  for each group (Julious, 2005) and taking into consideration the significant attrition rate in mindfulness studies, particularly in online mindfulness interventions, where adherence rates range from 35 to 92% (Sommers-Spijkerman et al., 2021). Participants were recruited between 24th November 2021 and 3rd December 2021 across Indonesia via social media advertisements, including via Instagram accounts and WhatsApp groups pertinent to Indonesian students (e.g., Seribu Tujuan, Belajarpsikologi.id, university students' union, consortium). After reading the study information and providing electronic informed consent in *Research Electronic Data Capture* (REDCap) survey platform, students who were interested in this study completed an application

for the study in the same platform and reported their demographic and contact information, eligibility questions, and the DASS-21 for screening purpose.

Participants who met the eligibility criteria were invited to complete a brief risk assessment telephone interview with a clinician (trained Provisional or fully qualified Clinical Psychologist). During the interview, the clinicians inquired about the participants' recent treatment history, whether they had any current intention to engage in deliberate self-harm and current suicidal ideation, and their availability throughout the trial period. For those individuals who did not meet the eligibility criteria, they were provided with a list of alternative mental health services and resources in Indonesia that they could access to address their specific needs. This ensured that participants who were not eligible for the study were directed toward appropriate sources of support and care.

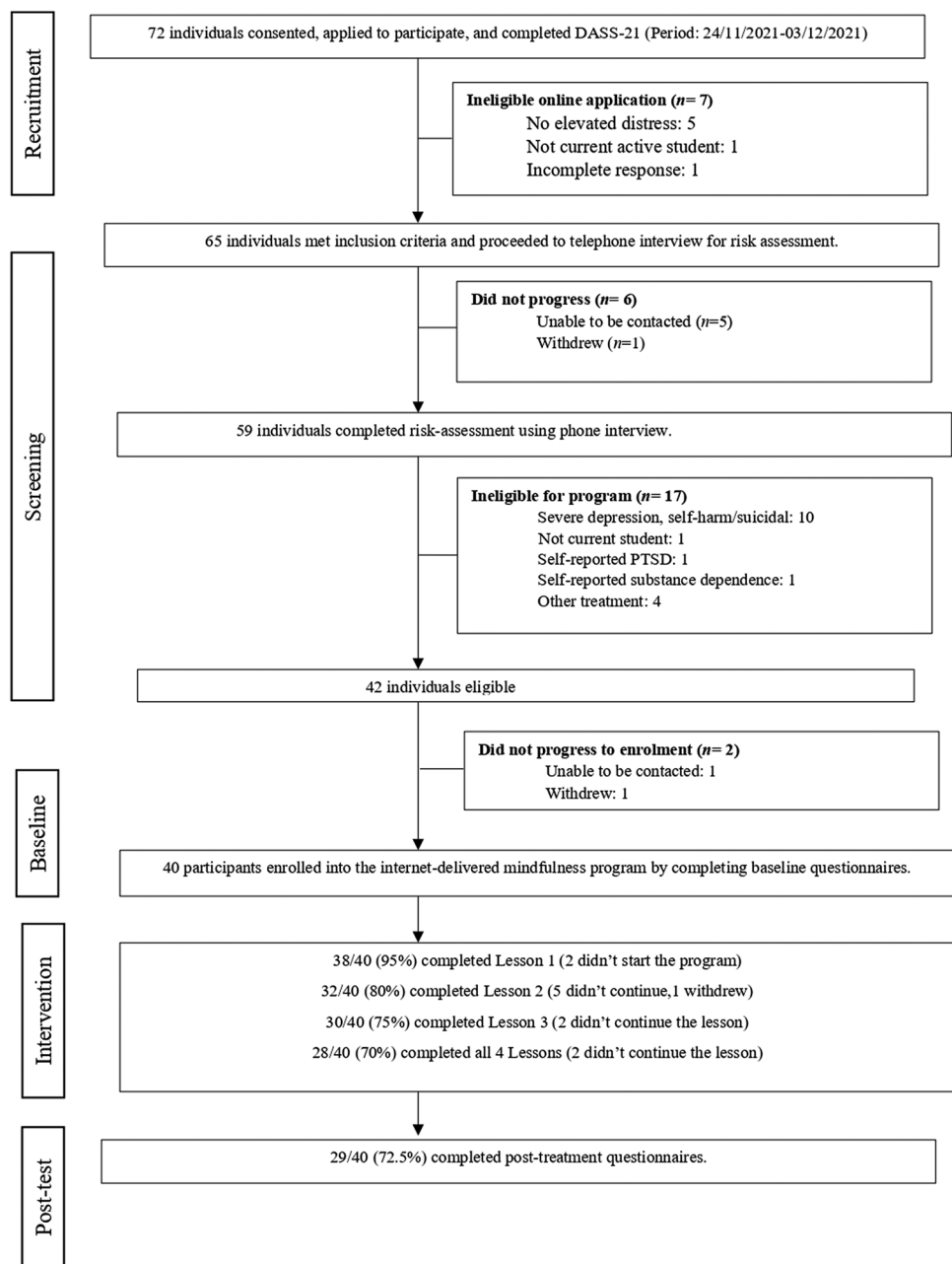
A link to complete baseline or pre-treatment measurement was sent by email to eligible participants. Only those who completed baseline measurements were enrolled in this study and were granted immediate access to the Indonesian internet-delivered mindfulness program using an individual link sent to their email. To facilitate their engagement with the program, trained counsellors (undergraduate psychology students or graduates) contacted each participant individually in each week (see the "Clinical Support" section for details).

Participants were asked to complete online questionnaires at specific time points throughout their participation in the program (see "Measures"). They completed all electronic self-report questionnaires at screening, pre-treatment, and post-treatment on the REDCap survey platform. The post-treatment assessment was completed 4 weeks after the pre-treatment assessment and consisted of the mental health outcome measures and measures of acceptability and satisfaction.

## Intervention

The intervention tested in this study was an Indonesian internet-delivered mindfulness intervention (*PSIDAMAI*; Listiyandini, et al., 2023). *PSIDAMAI* is a culturally adapted version of the *Introduction to Mindfulness* program (Li et al., 2022) provided by THIS WAY UP (an Australian digital mental health service). The *Introduction to Mindfulness* program is based on Mindfulness-Based Cognitive Therapy (MBCT) (Segal et al., 2004; Teasdale et al., 2000) and Mindfulness-Based Stress Reduction (MBSR) (Kabat-Zinn, 2003b), and was developed and evaluated among English-speaking Australian adults (Kladnitski et al., 2020; Li et al., 2022).

*PSIDAMAI* is a 4-week program (Table 1) that was developed following a detailed cultural adaptation process

**Fig. 1** CONSORT participant flow diagram

(Listiyandini et al., 2023) based on a systematic framework for cultural adaptation from Barrera et al. (2013). The program comprises (1) an illustrated and audio-guided story of a female Indonesian university student who is practicing mindfulness to help manage psychological distress, (2) four lesson summaries in PDF form that can be downloaded and printed, and (3) eight audios of guided mindfulness practices. Homework activities encouraged participants to review the lesson slides, practice the mindful meditations via the audio recordings, use mindfulness skills in day-to-day life, and reflect on their experiences. Participants were encouraged to spend approximately

30 min per week for reading the internet-delivered lessons and 10 min each day practicing mindfulness.

While maintaining the core treatment elements, internal logical processes, and fundamental aspects of the mindfulness-based intervention, adaptations were implemented to align with the Indonesian cultural context. Multiple features of the *PSIDAMAI* were developed in consultation with Indonesian university students and mental health experts using discussion and interviews, to enhance the program's cultural relevance, in terms of language, design, delivery, and sociocultural context. The adjustments involved practical enhancements, such as modifying illustrations and delivery



**Table 1** Summary of lesson content

Session	Lesson components
1: Becoming aware—understanding mindfulness	<ul style="list-style-type: none"> <li>• Psychoeducation: Distress and mindfulness</li> <li>• Three-minute breathing space</li> <li>• Raisin exercise (mindful eating)</li> <li>• Mindfulness in daily activities</li> <li>• Homework: Practicing each exercise, writing mindfulness practice diary</li> </ul>
2: Learning about your mind	<ul style="list-style-type: none"> <li>• Review first lesson</li> <li>• Psychoeducation: Mindfulness of the breath</li> <li>• Psychoeducation: Mindful stretching</li> <li>• Homework: Practicing each exercise, writing mindfulness practice diary</li> </ul>
3: Listening to your body and recognising blocks	<ul style="list-style-type: none"> <li>• Review second lesson</li> <li>• Common difficulties with mindfulness</li> <li>• Psychoeducation: listening to body, body scan, mindful walking</li> <li>• Homework: Practicing each exercise, writing mindfulness practice diary</li> </ul>
4: Mindfulness in daily life	<ul style="list-style-type: none"> <li>• Review third lesson</li> <li>• Psychoeducation: Recognising and surfing unhelpful urges (i.e., to be reactive, perfect, avoid discomfort)</li> <li>• Psychoeducation: Mindfulness of physical discomfort and difficulties</li> <li>• Reflection: Progress and future goals</li> <li>• Homework: Practicing mindfulness of physical discomfort and mindfulness of difficulties (optional)</li> </ul>

format, including a comic-style portrayal of a fictional character's journey tailored to Indonesian settings. The illustrations highlighted Indonesian characters and storylines. Furthermore, the integration of mindfulness activities into daily routines encompassed a wider array of social and spiritual practices than the Australian version. Based on our comprehension of Indonesia's religious and spiritual principles and language, we opted to keep the term "mindfulness" instead of adopting the Indonesian term "rasa berkesadaran." Likewise, we avoided using the term "meditation" and instead favored more inclusive phrases like "mindfulness practice" or "latihan mindfulness" in the Indonesian context. To streamline the program, psychoeducational sessions underwent modifications aimed at shortening their duration. These sessions were presented using a combination of written text, visual illustrations, and audio tracks, which is different from the original version which solely relied on visual illustrations. To enhance participant engagement and adherence, guidance was provided through preferred communication platforms, such as SMS, emails, or WhatsApp. Participants were also able to request phone consultations. Upon completion of the program, certificates and rewards were granted to participants as recognition for their achievement.

### Clinical Support

Clinical support was provided by trained counsellors (psychology students or graduates) supervised by a senior Indonesian Clinical Psychologist (RAL) and assisted by Indonesian registered psychologists and clinicians within the research team. Each week, counsellors contacted participants

using their preferred communication media (email, WhatsApp, or SMS). As part of their role, the counsellors (1) asked whether participants had completed a lesson, (2) gave reminders (when a participant had failed to log in or complete a lesson for > 10 days), (3) asked about participants' experience with the mindfulness lessons, and (4) encouraged participants to ask questions. Participants were also offered follow-up phone call consultations based on their needs and availability. Additional contact was always offered whenever a participant reported elevated psychological distress ( $K10 \geq 30$ ). When required, participants with elevated distress were referred to the trial clinical psychologist for risk assessment and safety planning.

### Measures

#### Feasibility and Acceptability Indicators

**Credibility/Expectancy Questionnaire** Participants' perceived credibility of the program was assessed at baseline through two items of the CEQ (Deville & Borkovec, 2000), specifically "At this point, how logical does the course offered to you seem?" and "At this point, how successful do you think this program will be in reducing your symptoms?" Items were rated on a 9-point scale from 1 (*Not at All*) to 9 (*Very*).

**Adherence** Adherence was operationalized as the total number of lessons completed, and program completion was defined as completing all four lessons. The study drop-out

rate was the proportion of participants who did not finish the post-treatment assessment.

**Engagement** To estimate program engagement, participants self-reported the frequency and duration of their weekly mindfulness practice. Participants reported how long they practiced mindfulness and what type of mindfulness practice they completed during the previous week.

**Treatment Satisfaction** The 8-item Client Satisfaction Questionnaire for Internet-based Interventions (CSQ-I) measures treatment satisfaction (Boss et al., 2016). Items have a 4-point response scale and evidence supporting the scales' internal consistency and factorial and construct validity has been published (Boss et al., 2016). A bilingual Indonesian psychologist translated the English version of CSQ-I into the Indonesian language for the purpose of this study. The CSQI-8 was administered at post-treatment (where internal consistency was  $\alpha = 0.63$ ).

**Program Feedback** At post-intervention, participants were asked open-ended questions about any positive effects of the program, unwanted side effects, or negative events that occurred because of the program. Participants were asked for additional feedback and asked which components of treatment were most useful in improving their distress.

## Outcome Measures

**Depression Anxiety Stress Scales (DASS)-21 Indonesian Adaptation** The DASS-21 is a short version of original DASS-42 (Lovibond & Lovibond, 1995a) and assesses depression, anxiety, and stress symptom severity. Items are rated on a 4-point scale; then, total score is doubled by two to be equivalent with DASS-42, with higher total scores indicating greater symptom severity (Henry & Crawford, 2005). Subscale scores can be used to categorize symptom severity (Lovibond & Lovibond, 1995b). The DASS-21 has been adapted for Indonesians and evaluated among university students by Kinanthi et al. (2020) with evidence of good internal reliability in each subscale (range  $\alpha$ s = 0.75–0.85). Internal consistency in this study at screening was  $\alpha = 0.89$  for total distress, and  $\alpha = 0.84$ , 0.79, and 0.74 for the depression, anxiety, and stress subscales, respectively. The DASS total score was the primary clinical outcome in this study, and the subscale scores were secondary clinical outcomes. The DASS-21 was administered at screening, baseline, and post-treatment.

**Kessler Psychological Distress Scale (K-10)—Indonesian Adaptation** The K-10 measures non-specific psychological distress (Kessler et al., 2002). Items are rated along a 5-point scale, with higher scores indicating greater distress

and total scores  $\geq 30$  indicative of severe distress (Andrews & Slade, 2001). Evidence of reliability and validity has been provided (Furukawa et al., 2003; Merson et al., 2021; Slade et al., 2011). The K-10 has been adapted for and psychometrically validated in Indonesian samples with evidence of good internal reliability ( $\alpha = 0.89$ ) (Tran et al., 2019). In this study, baseline K-10 internal consistency was  $\alpha = 0.86$ . We assessed participants' distress level using the K-10 at baseline, prior to each lesson, and post-treatment.

**Five Facet Mindfulness Questionnaire (FFMQ)—Indonesian Adaptation** Trait mindfulness was measured using the Indonesian version of the Five Facet Mindfulness Questionnaire (FFMQ) (Baer et al., 2006). The 39-item scale comprises five subscales that measure facets of mindfulness skills, specifically (a) Non-reactivity to internal experiences, (b) Noticing and observing, (c) Acting with awareness, (d) Describing, and (e) Non-judging of internal experiences. Higher scores indicate higher trait mindfulness. Evidence supporting the psychometric properties of the FFMQ has been provided (Baer et al., 2006), and the Indonesian FFMQ has previously been used among adults (Fourianalistyawati et al., 2016) and university students (Awaliyah & Listiyandini, 2017) with subscales demonstrating adequate internal consistency ( $\alpha = 0.53$ –0.84). In this study, baseline internal consistency was  $\alpha = 0.80$  for total scores. The FFMQ was administered at baseline and post-treatment.

**Indonesian Well-Being Scale (IWBS)** The 24-item IWBS (Maulana et al., 2019) assesses an Indonesian perspective of well-being and consists of four dimensions: (a) Basic Needs, (b) Social Relations, (c) Acceptance, and (d) Spirituality, with evidence of internal consistency, test–retest reliability and divergent, convergent, and discriminant validity. Baseline internal consistency was  $\alpha = 0.84$  in this study. The IWBS was administered at baseline and post-treatment.

## Data Analyses

Analyses were completed using IBM SPSS version 23. We used the descriptive statistics to report the feasibility and acceptability outcomes. To examine changes in the clinical outcomes assessed at three time points (DASS-21 total and subscale scores—screening, baseline, and post-treatment) and six time points (K-10—baseline, at each lesson, and post-treatment), an intention-to-treat (ITT) linear mixed model for each outcome was implemented using the MIXED procedure with a random intercept for subject. For each outcome, time was entered as a categorical fixed factor, and an identity covariance structure was specified to model the covariance structure. In the sample that completed post-treatment measures, we used paired sample *t*-tests to measure changes in mindfulness and well-being from baseline to

post-treatment because these outcomes were only assessed at two time points. A normality test at each time point was conducted beforehand using Shapiro–Wilk and the data was found normally distributed ( $p > 0.05$ ). Within-group effect sizes from screening/baseline to post-treatment were estimated using Hedges'  $g$  with 95% confidence intervals.

For qualitative feedback, participants' responses to the open questions for each topic were summarized by categorizing responses with similar themes. Categorization was done by the principal investigator (RAL) and verified by the Indonesian team members as a second rater. The summary was finalized by consensus between team members.

## Results

### Feasibility and Acceptability Evaluation

#### Perceived Credibility and Expectancy

Prior to the intervention, participants expected the program would be successful in reducing their symptoms ( $M$  ( $SD$ ) = 7.23 (1.29), range = 5–9, where 1 = *Not at all* and 9 = *Very*). On average, participants rated the program as highly logical ( $M$  ( $SD$ ) = 7.77 (1.31), range = 5–9, where 1 = *Not at All* and 9 = *Very*).

#### Adherence, Engagement, Clinician Support

In total, 28 participants (70%) completed all four lessons. After enrolment, two participants (5%) did not complete any lesson, six participants (15%) completed one lesson only, two participants (5%) completed two lessons, and two participants completed three lessons (5%). Based on this data, adherence and completion rates were 70%. The response rate of participants who completed post-treatment questionnaires was 72.5% ( $n = 29/40$ ), and thus, drop-out rates were 27.5% ( $n = 11/40$ ).

In terms of engagement, prior to Lessons 2, 3, and 4, participants reported the amount of time they spent engaging in mindfulness practices in the previous week. The amount of time reported varied considerably across participants. In the sample who reported their practice time since Lesson 2 ( $n = 32$ ), on average, participants spent 63 min ( $MSD = 63.5$ ,  $SD = (62.90)$ ) each week practicing mindfulness (equating to 9 min per day,  $M = 9.13$ ,  $SD = 8.96$ ).

Following the first lesson, participants reported the type of mindfulness practices they engaged in during the previous week. Each lesson taught new practices and participants could choose which practices they engaged in. Participants were encouraged to continue with practices from previous lessons. The three mindfulness practices that were most preferred by participants and most frequently engaged with

were the *3-min breathing space*, *mindful breathing meditation*, and *mindful daily activities* (Table 2). Despite the availability of new mindfulness practices, 70% of treatment completers reported that they were committed to continuing these practices until the last week of intervention.

Time providing clinical support (either by WhatsApp text or by phone call) to each participant each week was 13–15 min on average. For Week 1 of the program, the average time was 15 min ( $n = 35$ , range = 3–47,  $M$  ( $SD$ ) = 15.54 (10.43), median = 13); for Week 2, it was 12 min ( $n = 29$ , range = 3–37,  $M$  ( $SD$ ) = 12.90 (7.72), median = 11); for Week 3, it was 13 min ( $n = 28$ , range = 4–40,  $M$  ( $SD$ ) = 13.00 (9.69), median = 9); and for Week 4, it was 14 min ( $n = 28$ , range = 0–60,  $M$  ( $SD$ ) = 14.43 (13.18), median = 10.5). Among treatment completers, the mean total time for clinician support across all 4 weeks was approximately 55 min ( $n = 28$ , range = 10–137,  $M$  ( $SD$ ) = 55.57 (35.04), median = 49).

#### Treatment Satisfaction and Program Evaluation Rating

Participants reported a high degree of overall treatment satisfaction via the CSQ-I ( $M = 3.66$ ,  $SD = 0.48$ , where scores range 1–4). Specifically, participants reported that the program was of high quality ( $M = 3.83$ ,  $SD = 0.38$ ). It was the kind of program that they wanted ( $M = 3.66$ ,  $SD = 0.48$ ) and met their needs ( $M = 3.76$ ,  $SD = 0.44$ ). Participants reported that they would recommend the program to a friend ( $M = 3.90$ ,  $SD = 0.31$ ) and that they were satisfied with the amount of support they received during the program ( $M = 3.55$ ,  $SD = 0.57$ ). They also reported that the program helped them to deal with their problems more effectively ( $M = 3.66$ ,  $SD = 0.48$ ) and that they would return to a similar program if they needed to seek help again ( $M = 3.69$ ,  $SD = 0.54$ ). In terms of program characteristics, participants reported that the program was useful ( $M = 3.83$ ,  $SD = 0.38$ ), counsellors were helpful ( $M = 3.79$ ,  $SD = 0.55$ ), and the program was comprehensive ( $M = 3.69$ ,  $SD = 0.54$ ), fun ( $M = 3.69$ ,  $SD = 0.54$ ), and easy to understand ( $M = 3.66$ ,  $SD = 0.48$ ).

**Table 2** Mindfulness practices reported by completers at Lesson 4 ( $n = 28$ ) (completed questionnaire on the last week of treatment)

Mindfulness practice	$n$ (%)
3-min breathing space	22 (78.5)
Mindful eating	16 (57.1)
Mindful daily activities	20 (71.4)
Mindful breathing meditation	22 (78.5)
Mindful stretching	17 (60.7)
Body scan	17 (60.7)
Mindful walking	18 (64.2)



Participants provided feedback on the importance of different program features (where 1 = *not important at all* to 5 = *totally important*). Participants reported that the guided mindfulness audios were the most important component of the program ( $M=4.66$ ,  $SD=0.61$ ), followed by counsellor's support ( $M=4.55$ ,  $SD=0.63$ ), lesson text ( $M=4.48$ ,  $SD=0.69$ ), lesson audio ( $M=4.45$ ,  $SD=0.69$ ), and the progress questionnaires ( $M=4.45$ ,  $SD=0.68$ ). Features that were rated as slightly less important were the lesson summaries ( $M=4.24$ ,  $SD=0.83$ ), mindfulness journals ( $M=4.21$ ,  $SD=0.77$ ), and lesson illustrations ( $M=3.97$ ,  $SD=1.01$ ).

## Qualitative Post-treatment Feedback

### Usability and Features of the Program

All participants who completed the post-treatment questionnaires ( $n=29/40$ , 72.5% of total participants) reported positive feedback to open-ended questions. Positive feedback related to the usefulness of the counsellor's support ("The counsellor is also quite open to input, giving a lot of insights so as to make the process helpful"), the relatable program content ("Many explorations of new and simple activities that can be done with mindfulness"), the flexibility of learning via auditory and/or visual modalities ("I appreciate this program provides material to account people's preferences either using text or audio"), the clear and well-structured content ("It feels like the next lesson actually answers questions at previous lessons"), and the helpful mindfulness audios ("The audio guide is very helpful"). For negative feedback, one participant reported difficulties learning meditation by audio guidance and preferred video guidance ("I think it's better to include the video for practice. Even though the instructions say that it's okay either we do right or wrong, but I am personally quite disturbed because I cannot get rid of the thought 'is it right or not?"). Another participant reported difficulty completing mindfulness journals because the PDF format was challenging to edit ("It's only related to logbooks or journals that I ended up not using, replaced with manual notes in the book, because it's a bit difficult to fill, when there's a column stuffed into the other column, seems like it is a technical error. Maybe later it can be developed in the direction of an application that helps record the exercise").

**Wanted/Positive Effects** All participants who provided post-treatment data ( $n=29/40$ , 72.5% of total participants) reported experiencing wanted or positive effects. These effects included more positive emotions and acceptance about life and self ("I'm more accepting of myself and less worried about any events in my life"), increased awareness and attention in daily activities ("..become aware of what I'm doing and the longer I can maintain my focus, the more

satisfied and happier I am"), enhanced emotion regulation ("If I start to panic and get confused by something, I start getting used to making the breath as an anchor. If I feel discomfort in the body, I become calmer and not panic, then try to explore the discomfort."), increased self-reflection and understanding ("(It) helps me find out the cause of my feelings."), improved social connections ("I became closer to my family and the people around me"), greater inner peace ("I became calmer in the face of difficult situation"), feeling more supported ("All obstacles, pain, sadness, boredom, drowsiness, all the questions — with discussion sessions with counsellors it becomes inevitable and I can feel understood, enjoyed, and not judged"), increased motivation ("My motivation to do something also increases because of it"), and improved sleep and physical well-being ("It's easier to fall asleep because I usually sleep at 3 a.m.," "It almost never feels heavy anymore in my breath").

**Unwanted Side Effects** Two participants reported increased agitation and anxiety during the breathing practice, especially during their first practice ("The negative impact is caused by frequent concentration in breathing, so there is often anxiety during short breath."); "The negative impact only appeared at the beginning, namely when trying to do breathing exercises the first time. I became too focused on the breath so that it was difficult to breathe normally, but over time it did not happen again"). One participant reported increased self-criticism and awareness of negative emotions ("I feel more aware about what I feel and experience whether it's positive or negative feelings or thoughts. When negative feelings or thoughts are present, I am sometimes overwhelmed by them. Sometimes I win, sometimes I don't. When I lost, I became disappointed because I could not neutralize the negative feelings that existed until finally crying").

### Outcomes Measures

In terms of the primary outcome, we observed significant improvements in DASS-21 total distress scores ( $F(2, 68.06)=35.08$ ,  $p<0.001$ ) from screening to post-treatment. On the secondary outcomes, we also found significant improvements in depression scores ( $F(2, 67.66)=18.91$ ,  $p<0.001$ ), anxiety scores ( $F(2, 68.92)=21.44$ ,  $p<0.001$ ), and stress scores ( $F(2, 69.81)=45.81$ ,  $p<0.001$ ) from screening to post-treatment. Significant reductions in K-10 distress scores were also observed from pre- to post-treatment ( $F(5, 155.28)=31.56$ ,  $p<0.001$ ). Based on paired sample *t*-tests among participants who had baseline and post-treatment data, we observed significant improvements in mindfulness based on FFMQ scores (mindfulness;  $t(27)=-6.17$ ,  $p<0.001$ ) and well-being based on IWBS scores (well-being,  $t(27)=-4.02$ ,  $p<0.01$ ). Improvements

with large effect sizes were found on all outcome measures from pre- to post-treatment (Hedges'  $g = 0.85$ – $1.68$ ). Table 3 presents the associated treatment outcomes of intervention.

## Discussion

This study examined the feasibility, acceptability, and outcomes of a counsellor-guided culturally adapted internet-delivered mindfulness program for Indonesian university students experiencing elevated psychological distress. University students reported that they were satisfied with the program and regularly engaged in mindfulness practices during the program. Further, in terms of the primary outcome, we found that the Indonesian internet-delivered mindfulness program was associated with reductions in general psychological distress. In terms of the secondary outcomes, the program was also associated with reductions in depression, anxiety, and stress symptoms, as well increases in well-being and mindfulness. All the improvements from pre- to post-treatment corresponded to large effect sizes.

Program adherence in this study was higher (70%) than predicted, and higher than rates reported in an Indonesian clinician-guided internet-delivered transdiagnostic CBT program for depression and anxiety among Indonesian university students (which reported 50% completion) (Rahmadiana et al., 2021). We assumed that the level of completion rate during this pilot trial (70%) might be associated with the timeframe when this study was conducted. The pilot trial started to run between November and December 2021 when the COVID-19 pandemic was still ongoing. During the context of the pandemic, the increased social distancing measures related to COVID-19 necessitate an increase in access to care in a sustainable and scalable way for people living in LMICs, including the utilization of digital mental health interventions (Rodriguez-Villa et al., 2020).

On average, clinicians provided 55 min of support during the 4-week mindfulness intervention. This time is comparable to other studies on guided internet-delivered mindfulness interventions (e.g., 50–60-min clinical support provision) (Kladnitski et al., 2018, 2020). We also found that the duration of support provided varied among completers, which ranged from 10 to 137 min during 4 weeks of intervention. Future studies should examine the individual factors that contribute to the varied need for and uptake of clinical support in this internet-delivered intervention and examine the impact of clinician support on outcomes.

Previous studies of face-to-face MBSR among adults have found that the total number of minutes spent on mindfulness practice outside of the intervention sessions significantly correlates with the degree of change in mindfulness, mental health symptom severity, and well-being (Baer, 2009). In this study, participants reported appropriate engagement with the program that was broadly consistent with program recommendations. The average time spent on mindfulness practice among participants was approximately 63 min per week (~9 min/day). The most common daily mindfulness practices were the 3-min breathing space, mindful breathing meditation, and mindful daily activities. Based on the Client Satisfaction Questionnaire, students perceived that the program was useful and met their needs, and they intended to recommend the program to their friends with similar problems. These results provide further support for the feasibility and acceptability of the program.

Furthermore, participants who completed post-treatment questionnaires reported high satisfaction with the quality of the program and the nature and amount of clinician support they received. Based on quantitative measurements, participants rated the guided mindfulness audio recordings as the most beneficial part of the program, followed by the counsellor support, lesson text, and lesson audio guides. These findings were confirmed by the qualitative feedback that

**Table 3** Pre- to post-treatment pilot trial outcomes

Outcomes	Screening	Pre-treatment	Post-treatment	Pre to post-treatment
	EMM (SD)	EMM (SD)	EMM (SD)	$g$ (95% CI)
DASS-21				
Total Subscales	62.35 (22.90)	60.72 (22.86)	27.48 (22.35)	1.46 (0.96–1.95)
Depression	17.25 (9.63)	17.37 (9.60)	7.18 (9.53)	1.06 (0.60–1.53)
Anxiety	18.60 (8.65)	17.20 (8.62)	8.13 (8.38)	1.06 (0.59–1.52)
Stress	26.5 (8.37)	26.17 (8.34)	12.14 (8.17)	1.68 (1.17–2.19)
		Mean (SD)	Mean (SD)	$g$ (95% CI)
K-10 (Distress)	-	29.52 (6.19)	18.6 (6.72)	1.51 (1.02–2.01)
FFMQ (Mindfulness)	-	84.86 (14.42)	106.36 (14.17)	1.30 (0.72–1.87)
IWBS (Well-being)	-	68.18 (9.90)	76.54 (9.49)	0.85 (0.30–1.30)

*Note.* DASS-21, Depression, Anxiety, and Stress Subscale 21 Item—Indonesian version; EMM, estimated marginal means; K-10, Kessler-10 Psychological Distress Scale; FFMQ, Five Facet Mindfulness Questionnaire; IWBS, Indonesian Well-being Scale

participants provided. They stated that the counsellors gave useful insights and guidance, and they appreciated the structure of program content, the flexibility of learning via auditory and/or visual modalities, and the helpful mindfulness audios. Nevertheless, there are some suggestions regarding the technical aspects of the program, such as availability of the videos to guide practice and improving daily mindfulness journals using a more accessible platform than a PDF file which was used in the program. This feedback could be considered in future RCTs.

Unwanted treatment effects were hardly reported and appeared to be temporary. Two participants reported that bringing awareness to the breath, negative emotions, and their ruminative thoughts made them initially more anxious and self-critical. The unpleasant experience arising from difficulties accepting negative thoughts and emotions during self-observation may be a common experience among those new to mindfulness and meditation (Lilja et al., 2012). Although these experiences may be short-lived, our results highlighted the importance of educating and normalizing these experiences among program users and supervising clinicians, and routinely assessing negative effects of digital interventions in future research.

Regarding mental health outcomes, we hypothesized that the Indonesian internet-delivered mindfulness program would be associated with reductions in psychological distress with a medium effect size. In this study, we found reductions with large effect sizes in general psychological distress based on total DASS-21 as primary outcome, reductions in depression, anxiety, and stress symptoms based on each subscale of DASS-21, as well as unspecific psychological distress based on K-10 (Hedges'  $g = 1.06\text{--}1.68$ ). The positive effects of this program in reducing psychological distress were also confirmed from the qualitative evaluations. Participants stated that the program helped them to improve their ability to regulate emotional distress. By anchoring in the present moment using their breath, they became calmer in the face of difficult situations. These large effect sizes found in our study are comparable to those found in a previous study of the clinician-guided, six-lesson Australian internet-delivered mindfulness-based program (Kladnitski et al., 2018, 2020). However, our effect sizes were larger than those reported for the four-lesson, self-guided Australian mindfulness program (Li et al., 2022).

The intervention program was also associated with large and significant positive effects on mental well-being and mindfulness (Hedges'  $g = 0.85\text{--}1.30$ ). Qualitative feedback from participants confirmed the positive effects of program on mindfulness and well-being. Participants reported that the program helped them to improve their positive emotions and physical well-being; increase motivation; develop greater self-awareness, reflection, and acceptance; and enhance their sense of social connection and support. The positive impact

of the program on mindfulness and well-being is consistent with previous research evaluating internet-delivered mindfulness-based interventions in high-income countries (Cavanagh et al., 2013; Kladnitski et al., 2018).

## Limitations and Future Research

This study has limitations. Although our results indicate that the intervention had good feasibility and acceptability, our data did not include participants who dropped out and could not be contacted for post-treatment assessments. Therefore, our findings may overestimate program feasibility and acceptability. Future research should examine reasons for non-adherence and explore avenues to improve completion rates. Second, in this study, students were self-referred and were likely motivated to engage with the program. Our findings may not generalize to less motivated participants or those referred through other ways such as mental health practitioners. Third, the current evaluation relied on self-reported measurements of psychological distress which introduces the possibility of social desirability bias. More objective measurements, such as expert evaluation, diagnostic interviews, biological indicators, or evaluation from significant others could be considered in future studies. Furthermore, we do not know the mechanisms by which psychological distress reduced from pre- to post-treatment. It is conceivable that improvements in mindfulness may improve distress, or that reduced distress may improve mindfulness. Variables that may play an important role, such as acceptance, self-compassion, and emotion regulation, need to be examined as potential mechanisms of change in future studies (Baer, 2009). Finally, we lacked a control group, and therefore, we cannot determine whether the internet-based mindfulness program caused symptom improvements compared to other factors, such as time or changes in participants' biopsychosocial context. We also lacked follow-up measurements, leaving the longer-term outcomes of the program unknown.

This is the first study conducted in LMICs in the Southeast Asian region that showed a guided culturally adapted internet-based mindfulness intervention was feasible and acceptable among Indonesian university students experiencing psychological distress. Despite its limitations, this pilot study provided important insights about the implementation of a culturally adapted internet-delivered mindfulness intervention among people coming from collectivistic backgrounds in LMICs, within the Southeast Asian region. Since previous studies have highlighted an urgent need to evaluate the culturally adapted mindfulness interventions (Creswell, 2017; Oman, 2023), this study provides important evidence of the benefits of culturally adapted mindfulness interventions delivered over the internet, especially among a population that has been understudied in the literature. This study

showed that an Indonesian guided culturally adapted internet-delivered mindfulness program was feasible, acceptable, and associated with improvement in the mental health of Indonesian university students experiencing distress. Thus, an RCT with follow-up is now needed to evaluate the efficacy and longer-term benefit of this program.

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**Author Contribution** RAL developed *PSIDAMAI* content based on the Australian internet-based mindfulness intervention developed by AEJM and JMN. RAL, MM, AEJM, and JMN designed the trial and oversaw the trial protocol. AA facilitated recruitment. NA and PBUK were responsible as a clinical assessor and psychologist related to the participants' safety together with other clinicians. RAL conducted the data analyses with the assistance of AA, NA, and PBUK. RAL drafted the article which was reviewed, revised, and approved by all other authors.

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**Data Availability** All data collected could be accessed upon reasonable request by contacting the authors.

## Declarations

**Ethics Approval** This study was approved by The University of New South Wales Human Research Ethics Committee (HC210006) and Indonesian Consortium of Psychological Science Research Ethics Committee (019/2020 Etik/KPIN) and has therefore been performed in accordance with the ethical standards laid down in the 1964 Declaration of Helsinki and its later amendments.

**Informed Consent** All participants provided informed consent prior to participation in the study.

**Conflict of Interest** The authors declare no competing interests.

**Use of Artificial Intelligence** This manuscript utilized ChatGPT to improve the quality of grammar and clarity.

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## References

- Andrews, G., & Slade, T. (2001). Interpreting scores on the Kessler Psychological Distress Scale (K10). *Australian and New Zealand Journal of Public Health*, 25(6), 494–497. <https://doi.org/10.1111/j.1467-842X.2001.tb00310.x>
- Arjadi, R., Nauta, M. H., Scholte, W. F., Hollon, S. D., Chowdhary, N., Suryani, A. O., Uiterwaal, C., & Bockting, C. L. H. (2018). Internet-based behavioural activation with lay counsellor support versus online minimal psychoeducation without support for treatment of depression: A randomised controlled trial in Indonesia. *Lancet Psychiatry*, 5(9), 707–716. [https://doi.org/10.1016/S2215-0366\(18\)30223-2](https://doi.org/10.1016/S2215-0366(18)30223-2)
- 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. *Journal of Abnormal Psychology*, 127(7), 623–638. <https://doi.org/10.1037/abn0000362>
- Awaliyah, A., & Listiyandini, R. A. (2017). Pengaruh rasa kesadaran terhadap kesejahteraan psikologis pada mahasiswa. *Jurnal Psikogenesis*, 5(2), 89–101. <https://doi.org/10.24854/jps.v5i2.498>
- Baer, R. A. (2009). Self-focused attention and mechanisms of change in mindfulness-based treatment. *Cognitive Behaviour Therapy*, 38, 15–20. <https://doi.org/10.1080/16506070902980703>
- Baer, R. A., Smith, G. T., Hopkins, J., Krietemeyer, J., & Toney, L. (2006). Using self-report assessment methods to explore facets of mindfulness. *Assessment*, 13(1), 27–45. <https://doi.org/10.1177/1073191105283504>
- Barrera, M., Jr., Castro, F. G., Strycker, L. A., & Toobert, D. J. (2013). Cultural adaptations of behavioral health interventions: A progress report. *Journal of Consulting and Clinical Psychology*, 81(2), 196–205. <https://doi.org/10.1037/a0027085>
- Baumeister, H., Reichler, L., Munzinger, M., & Lin, J. (2014). The impact of guidance on Internet-based mental health interventions—A systematic review. *Internet Interventions*, 1(4), 205–215. <https://doi.org/10.1016/j.invent.2014.08.003>
- Beshai, S., Desjarlais, S. M., & Green, B. (2023). Perspectives of indigenous university students in Canada on mindfulness-based interventions and their adaptation to reduce depression and anxiety symptoms. *Mindfulness*, 14(3), 538–553. <https://doi.org/10.1007/s12671-023-02087-7>
- Blignault, I., Saab, H., Woodland, L., Mannan, H., & Kaur, A. (2021). Effectiveness of a community-based group mindfulness program tailored for Arabic and Bangla-speaking migrants. *International Journal of Mental Health Systems*, 15, 32. <https://doi.org/10.1186/s13033-021-00456-0>
- Boss, L., Lehr, D., Reis, D., Vis, C., Riper, H., Berking, M., & Ebert, D. D. (2016). Reliability and validity of assessing user satisfaction with web-based health interventions. *Journal of Medical Internet Research*, 18(8), e234. <https://doi.org/10.2196/jmir.5952>
- Castellanos, R., Yildiz Spinel, M., Phan, V., Orenge-Aguayo, R., Humphreys, K. L., & Flory, K. (2020). A systematic review and meta-analysis of cultural adaptations of mindfulness-based interventions for Hispanic populations. *Mindfulness*, 11(2), 317–332. <https://doi.org/10.1007/s12671-019-01210-x>
- Cavanagh, K., Strauss, C., Cicconi, F., Griffiths, N., Wyper, A., & Jones, F. (2013). A randomised controlled trial of a brief online mindfulness-based intervention. *Behavior Research and Therapy*, 51(9), 573–578. <https://doi.org/10.1016/j.brat.2013.06.003>



- Creswell, J. D. (2017). Mindfulness interventions. *Annual Review of Psychology*, 68, 491–516. <https://doi.org/10.1146/annurev-psych-042716-051139>
- Deville, G. J., & Borkovec, T. D. (2000). Psychometric properties of the credibility/ expectancy questionnaire. *Journal of Behavior Therapy and Experimental Psychiatry*, 31, 73–86. [https://doi.org/10.1016/S0005-7916\(00\)00012-4](https://doi.org/10.1016/S0005-7916(00)00012-4)
- Eldridge, S. M., Chan, C. L., Campbell, M. J., Bond, C. M., Hopewell, S., Thabane, L., Lancaster, G. A., Group P. (2016). CONSORT 2010 statement: Extension to randomised pilot and feasibility trials. *Pilot and Feasibility Studies*, 2, 64. <https://doi.org/10.1186/s40814-016-0105-8>
- Eldridge, S. M., Lancaster, G. A., Campbell, M. J., Thabane, L., Hopewell, S., Coleman, C. L., & Bond, C. M. (2016b). Defining feasibility and pilot studies in preparation for randomised controlled trials: Development of a conceptual framework. *PLoS ONE*, 11(3), e0150205. <https://doi.org/10.1371/journal.pone.0150205>
- Farrer, L., Gulliver, A., Chan, J. K., Batterham, P. J., Reynolds, J., Calear, A., Tait, R., Bennett, K., & Griffiths, K. M. (2013). Technology-based interventions for mental health in tertiary students: Systematic review. *Journal of Medical Internet Research*, 15(5), e101. <https://doi.org/10.2196/jmir.2639>
- Farrer, L., Gulliver, A., Katruss, N., Fassnacht, D. B., Kyrios, M., & Batterham, P. J. (2019). A novel multi-component online intervention to improve the mental health of university students: Randomised controlled trial of the Uni Virtual Clinic. *Internet Interventions*, 18, 100276. <https://doi.org/10.1016/j.invent.2019.100276>
- Fourianalistyawati, E., Listiyandini, R. A., & Fitriana, T. S. (2016). Hubungan mindfulness dan kualitas hidup orang dewasa. Forum Ilmiah Psikologi Indonesia (FIPI). [https://www.researchgate.net/publication/318128207\\_Hubungan\\_Mindfulness\\_dan\\_Kualitas\\_Hidup\\_Orang\\_Dewasa](https://www.researchgate.net/publication/318128207_Hubungan_Mindfulness_dan_Kualitas_Hidup_Orang_Dewasa)
- Fu, Z., Burger, H., Arjadi, R., & Bockting, C. L. H. (2020). Effectiveness of digital psychological interventions for mental health problems in low-income and middle-income countries: A systematic review and meta-analysis. *The Lancet Psychiatry*, 7(10), 851–864. [https://doi.org/10.1016/s2215-0366\(20\)30256-x](https://doi.org/10.1016/s2215-0366(20)30256-x)
- Furukawa, T. A., Kessler, R. C., Slade, T., & Andrews, G. (2003). The performance of the K6 and K10 screening scales for psychological distress in the Australian National Survey of Mental Health and Well-Being. *Psychological Medicine*, 33(2), 357–362. <https://doi.org/10.1017/s0033291702006700>
- Harrer, M., Adam, S. H., Fleischmann, R. J., Baumeister, H., Auerbach, R., Bruffaerts, R., Cuijpers, P., Kessler, R. C., Berking, M., Lehr, D., & Ebert, D. D. (2018). Effectiveness of an internet- and app-based intervention for college students with elevated stress: Randomized controlled trial. *Journal of Medical Internet Research*, 20(4), e136. <https://doi.org/10.2196/jmir.9293>
- Hartini, N., Fardana, N. A., Ariana, A. D., & Wardana, N. D. (2018). Stigma toward people with mental health problems in Indonesia. *Psychology Research and Behavior Management*, 11, 535–541. <https://doi.org/10.2147/PRBM.S175251>
- Henry, J. D., & Crawford, J. R. (2005). The short-form version of the Depression Anxiety Stress Scales (DASS-21): Construct validity and normative data in a large non-clinical sample. *British Journal of Clinical Psychology*, 44(2), 227–239. <https://doi.org/10.1348/014466505x29657>
- Herrero, R., Mira, A., Cormo, G., Etxemendy, E., Banos, R., Garcia-Palacios, A., Ebert, D. D., Franke, M., Berger, T., Schaub, M. P., Gorlich, D., Jacobi, C., & Botella, C. (2019). An internet based intervention for improving resilience and coping strategies in university students: Study protocol for a randomized controlled trial. *Internet Interventions*, 16, 43–51. <https://doi.org/10.1016/j.invent.2018.03.005>
- Jessop, D. C., Reid, M., & Solomon, L. (2020). Financial concern predicts deteriorations in mental and physical health among university students. *Psychology & Health*, 35(2), 196–209. <https://doi.org/10.1080/08870446.2019.1626393>
- Julious, S. A. (2005). Sample size of 12 per group rule of thumb for a pilot study. *Pharmaceutical Statistics*, 4(4), 287–291. <https://doi.org/10.1002/pst.185>
- Juniar, D., van Ballegooijen, W., Schulte, M., van Schaik, A., Passchier, J., Heber, E., Lehr, D., Sadarjoen, S. S., & Riper, H. (2022). A web-based stress management intervention for university students in Indonesia (Rileks): Feasibility study using a pretest-posttest design. *JMIR Formative Research*, 6(7), e37278. <https://doi.org/10.2196/37278>
- Kabat-Zinn, J. (2003a). Mindfulness-based interventions in context: Past, present, and future. *Clinical Psychology: Science and Practice*, 10(2), 144–156. <https://doi.org/10.1093/clipsy.bpg016>
- Kabat-Zinn, J. (2003). Mindfulness-based stress reduction (MBSR). *Constructivism in the Human Sciences*, 8(2), 73–107. <https://psycnet.apa.org/record/2004-19791-008>
- Kaloeti, D. V. S., Rahmandani, A., Sakti, H., Salma, S., Suparno, S., & Hanafi, S. (2018). Effect of childhood adversity experiences, psychological distress, and resilience on depressive symptoms among Indonesian university students. *International Journal of Adolescence and Youth*, 24(2), 177–184. <https://doi.org/10.1080/02673843.2018.1485584>
- Kessler, R. C., Andrews, G., Colpe, L. J., Hiripi, E., Mroczek, D. K., Normand, S. L., & Zaslavsky, A. M. (2002). Short screening scales to monitor population prevalences and trends in non-specific psychological distress. *Psychological Medicine*, 32(6), 959–976. <https://doi.org/10.1017/S0033291702006074>
- Kinanthi, M. R., Listiyandini, R. A., Amaliah, U. S., Ramadhanty, R., & Farhan, M. (2020). Adaptasi DASS 21 versi Indonesia pada populasi mahasiswa di Jakarta. *Seminar Nasional dan Call for Paper UMB Yogyakarta*. [https://www.researchgate.net/publication/339616412\\_Adaptasi\\_Alut\\_Ukur\\_DASS-21\\_Versi\\_Indonesia\\_pada\\_Populasi\\_Mahasiswa](https://www.researchgate.net/publication/339616412_Adaptasi_Alut_Ukur_DASS-21_Versi_Indonesia_pada_Populasi_Mahasiswa)
- Kladnitski, N., Smith, J., Allen, A., Andrews, G., & Newby, J. M. (2018). Online mindfulness-enhanced cognitive behavioural therapy for anxiety and depression: Outcomes of a pilot trial. *Internet Interventions*, 13, 41–50. <https://doi.org/10.1016/j.invent.2018.06.003>
- Kladnitski, N., Smith, J., Uppal, S., James, M. A., Allen, A. R., Andrews, G., & Newby, J. M. (2020). Transdiagnostic internet-delivered CBT and mindfulness-based treatment for depression and anxiety: A randomised controlled trial. *Internet Interventions*, 20, 1–14. <https://doi.org/10.1016/j.invent.2020.100310>
- Lancaster, G. A., & Thabane, L. (2019). Guidelines for reporting non-randomised pilot and feasibility studies. *Pilot and Feasibility Studies*, 5(114), 1–16. <https://doi.org/10.1186/s40814-019-0499-1>
- Leon, A. C., Davis, L. L., & Kraemer, H. C. (2011). The role and interpretation of pilot studies in clinical research. *Journal of Psychiatry Research*, 45(5), 626–629. <https://doi.org/10.1016/j.jpsyc.2010.10.008>
- Li, I., Chen, A. Z., Newby, J. M., Kladnitski, N., Haskelberg, H., Millard, M., & Mahoney, A. (2022). The uptake and outcomes of an online self-help mindfulness programme during COVID-19. *Clinical Psychologist*, 26(3), 255–268. <https://doi.org/10.1080/13284207.2022.2045866>
- Lilja, J. L., Lundh, L.-G., Josefsson, T., & Falkenström, F. (2012). Observing as an essential facet of mindfulness: A comparison of FFMQ patterns in meditating and non-meditating individuals. *Mindfulness*, 4(3), 203–212. <https://doi.org/10.1007/s12671-012-0111-8>
- Listiyandini, R. A., Andriani, A., Kusristanti, C., Moulds, M., Mahoney, A., & Newby, J. M. (2023). Culturally adapting an internet-delivered mindfulness intervention for Indonesian



- university students experiencing psychological distress: Mixed methods study. *JMIR Formative Research*, 7, e47126. <https://doi.org/10.2196/47126>
- Lovibond, P. F., & Lovibond, S. H. (1995a). The structure of negative emotional states: Comparison of the Depression Anxiety Stress Scales (DASS) with the Beck Depression and Anxiety Inventories. *Behaviour Research and Therapy*, 33(3), 335–343. [https://doi.org/10.1016/0005-7967\(94\)00075-u](https://doi.org/10.1016/0005-7967(94)00075-u)
- Lovibond, S. H., & Lovibond, P. F. (1995b). *Manual for the Depression Anxiety Stress Scale* (2nd ed.). Psychology Foundation.
- Maulana, H., Khawaja, N. G., & Obst, P. (2019). Development and validation of the Indonesian Well-being Scale. *Asian Journal of Social Psychology*, 22(3), 268–280. <https://doi.org/10.1111/ajsp.12366>
- Merson, F., Newby, J., Shires, A., Millard, M., & Mahoney, A. (2021). The temporal stability of the Kessler Psychological Distress Scale. *Australian Psychologist*, 56(1), 38–45. <https://doi.org/10.1080/00050067.2021.1893603>
- Muñoz, R. F. (2010). Using evidence-based internet interventions to reduce health disparities worldwide. *Journal of Medical Internet Research*, 12(5), e60. <https://doi.org/10.2196/jmir.1463>
- Musanje, K., Camlin, C. S., Kanya, M. R., Vanderplasschen, W., Louise Sinclair, D., et al. (2023). Culturally adapting a mindfulness and acceptance-based intervention to support the mental health of adolescents on antiretroviral therapy in Uganda. *PLOS Global Public Health*, 3(3), e0001605. <https://doi.org/10.1371/journal.pgph.0001605>
- Musiati, P., Johnson, C., Atkinson, M., Wilksch, S., & Wade, T. (2022). Impact of guidance on intervention adherence in computerised interventions for mental health problems: A meta-analysis. *Psychological Medicine*, 52(2), 229–240. <https://doi.org/10.1017/S0033291721004621>
- Oman, D. (2023). Mindfulness for global public health: Critical analysis and agenda. *Mindfulness*. <https://doi.org/10.1007/s12671-023-02089-5>
- Palitsky, R., Lyons, M. J., & Kaplan, D. M. (2023). Beyond hub-and-spoke adaptation: Religiously and culturally responsive implementation of mindfulness for global public health. *Mindfulness*. <https://doi.org/10.1007/s12671-023-02276-4>
- Rahmadiana, M., Karyotaki, E., Schulte, M., Ebert, D. D., Passchier, J., Cuijpers, P., Berger, T., van Ballegooijen, W., Wimbarti, S., & Riper, H. (2021). Transdiagnostic internet intervention for Indonesian university students with depression and anxiety: Evaluation of feasibility and acceptability. *JMIR Mental Health*, 8(3), e20036. <https://doi.org/10.2196/20036>
- Rodriguez-Villa, E., Naslund, J., Keshavan, M., Patel, V., & Torous, J. (2020). Making mental health more accessible in light of COVID-19: Scalable digital health with digital navigators in low and middle-income countries. *Asian Journal of Psychiatry*, 54, 102433. <https://doi.org/10.1016/j.ajp.2020.102433>
- Sarfraz, A., & Siddiqui, S. (2023). Cultural adaptation of a mindfulness-based intervention for young adults: An application of heuristic framework. *Pakistan Journal of Social Research*, 5(2), 40–53. <https://doi.org/10.52567/pjrs.v5i02.1166>
- Segal, Z. V., Teasdale, J. D., & Williams, J. M. G. (2004). Mindfulness-based cognitive therapy: Theoretical rationale and empirical status. In S. C. Hayes, V. M. Follette, & M. M. Linehan (Eds.), *Mindfulness and acceptance: Expanding the cognitive-behavioral tradition* (pp. 45–65). The Guilford Press. <https://psycnet.apa.org/record/2005-02461-003>
- Setiawan, J. L. (2006). Willingness to seek counselling, and factors that facilitate and inhibit the seeking of counselling in Indonesian undergraduate students. *British Journal of Guidance & Counselling*, 34(3), 403–419. <https://doi.org/10.1080/03069880600769654>
- Slade, T., Grove, R., & Burgess, P. (2011). Kessler Psychological Distress Scale: Normative data from the 2007 Australian National Survey of Mental Health and Wellbeing. *Australian and New Zealand Journal of Psychiatry*, 45, 308–316. <https://doi.org/10.3109/00048674.2010.543653>
- Sommers-Spijkerman, M., Austin, J., Bohlmeijer, E., & Potts, W. (2021). New evidence in the booming field of online mindfulness: An updated meta-analysis of randomized controlled trials. *JMIR Mental Health*, 8(7), e28168. <https://doi.org/10.2196/28168>
- Spek, V., Cuijpers, P., Nyklicek, I., Riper, H., Keyzer, J., & Pop, V. (2007). Internet-based cognitive behaviour therapy for symptoms of depression and anxiety: A meta-analysis. *Psychological Medicine*, 37(3), 319–328. <https://doi.org/10.1017/S0033291706008944>
- Teasdale, J. D., Segal, Z. V., Williams, J. M., Ridgeway, V. A., Soulsby, J. M., & Lau, M. A. (2000). Prevention of relapse/recurrence in major depression by mindfulness-based cognitive therapy. *Journal of Consulting and Clinical Psychology*, 68(4), 615–623. <https://doi.org/10.1037//0022-006x.68.4.615>
- Tran, T. D., Kaligis, F., Wiguna, T., Willenberg, L., Nguyen, H. T. M., Luchters, S., Azzopardi, P., & Fisher, J. (2019). Screening for depressive and anxiety disorders among adolescents in Indonesia: Formal validation of the centre for epidemiologic studies depression scale - revised and the Kessler Psychological Distress Scale. *Journal of Affective Disorder*, 246, 189–194. <https://doi.org/10.1016/j.jad.2018.12.042>
- Tristian, R. D., Yusuf, A., Fitriyari, R., Wahyuni, S. D., & Nihayati, H. E. (2018). Perceived barriers on mental health services by the family of patients with mental illness. *International Journal of Nursing Sciences*, 5(1), 63–67. <https://doi.org/10.1016/j.ijnss.2017.12.003>
- Wijayaningsih, A., Hasanah, M., & Sholichah, I. (2022). Efektivitas pelatihan mindfulness untuk mengatasi insomnia pada mahasiswa. *Jurnal Ilmiah Psikologi Terapan*, 10(1), 257–266. <https://doi.org/10.22219/jipt.v10i1.16086>
- Yusainy, C., Nurwanti, R., Dharmawan, I. R. J., Andari, R., Mahmudah, M. U., Tiyas, R. R., Husnaini, B. H. M., & Anggono, C. O. (2018). Mindfulness sebagai strategi regulasi emosi. *Jurnal Psikologi*, 17(2), 174–188. <https://doi.org/10.14710/jp.17.2.174-188>

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