A randomised trial to evaluate the effectiveness of an Islamic psychospiritual ACT-based prevention program for at-risk young adults during the COVID-19 pandemic

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Abstract

Objective: With rising psychological concerns amidst the pandemic, efforts are needed to preserve the mental health of at-risk populations. The present study examined the effectiveness of *i-ACT for Life*[TM] ,an Islamic psychospiritual Acceptance and Commitment Therapy-based prevention program to reduce psychological distress in at-risk young adults in Malaysia during the COVID-19 pandemic. **Method:** Study was preregistered at ClinicalTrials.gov (NCT04870385). Purposive sampling was used to recruit university students studying in Malaysia (n=93, 78% female) aged 18-29 years old. Participants were randomised to either receive the prevention program (n=46) or be waitlisted (n=47), and were asked to complete assessments at pre-intervention, mid-intervention, post-intervention, and 1-month follow-up. Outcome assessed were anxiety, stress, depression, self-compassion, psychological flexibility, and resilience. **Results:** Intention-to-treat analyses using Last Observation Carried Forward reported significant between-group effects at post-intervention and follow-up (p<.05), and a significant overall effect of time across the four time points (p<.001). **Conclusions:** Findings suggest that web-based prevention programs are effective for preserving the mental health of Muslim young adults in Malaysia during the pandemic, and support the integration of Islamic spiritual elements into traditional cognitive-behavioural and mindfulness techniques to improve acceptability of mental health interventions.

Keywords: COVID-19, Islamic psychospiritual intervention, Acceptance and Commitment Therapy, Prevention program, Psychological distress

Public health Significance Statement

This study strongly suggests that *i-ACT for Life*[TM] is effective at preserving the mental health of at-risk young adults during the pandemic, and highlights the importance of catering mental health interventions to the religio-cultural characteristics of the targeted population.

Funding and support

Introduction

The global prevalence of mental health issues in the general population has increased significantly since the start of the COVID-19 pandemic (Xiong et al., 2020). Even so, the psychological impact of the pandemic is expected to outlast the current viral outbreak (Varma et al., 2021), with societies facing economic contraction, limited mental healthcare resources, and dramatically changed lifestyles (Gavin et al., 2020). Globally, the burden of mental disorder falls most heavily on young adults (Vos et al, 2020), and this trend continues to exist even in the current pandemic (Xiong et al., 2020).

The inherent distress of unstable social relationships, job commitments, and general life structure make young adults more vulnerable to developing mental disorders (Arnett et al., 2014; Gustavson et al., 2018). The social and economic disruptions of the pandemic stand to exacerbate these stressors of young adulthood, putting an already vulnerable population at higher risk (Shanahan et al., 2020). In Malaysia, alarming pre-pandemic rates of psychological distress reported by young adults under 30 (Institute of Public Health, 2020) have led to the demographic being at higher risk and reporting higher levels of psychological distress during the pandemic compared to other age groups (Ding et al., 2021). A majority of those affected are university students (Wong et al., 2021), citing financial constraints, remote learning, and future uncertainty as some of the most prominent pandemic-specific stressors (Sundarasen et al., 2020).

The pandemic has challenged the ways of modern healthcare delivery, and remote methods of delivering evidence-based mental healthcare are more important now than before (Ho et al., 2020). Digital mental health interventions (DMHI) have already been lauded for its ability to reduce cost, transcend physical limits, and increase flexibility and autonomy of users (Wasil et al., 2021), making its use arguably vital in managing the mental health impact of the pandemic Given that rates of mental disorders are expected to increase post-pandemic

(Varma et al., 2021), novel methods to introduce preventative mental health interventions are needed to reduce the strain on Malaysia's already overburdened mental healthcare system (Beckstein et al., 2021).

Several protective factors have been identified that can help mitigate the psychological distress associated with COVID-19, and these include psychological flexibility (Kroska et al., 2020), self-compassion (Lau et al., 2020), and resilience (Paredes et al., 2020). Accordingly, interventions to lessen the psychological impact of the pandemic should seek to develop or enhance these personal resources. Acceptance and Commitment Therapy (ACT) not only targets development of these resources, but also heavily features cognitive behavioural and mindfulness strategies, both of which have been emphasised for use during the pandemic (Ding et al., 2020; Ho et al., 2020). As a transdiagnostic, acceptance- and mindfulness-based behavioural approach, ACT can be particularly useful in helping individuals foster awareness, accept difficult internal experiences, and pursue personal values, even amidst COVID-19 adversity (Kroska et al., 2020). Internet-based ACT interventions have been shown effective at improving a variety of mental health problems (Thompson et al., 2020), yet the effectiveness of internet-based ACT interventions in preserving the mental health of young adults during the pandemic remains unknown.

Major disasters tend to promote increased reliance on spirituality and religiosity (Aten et al., 2019), and the early months of the pandemic reported a phenomenal increase in religious and/or spiritual coping on a global scale (Bentzen, 2020). Positive religious coping during the pandemic have been shown to buffer the psychological impact in religious populations (Counted et al., 2020; Thomas & Barbato, 2020), and given these findings, integrating religious coping techniques with evidence-based mental health interventions have been emphasised (Counted et al., 2020). Indeed, past research has shown that religio-spiritual integrated psychological treatments have resulted in greater psychological and spiritual

improvements compared with no treatment controls and standard non religio-spiritual psychotherapy (Captari et al., 2018).

As a Muslim-majority population, the religiosocial characteristics of Malaysians need to be considered in dispensing any form of psychological treatment. Past studies on Muslim-based psychotherapies have shown that integrating Islamic practices led to significantly better results in improving diverse mental health outcome (Koenig et al., 2012), and a systematic review of treatments of anxiety disorders in Malaysia have shown that treatments that are religious, spiritual, and culturally appropriate produced higher effect sizes (Abdul Khaiyom et al., 2019). Despite conceptual commonalities shared between the principles of ACT and Islam, no existing study has yet to investigate how ACT can be specifically adapted to Muslims populations (Tanhan, 2019). Although an ACT intervention would be effective on its own, given the cultural characteristics of the Malaysian population, integrating Islamic elements can serve to increase the effectiveness by utilising existing spiritual resources in Muslims in tandem with the intervention itself (Tanhan, 2019).

The present study aims to investigate the effectiveness of *i-ACT for Life*™, a web-based Islamic psychospiritual ACT-based prevention program in reducing psychological distress and improving the psychological flexibility, self-compassion, and resilience of at-risk young adults in Malaysia during the COVID-19 pandemic. It was hypothesised that young adults receiving the program would report significant improvements in all outcomes after receiving the intervention, and would report significant improvements in all outcomes when compared to a waitlist control group. Investigating novel and culturally relevant methods of preserving mental health can contribute to more effective future community-wide prevention of psychological distress for young adults in Malaysia.

Method

Transparency and Openness

We report sample size determination, all data exclusions, all manipulations, and all measures in the study, and we follow Journal Article Reporting Standards (JARS; Appelbaum et al., 2018). This study's design and hypotheses were retrospectively registered at ClinicalTrials.gov (NCT04870385). Unless otherwise specified, data analyses were conducted using IBM SPSS. Data and materials for this study are not available.

Participants and Recruitment

Participants consisted of young adults in Malaysia who were recruited using purposive sampling. Young adults who were enrolled in an undergraduate or postgraduate program in a Malaysian higher education institute, aged 18-29 years old, obtained moderate and above levels of severity for either one of the stress, anxiety, and depression subscales of the 21-item Depression, Anxiety and Stress Scale (DASS-21) during the screening assessment, were Muslim, owned an electronic gadget with Internet access, and can read and understand English were eligible to receive the intervention. Young adults with self-reported past or present diagnosis of a mental and/or neurological disorder, who have had previous experience with a modular ACT-based treatment with Islamic elements, who were experiencing active suicidality at time of screening, and who were involved in any other form of psychological treatment (i.e., psychotherapy, pharmacotherapy) were excluded from participation in the study. The exclusion criteria were set to minimise any risks of further harm to vulnerable populations given that *i-ACT for Life*™ is a fully web-based preventative intervention involving no specialised professional assistance.

Of the 257 young adults screened for eligibility (see Figure 1 for the CONSORT diagram of participant flow), 127 met the inclusion criteria; of these, 93 were enrolled in the study (a 73% recruitment rate). Sample size was informed by an *a priori* power analysis using GPower. Using effect sizes reported by Thompson and colleague's (2020) meta-analysis of internet-based ACT treatments, a sample size of 57 was sufficient for detecting

significant between-group effects at .80 power using an analysis of covariance (ANCOVA).

Equal (1:1) randomisation of participants across the study's two treatment groups were

conducted using the *randomizr* package (Coppock, 2019) on RStudio (RStudio Team, 2020;

R Core Team, 2021). Table 1 shows the demographic characteristics of the sample at

baseline.

Intervention

The *i-ACT for Life*™ prevention program was developed based on the World Health

Organization's (WHO) stress management guide for coping with adversity (WHO, 2020), a

module featuring five of the six core ACT processes: Contact with the Present Moment,

Cognitive Defusion, Values, Committed Action, and Acceptance. The ACT elements from

the module were supplemented with additional strategies taken from evidence-based ACT

and positive psychology protocols (Harris & Hayes, 2009; Hayes & Smith, 2005; Hayes &

Strosahl, 2011; Neff & Germer, 2018). Appropriate elements of Islamic spirituality, such as

Quranic verses, hadith, and dhikr, were integrated based extensive discussions by subject

matter experts in the field of clinical psychology, psychiatry, Islamic studies, and linguistics.

i-ACT for Life™ consists of five weekly modules that each correspond to a core ACT

process. A summary of each week's module and example of exercises is presented in Table 2.

The contents of the program's modules were designed for delivery through instant-messaging

platforms, in the form of images, videos, audio files, text messages, and online interactive

psychoeducation quizzes. Additionally, culturally relatable cartoon illustrations were

commissioned to complement the Islamic elements and increase the appeal of the overall

program. Each module contained 10–15-minute exercises that – while delivered daily from

Monday to Friday – can be repeatedly engaged with at any point in time.

The intervention opened with an introduction for the program, and at the beginning of

each week, a summary of the week's module was given on Sunday night. The respective

ACT and Islamic elements of the module were then delivered alternately throughout the weekdays. Delivery of the program materials were automated by the application, which allowed all participants to receive the program materials concurrently throughout the whole program. In the middle of each week, participants received additional reminders to engage with the week's exercises.

At the end of each week, participants were given a Google form where they had to complete a checklist of the daily exercises they engaged in for the past week, and submit a brief reflection on their experiences engaging with the exercises as part of an adherence check. Participants had roughly 3 days (Friday-Sunday) to fill and submit their weekly reflection forms, during which they would not receive any program materials. To prevent contamination, participants would receive twice-weekly reminders to avoid sharing any of the program materials or exercises to any outside parties.

Procedure

The study protocol received institutional ethics approval (IREC 2021-047). A month-long recruitment process began in March 2021 with the spread of recruitment posters and questionnaire link through social media channels. The screening questionnaire was hosted on Google Forms, and doubled as the baseline (T1) assessment for those who later enrolled in the study. Participants meeting the inclusion criteria were contacted for their consent to participate in the program, and were informed of their expected commitments to the 5-week program, as well as possible honorariums for participation. Participants were given one week to confirm their participation, and those who gave their consent were randomised to the study's two treatment groups. Participants were only informed on the dates from which they would undergo the program, and were not explicitly told of their group allocation within the study.

For participants in the experimental group, the *i-ACT For Life*™ prevention program started on 11th April 2011 and lasted for 5 weeks. The entire program was conducted entirely on the web-based messaging platform Telegram, with participants receiving the program materials in tandem with the weekly modules. Throughout the duration of the study, participants were given permission to contact the researcher, and those who reported of overwhelming psychological distress were referred to a clinical psychologist who advised on appropriate methods for assistance. However, personal communications with the participants were limited to only matters pertinent to the prevention program and were kept to a minimum to promote self-help behaviours.

All participants were invited to fill in online assessments at four time points (refer to flowchart in Figure 1). Each assessment was conducted online via Google Forms, and a deep breathing video was embedded at the end of the questionnaire during each assessment in the event participants get triggered with negative feelings when answering the items. Informed consent was obtained at all data collection points. All participants were awarded RM3 ($0.71) for each outcome assessment completed, and those in the experimental group also received an additional RM3 for each weekly reflection they submitted.

Measurements

Participants were asked to supply socio-demographic details, and details on mental health history to screen participants meeting exclusion criteria. Primary outcomes of interest are changes in psychological distress, measured using the DASS-21. Secondary outcome measures are interested in evaluating changes in psychological flexibility, self-compassion, and resilience, respectively measured using the Acceptance and Action Questionnaire (AAQ-II), the Self-Compassion Scale (SCS), and the Brief Resilience Scale (BRS).

Depression, Anxiety and Stress Scale – 21 items (DASS-21)

DASS-21 is a self-report scale consisting of 21 items equally divided into three subscales measuring the emotional states of depression, anxiety, and stress (Lovibond & Lovibond, 1995). Items are scored on a 4-point Likert scale ranging from 0 – "did not apply to me at all" to 4 – "applied to me very much or most of the time," and final scale scores are obtained by multiplying subscale scores by 2, with higher scores indicating higher severity for each scale. Both English and Malay versions of the test have been validated in Malaysia, with acceptable reliability estimates reported for each subscale (Zakaria et al, 2017). Reliability estimates at T1 reported Cronbach alphas for DASS-Stress, a=0.76, DASS-Anxiety, a=0.82, and DASS-Depression, a=0.87.

Acceptance and Action Questionnaire (AAQ-II)

The AAQ-II is a unidimensional 7-item scale commonly used to assess psychological flexibility and experiential avoidance (Bond et al., 2011; Hayes et al., 2004). Items are scored on a 7-point Likert scale from 1 (never true) to 7 (always), and responses are summed to produce a total AAQ-II score ranging from 7 to 49, where lower scores indicate higher psychological flexibility. The AAQ-II has reported adequate validity and reliability in non-clinical samples (Bond et al., 2011), and has exhibited adequate discriminant and convergent validity through correlations with theoretically related variables (Bond et al., 2011). Reliability estimates at T1 reported Cronbach's a=0.84, indicating good internal consistency.

Self-Compassion Scale (SCS)

The SCS measures trait levels of self-compassion through 26 items divided into 6 subscales (self-kindness, self-judgement, common-humanity, isolation, mindfulness, over-idenfitication) that assess thoughts, emotions, and behaviours associated with the various components of self-compassion (Neff, 2003). Responses are rated on a 5-point Likert scale ranging from 1 (almost never) to 5 (almost always). Subscale scores are calculated by averaging subscale items, while total self-compassion score is obtained after reversing

negative items (self-judgement, isolation, and over-identification), computing subscale means, and then computing a grand mean of all six subscale means. The scale has exhibited extensive evidence of its validity and reliability (Neff, 2015), and the English version has been shown to reliably measure self-compassion in a sample of Malaysian young adults (α= 0.88; Ping et al., 2020). Reliability estimates at T1 reported a=0.84, indicating good internal consistency.

Brief Resilience Scale (BRS)

The BRS is a unidimensional 6-item scale that assesses an individual's ability to bounce back or recover from stress (Smith et al., 2008). Items are rated on a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree), and 3 of the 6 items are negatively worded. The BRS is scored by reverse coding the negatively worded items and finding the mean of the six items, with total scores ranging from 6-30. Higher scores indicate higher levels of resilience. Construct validity of the BRS has been established through correlations with theoretically similar constructs (Smith et al., 2008), and the English version of the scale has been shown to reliably measure resilience in a sample of Malaysian students (Ali et al., 2018). Reliability estimates at T1 of the present study reported Cronbach's a=0.64.

Data analysis

Descriptive analyses were conducted on sociodemographic variables and outcome variables at all time points. Chi square tests and independent *t*-tests on sociodemographic variables and outcome variables at T1 showed no significant differences between the two groups (Table 1).

Analyses of primary and secondary outcomes were conducted on the principle of both intention-to-treat (ITT) and per-protocol (PP). For the ITT analyses, the conservative single imputation method of last observation carried forward (LOCF) was used to impute the missing data for all participants who were enrolled into the program, regardless of whether

they received the intervention. 5.4% of the sociodemographic variables were missing, while

20% of outcome variables were missing at T2, 16% at T3, and 18.28% at T4. Little's MCAR

test (Little, 1988) on all outcome and covariate variables were non-significant, indicating that

missingness was completely at random (MCAR, $\chi2$ (192) = 157.352, p = .968).

Repeated measures ANOVAs were conducted to assess for within-group changes for

all outcomes from T1 to T4. ANCOVAs were conducted to measure the effect of group on

outcome variables at T2, T3, and T4, with variable baseline score, gender, field of study,

level of study, and type of degree set as covariates. PP analyses only investigated the changes

across time for completers, identified as participants receiving the intervention who submitted

weekly reflections for all five weeks. Effect sizes for ANCOVAs are reported as partial eta

squared (η_p^2) and interpreted as small=0.01; medium=0.06; large=0.14 (Cohen, 1988). 90%

confidence intervals for the effect size were calculated using the MBESS package (Kelley,

2020) on R. All inferential analyses were interpreted at a 0.05 significance level.

Results

Adherence

Adherence to the prevention program was measured through the number of weekly

reflections submitted throughout the intervention period. Table 3 shows the adherence rates

of participants in the experimental group for each weekly module. Adherence for the first two

weeks was high (80.43%) yet was not full, and the adherence rates declined throughout the 5-

week duration, with only 30 participants (65.22%) submitting a weekly reflection for the final

week of the prevention program. Of the 46 participants who received the program, only 23

submitted reflections for each weekly module, and of these 23, only 14 reported to have

engaged in at least 4 exercises per week. Throughout the whole program, 3 participants did

not submit any weekly reflections at all.

Reliable change and clinical significance

Thresholds for assessing reliable change and clinical significance were specified after completion of data collection. 'Reliable clinical significance' of the prevention program was defined by meeting the following criteria (Cullen et al., 2021): (1) Reliable change scores as indicated by the Jacobson-Truax Reliable Change Index (RCI), where RCI=(Xa-X0)/Sdiff , where, Xa= scale score at one of the time point after baseline, X0: baseline scale score, Sdiff =√2*Se2, Se = SD*√(1-r), SD is the standard deviation and r is the reliability coefficient (internal consistency) of the measurement scale at baseline (Jacobson & Truax, 1991; Evans et al., 1998), and; (2) Improvement in severity level of the DASS (Anxiety, Stress, Depression) subscales.

Based on the two factors above, the change scores from baseline to mid-intervention, post-intervention, and to 1-month post-intervention, of the DASS anxiety, stress, and depression scores for the intervention group were classified into three categories (Cullen et al., 2021): (1) Reliable improvement (RCI≤-1.96 and moving from a higher level to a lower level); (2) No reliable change (-1.96<RCI <1.96) or non-clinically significant changes (stay in the same level of severity), or; (3) Reliable deterioration (RCI≥-1.96 and moving from a lower level to a higher level).

Tables 4-6 shows the number of participants from the experimental group, separated into completers (n=23) and non-completers (n=23), grouped into the three categories for each of the DASS subscales. Most completers showed no reliable change in anxiety at T2 to T4 (65-74%), though compared to non-completers, no completers showed reliable deterioration for anxiety throughout the study. Similarly, most of the completers also showed no reliable change in stress and depression throughout the study, though a minority of completers (<10%) showed reliable deteriorations for both stress and depression. The number of completers and non-completers who showed reliable improvement at T3 and T4 for stress

and anxiety were similar (30-35%), whereas completers showed the most reliable improvement for depression at T4 (39.13%).

Outcomes

Table 7-8 shows the means and standard deviations reported by the experimental and control group for outcome variables at all time points. Repeated measures ANOVAs show significant improvements over time for primary and secondary outcomes in the experimental group ($p<0.001$), whereas no significant changes were reported by the control group. For components of self-compassion, the experimental group reported significant improvements in self-judgement, isolation, and overidentification ($p<0.05$). Per protocol analyses (Table 9) on the completer sample showed similar improvements in all primary and secondary outcomes across the four time points, as well as in the same three SCS subscales ($p<0.05$).

Results comparing outcomes between the two groups at T2, T3, and T4 are reported in Table 10. At mid-intervention, significant effects were only detected for stress, anxiety, and resilience ($p<0.05$), whilst at T3 and T4, the experimental group reported significant improvements in all primary and secondary outcomes compared to the control group ($p<0.05$). Of the six components of self-compassion, between-group differences were only detected for self-kindness, self-judgement, mindfulness, and over-identification at post-intervention and follow-up ($p<0.05$).

<center>**Discussion**</center>

This study was conducted to the test effectiveness of *i-ACT for Life*™, an ACT-based Islamic psychospiritual prevention program, in reducing psychological distress and improving coping skills in at-risk young adults during the COVID-19 pandemic. A total of 93 Malaysian university students with moderate-and-above levels of psychological distress were recruited to receive the 5-week prevention program over a web-based instant messaging platform. Results support the study's hypotheses, and showed that those who received the

web-based prevention program reported significant improvements in all primary and secondary outcomes at the end of the program and at one month follow-up. In addition, results showed significant treatment effects on all outcome variables, with medium-to-large effect sizes for between-group differences at post-intervention and at one-month follow-up.

Very limited intervention studies have been conducted to address the psychological impact of the pandemic, and our results support previous trials which have shown that brief and scalable online interventions are effective at reducing psychological distress during the pandemic (Wahlund et al., 2021; Pheh et al., 2020). Given the expected lasting mental health effects of COVID-19, scalable, low-intensity, and easily acceptable preventive interventions are needed to prevent higher onset of mental disorders in young adults during the pandemic's aftermath.

Although other internet-based interventions have been conducted during the pandemic, to our knowledge, this was the first to have conducted a self-help intervention during the pandemic via an instant-messaging platform. Previous studies have shown the effectiveness of web-based instant-messaging mental health interventions (Pandya, 2021), and our findings further support the use of this medium in conducting mental health interventions. The rural and urban divide in mental healthcare in low- and middle-income countries has been identified as a major limitation to address pandemic-related psychological distress (De Sousa et al., 2020). Considering that smartphone ownership is significantly higher among Malaysians compared to ownership of personal computers or tablets (Abdul Hamid & Khalidi, 2020), delivering the program through Telegram – a web-based platform that comes in the form of both mobile application and computer software – made the program more accessible to the general population of Malaysia, thus overcoming possible socioeconomic barriers that might prevent participation in exclusive computer-based online interventions (Richards & Richardson, 2012).

Given the systemic and social divisions that tend to separate religiosity and/or spirituality and mental health treatment in low- and middle-income countries (De Sousa et al., 2020), the *i-ACT for Life*™ program was a novel way to introduce the evidence-based cognitive-behavioural and mindfulness techniques of ACT – which are generally deemed as secular approaches to mental health – to the religious Muslim population of Malaysia. Effect sizes reported in our study were generally larger compared to other online interventions during the pandemic (Wahlund et al., 2021; Pheh et al., 2020), which support the sentiment that religiously integrated mental health intervention might be more effective for the Malaysian population (Abdul Khaiyom et al., 2019).

Despite promising results on the effectiveness of *i-ACT for* Life™, this study had several limitations that should be taken into consideration. Our sample comprised exclusively of university students, which limits the generalisability of the program's effectiveness. Although university students are faced with increasingly stressful online learning conditions due to the pandemic, young adults who are not university students (i.e., working young adults) face an extremely different set of COVID-19 related stressors – such as job insecurity, work rights exploitations, and future economic uncertainty (Giorgi et al., 2020) – that may influence the program's effectiveness on other young adult subpopulations. Given that young adult workers are also at high risk of psychological distress due to COVID-19 (Giorgi et al., 2020), future efforts to focus on interventions that target this subgroup to prevent worsening symptoms of psychological distress. In addition, a majority of this study's sample were female, and although this is common in Internet-based research (Gulliver et al., 2021), this discrepancy limits the generalizability of the program to the male population.

Due to limitations in resource, this study did not measure any effect of an Islamic spiritually integrated intervention on participant's levels of self-reported religiosity or spirituality, nor did it measure levels of religious coping. Due to the high conceptual

similarities shared between ACT and Islam, and to the Islamic psychospiritual elements integrated into the module, it would be interesting to test if a spiritually integrated intervention module would result in changes in religiosity, spirituality, or religious coping. Future studies looking to examine the effectiveness of spiritually integrated psychological interventions on mental health outcomes would benefit from testing its effectiveness on increasing self-report religiosity, spirituality, and in improving religious coping as well.

Although due caution should be exercised to the conclusions made in light of the study's limitations, our findings suggests that Muslim young adults in Malaysia who are undergoing their undergraduate and postgraduate degrees are able to effectively cope with their stressors during the COVID-19 pandemic through the use of digital mental health interventions. In effect, findings of this study supported the integration of Islamic principles within the ACT framework of promoting behavioural and psychological change, and thus provides encouragement for future efforts to look further into the theoretical and clinical relationship between the two.

Declaration of Conflict of Interest

The authors have no conflict of interest to declare.

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Figure 1

CONSORT diagram showing flow of participants throughout study duration.
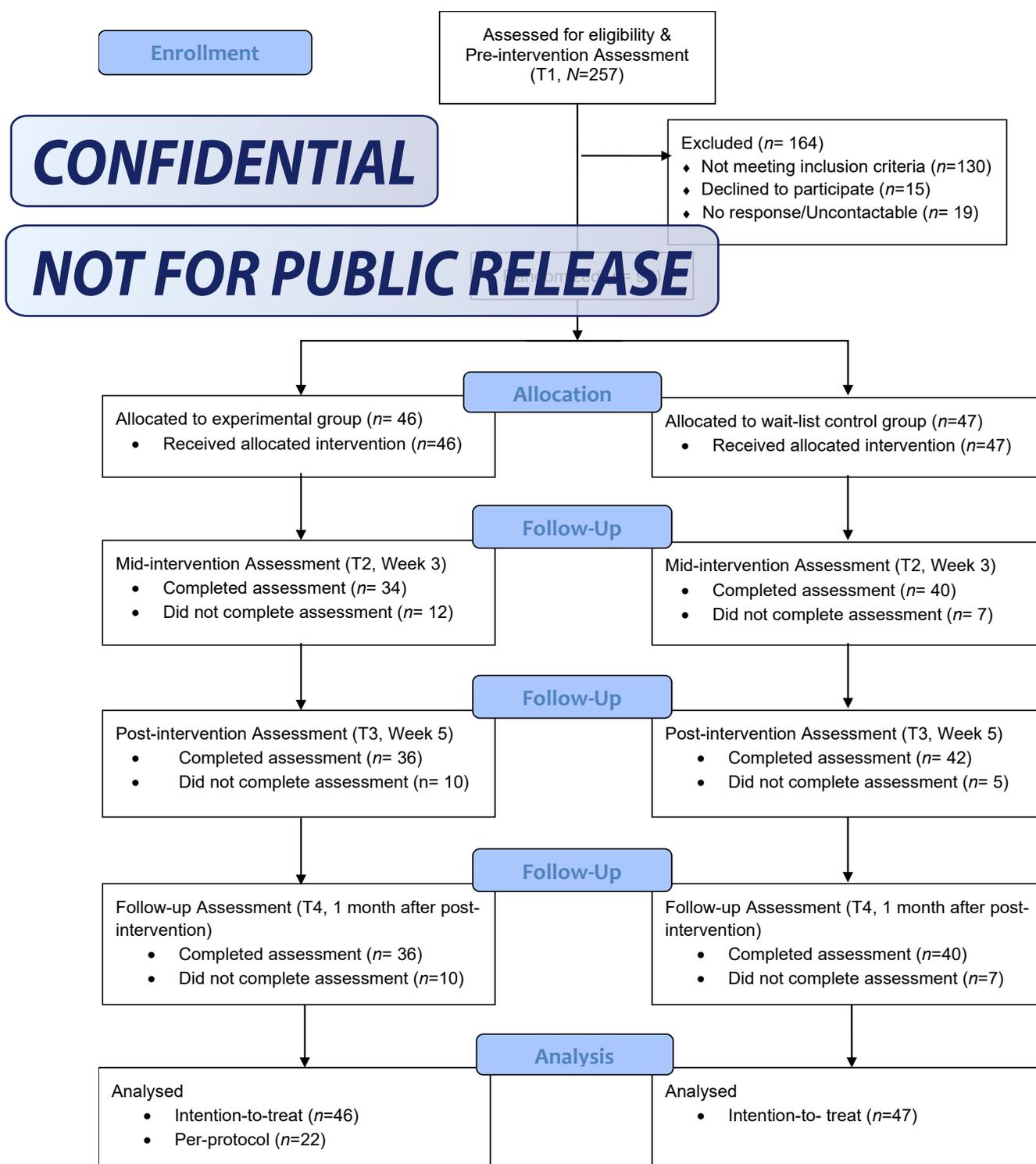
Tables

Table 1

Baseline characteristics of total sample, experimental group, and control group

		Experimental (n=46)		Control (n=47)		Total (n=93)	
		n	%	n	%	n	%
Age[a]	Mean (SD)	23.07 (1.96)		22.87 (2.03)		22.97 (1.99)	
Gender[b]	Male	10	21.7	5	10.64	15	16.13
	Female	36	78.3	42	89.36	78	83.87
Nationality[b]	Malaysian	44	95.7	41	87.23	85	91.40
	Singaporean	1	2.2	2	4.26	3	3.23
	Indian	1	2.2%	0	0.00	1	1.08
	Yemeni	0	0.0	1	2.1	1	1.08
	Ethiopian	0	0.0	1	2.1	1	1.08
	Bangladeshi	0	0.0	1	2.1	1	1.08
	Maldivian	0	0.0	1	2.1	1	1.08
Field of study[b]	Education	1	2.3	2	4.4	3	3.23
	Arts and Humanities	8	18.2	9	20.0	17	18.28
	Social Sciences, Business, and Law	18	40.9	21	46.7	39	41.94

		n	%	n	%	n	%
	Science, Mathematics and Computer	9	20.5	4	8.9	13	13.98
	Engineering, Manufacturing, and Construction	2	4.5	3	6.7	5	5.38
	Agriculture and Veterinary	0	0.0	1	2.2	1	1.08
	Health and Welfare	6	13.6	4	8.9	10	10.75
	Services	0	0.0	1	2.2	1	1.08
	N/A	2	4.35	2	4.26	4	4.30
Type of study[b]	Undergraduate	40	87.0	39	83.0	79	84.95
	Postgraduate	6	13.0	8	17.0	14	15.05
Level of study[b]	Level 1	8	17.8	6	12.8	14	15.05
	Level 2	6	13.3	5	10.6	11	11.83
	Level 3	5	11.1	14	15.2	19	20.43
	Level 4	17	37.8	10	21.3	27	29.03
	Level 5 and above	3	6.7	2	4.3	5	5.38
	Postgraduate	6	13.04	9	19.1	15	16.13
	Other	1	2.2	1	2.1	2	2.15
Relationship status[b]	Single	46	100.0	44	93.6	90	96.77
	Married	0	0.0	2	4.3	2	2.15
	Other	0	00	1	1.1	1	1.08

Present	Yes	10	21.7	10	21.3	20	21.5
health	No	36	78.3	37	78.7	73	78.5
problems[b]							
Practicing	Yes	42	91.3	46	97.9	88	94.6
Muslim[b]	No	4	8.7	1	2.1	5	5.4

[a]No significant differences between intervention and control group (t-test with $p>0.05$).

[b]No significant differences between intervention and control troup (chi-square tests with $p>0.05$).

Table 2

Summary of module and exercises for i-ACT for Life™

No.	Module	Summary/Aim	Examples Islamic psychospiritual elements and ACT exercises
1.	Grounding	Noticing thoughts and feelings, slowing down and connecting with the body, and paying attention to the present moment. *Exercises:* Khusyu' and mindful dhikr exercises.; mindful breathing exercises.	
2.	Unhooking	Noticing and naming difficult thoughts or feelings and then distancing from them. *Exercises:* Reflections on relevant Quranic verses and authentic hadith; Notice, Name, and Refocus 3-step exercise.	
3.	Acting on Your Values	Choosing values that are important and picking one small way to act according to these values. *Exercises:* Value-setting as a Muslim; improving an existing personal relationship by acting on a chosen value.	
4.	Being Kind	Noticing pain in the self and others and responding with kindness. *Exercises:* Reflections on relevant Quranic verses and authentic hadith; self-talk kindness exercise.	
5.	Making Room	Noticing and naming difficult thoughts or feelings and allowing them to come and go. *Exercises:* Reflection on Rumi's 'The Guest House'; making room breathing exercise.	

Table 3

Table showing number and percentage of participants who adhered to each weekly module. (*N*=46).

i-ACT for Life^{TM} module	*n* (percentage)
Module 1: Grounding	37 (80.43%)
Module 2: Unhooking	37 (80.43%)
Module 3: Acting on Values	33 (71.74%)
Module 4: Being Kind	33 (71.74%)
Module 5: Making Room	30 (65.22%)

Tables 4-6

RCI values for Depression, Anxiety, and Stress (DASS)

Anxiety	Completers (*n* = 23)						Non-completers (n=23)					
	Mid		Post		Follow-Up		Mid		Post		Follow-Up	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Reliable Improvement	6	26.09	7	30.43	7	30.43	4	17.39	6	26.09	7	30.43
No reliable change	17	73.91	16	69.57	15	65.22	7	30.43	6	26.09	6	26.09
Reliable Deterioration	0	0.0	0	0.0	0	0.0	0	0.0	1	4.35	1	4.35

Stress	Completers (*n* = 23)						Non-completers (n=23)					
	Mid		Post		Follow-Up		Mid		Post		Follow-Up	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Reliable Improvement	4	17.39	7	30.43	7	30.43	5	21.74	6	26.09	8	34.78
No reliable change	17	73.91	14	60.87	14	60.87	6	26.09	6	26.09	5	21.74
Reliable Deterioration	2	8.70	2	8.70	1	4.35	0	0.00	1	4.35	1	4.35

Depression	Completers (*n* = 23)						Non-completers (n=23)					
	Mid		Post		Follow-Up		Mid		Post		Follow-Up	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Reliable Improvement	7	30.43	6	26.09	9	39.13	3	13.04	6	26.09	5	21.74
No reliable change	15	65.22	16	69.57	12	52.17	7	30.43	7	30.43	8	34.78
Reliable Deterioration	1	4. 35	1	4.35	1	4.35	1	4.35	0	0.0	1	4.35

Table 7

Means, standard deviations, and results of Repeated Measures ANOVAs for changes across time in outcomes for the experimental group (n=46)

	T1	T2	T3	T4	F (df)	p	η_p^2 [90% CI]
	M (SD)	M (SD)	M (SD)	M (SD)			
Anxiety	19.43 (10.90)	14.00 (10.44)	13.22 (11.37)	12.48 (10.33)	14.22 (2.47, 111.22)	<0.001	0.24 [0.12, 0.33]
Stress	22.43 (8.98)	18.43 (9.70)	16.43 (10.87)	15.43 (11.54)	12.73 (2.69, 120.98)	<0.001	0.22 [0.11, 0.31]
Depression	21.43 (10.21)	17.35 (11.51)	15.74 (12.19)	15.65 (12.88)	9.04 (2.53, 113.90)	<0.001	0.17 [0.06. 0.27]
Self-Compassion	2.90 (0.46)	3.06 (0.54)	3.26 (0.74)	3.28 (0.74)	10.24 (2.14, 96.23)	<0.001	0.19 [0.07, 0.29]
Self-Kindness	3.43 (0.73)	3.41 (0.82)	3.61 (0.77)	3.63 (0.87)	1.94 (3, 135)	0.126	0.04 [0.00, 0.09]
Self-Judgement	3.61 (0.78)	3.26 (0.95)	3.05 (1.07)	2.97 (1.08)	10.8 (2.42, 109.03)	<0.001	0.196 [0.08, 0.29]
Common Humanity	3.55 (0.80)	3.60 (0.77)	3.74 (0.79)	3.76 (0.81)	1.73 (3, 135)	0.163	0.037 [0.00, 0.08]
Isolation	3.64 (0.77)	3.40 (1.05)	3.23 (1.17)	3.12 (1.20)	6.19 (2.79, 125.71)	0.001	0.121 [0.03, 0.20]
Mindfulness	3.33 (0.82)	3.42 (0.73)	3.60 (0.87)	3.54 (0.86)	2.51 (2.56, 115.07)	0.072	0.053 [0.00, 0.12]
Overidentification	3.66 (0.67)	3.39 (0.92)	3.13 (0.98)	3.13 (1.05)	10.18 (2.77, 124.57)	<0.001	0.184 [0.08, 0.27]
Psychological Flexibility	34.41 (8.67)	31.11 (10.48)	27.50 (11.78)	27.00 (12.10)	15.81 (2.52, 113.48)	<0.001	0.26 [0.14, 0.35]
Resilience	2.71 (0.73)	2.96 (0.89)	3.09 (0.80)	3.14 (0.91)	7.34 (2.61, 117.43)	<0.001	0.14 [0.05, 0.22]

Table 8

Means, standard deviations, and results of Repeated Measures ANOVA for changes across time in outcomes for the control group (n=47)

	T1	T2	T3	T4	F (df)	p	η_p^2 [90% CI]
	M (SD)	M (SD)	M (SD)	M (SD)			
Anxiety	16.94 (8.39)	18.30 (8.89)	19.15 (10.76)	19.32 (11.45)	2.00 (2.57, 118.66)	0.126	0.04 [0.00, 0.10]
Stress	20.98 (6.43)	21.62 (7.80)	22.30 (10.00)	23.74 (10.88)	1.86 (3, 138)	0.139	0.04 [0.00, 0.09]
Depression	18.13 (9.80)	17.79 (10.11)	18.77 (10.87)	20.26 (12.33)	1.53 (2.73, 125.66)	0.214	0.03 [0.00, 0.08]
Self-Compassion	2.93 (0.49)	2.96 (0.51)	2.94 (0.48)	2.94 (9.49)	0.09 (3, 138)	0.964	0.002 [0.00, -]
Self-Kindness	3.36 (0.68)	3.35 (0.69)	3.35 (0.70)	3.27 (0.79)	0.62 (3, 138)	0.606	0.01 [0.00, 0.04]
Self-Judgement	3.57 (0.85)	3.58 (0.90)	3.60 (0.83)	3.60 (0.95)	0.04 (3, 138)	0.991	0.001 [0.00, -]
Common Humanity	3.49 (0.82)	3.60 (0.86)	3.50 (0.77)	3.61 (0.88)	1.05 (3, 138)	0.373	0.02 [0.00, 0.06]
Isolation	3.63 (0.94)	3.58 (0.90)	3.46 (1.01)	3.45 (1.06)	1.10 (3, 138)	0.352	0.02 [0.00, 0.06]
Mindfulness	3.49 (0.81)	3.43 (0.75)	3.49 (0.82)	3.41 (0.78)	0.52 (3, 138)	0.668	0.01 [0.00, 0.03]
Overidentification	3.53 (0.80)	3.48 (0.76)	3.62 (0.76)	3.54 (0.83)	0.69 (3, 138)	0.558	0.02 [0.00, 0.04]
Psychological Flexibility	32.89 (8.69)	32.96 (9.63)	32.87 (9.61)	32.79 (10.08)	0.009 (3, 138)	0.999	<0.001 [0.00, -]
Resilience	2.87 (0.58)	2.77 (0.64)	2.83 (0.46)	2.84 (0.66)	0.47 (2.52, 115.85)	0.669	0.010 [0.00, 0.04]

Table 9

Means, standard deviations, and results of Repeated Measures ANOVAs for changes across time for completers (Per Protocol, n=22)

	T1	T2	T3	T4	F (df)	p	η_p^2 [90% CI]
	M (SD)	M (SD)	M (SD)	M (SD)			
Anxiety	20.91 (10.19)	12.27 (10.33)	12.45 (11.48)	12.18 (11.09)	11.95 (3, 63)	<0.000	0.36 [0.18, 0.47]
Stress	21.18 (8.20)	16.82 (9.79)	14.36 (10.32)	13.55 (10.36)	6.59 (3, 63)	0.001	0.24 [0.08, 0.35]
Depression	23.91 (9.75)	16.64 (11.72)	16.91 (13.00)	16.45 (12.71)	6.23 (1.98, 41.58)	0.004	0.23 [0.05, 0.37]
Self-Compassion	2.91 (0.43)	3.17 (0.54)	3.40 (0.69)	3.35 (0.60)	6.53 (2.22, 46.52)	0.002	0.24 [0.06, 0.37]
Self-Kindness	3.40 (0.80)	3.45 (0.94)	3.78 (0.81)	3.63 (0.80)	1.63 (3, 63)	0.192	0.07 [0.00, 0.16]
Self-Judgement	3.63 (0.67)	3.15 (0.89)	2.91 (0.99)	2.78 (0.99)	8.05 (2.13, 44.66)	0.001	0.28 [0.09, 0.41]
Common Humanity	3.55 (0.93)	3.74 (0.79)	3.90 (0.78)	3.64 (0.93)	1.41 (3, 63)	0.248	0.06 [0.00, 0.14]
Isolation	3.61 (0.70)	3.18 (1.13)	3.15 (1.13)	3.00 (1.18)	3.27 (3, 63)	0.027	0.14 [0.01, 0.24]
Mindfulness	3.32 (0.90)	3.43 (0.68)	3.66 (0.89)	3.45 (0.86)	1.31 (2.24, 46.96)	0.281	0.06 [0.00, 0.16]
Overidentification	3.53 (0.58)	3.26 (0.96)	2.85 (0.89)	2.86 (0.95)	6.39 (3, 63)	0.001	0.23 [0.07, 0.34]
Psychological Flexibility	35.77 (6.70)	30.82 (9.25)	28.09 (10.68)	25.91 (11.66)	11.66 (3, 63)	<0.000	0.36 [0.18, 0.46]
Resilience	2.61 (0.65)	3.08 (0.86)	3.18 (0.79)	3.18 (0.81)	9.87 (3, 63)	<0.000	0.32 [0.14, 0.42]

Table 10

Results of ANCOVAs comparing the two groups for all outcomes at mid-intervention (T2), post-intervention (T3), and 1-month follow-up (T4).

	T2			T3			T4		
	F^b	p	η_p^2 [90% CI]	F^b	p	η_p^2 [90% CI]	F^b	p	η_p^2 [90% CI]
Anxiety	6.54	.012	.07 [.01, .17]	11.67	.001	.13 [.03, .23]	17.65	<.001	.18 [.06, .28]
Stress	12.35	.001	.13 [.04, .23]	14.46	<.001	.15 [.05, .25]	14.47	<.001	.15 [.05, .25]
Depression	2.42	.124	.03 [.00, .10]	8.55	.004	.09 [.02, .19]	8.71	.004	.10 [.02, .19]
Self-Compassion	1.58	.212	.02 [.00, .09]	9.16	.003	.10 [.02, .20]	11.78	.001	.13 [.03, .23]
Self-Kindness	0.13	.722	.002 [.00, .04]	4.23	.043	.05 [.00078, .13]	7.22	.009	.08 [.01, .18]
Self-Judgement	3.12	.081	.04 [.00, .12]	8.76	.004	.10 [.02, .19]	9.72	.003	.11 [.02, .21]
Common Humanity	0.009	.923	<0.001 [.00, .01]	3.81	.054	.04 [.02, .19]	1.77	.187	.02 [.00, .09]
Isolation	0.49	.488	.01 [.00, .06]	1.10	.297	.01 [.00, .08]	3.01	.086	.04 [.00, .11]
Mindfulness	0.64	.426	.01 [.00, .06]	4.04	.048	.05 [.00024, .12]	5.42	.022	.06 [.0045, .15]
Overidentification	0.38	.542	.01 [.00, .05]	11.63	.001	.12 [.03, .23]	9.36	.003	.10 [.02, .20]
Psychological Flexibility	1.99	.163	.02 [.00, .10]	12.86	.001	.14 [.04, .24]	10.42	.002	.11 [.03, .21]
Resilience	4.06	.047	.05 [.0003, .13]	9.438	.003	.10 [.02, .20]	4.92	.029	.06 [.003, .14]

[b]Adjusted model with baseline score, gender, field of study, level of study, and type of degree set as covariates. Numerator degrees of freedom=1, denominator degrees of freedom=82. Due to missing values in covariates, total sample size is, $n=89$; experimental group, $n=44$, control group, $n=45$.