

EVALUATING THE EFFECTIVENESS OF MINDLINE.SG: A RANDOMIZED CONTROLLED TRIAL OF A NATIONAL DIGITAL MENTAL HEALTH PLATFORM IN SINGAPORE

Tan, C.¹, Sevdalis, N.², Hoomans, T.², Heaukulani, C.¹, Kampman, O.¹, Yeo, M. G.¹, Cheok, C.¹, Oh, S.³, Tan, E.³, Agoramurthy, S.³, Liu, J. C.³

¹Ministry of Health Office for Healthcare Transformation

²Behavioural and Implementation Science Interventions

³Centre for Evidence and Implementation

MOHT

MOH OFFICE FOR
HEALTHCARE TRANSFORMATION



Behavioural and Implementation
Science Interventions
Yong Loo Lin School of Medicine



INTRODUCTION

As part of Ministry of Health’s Office for Healthcare Transformation (MOHT)’s work, mindline.sg was developed in response to rising stress levels experienced by Singapore residents. In partnership with Ministry of Social and Family Development (MSF), National Council of Social Service (NCSS) and Institute of Mental Health (IMH), MOHT launched mindline.sg in July 2020 to provide an easily accessible platform to improve the wellbeing of people in Singapore. The aim of mindline.sg was to enable self-care and management of whole-of-person wellbeing. The key features of mindline.sg include a clinically validated self-assessment tool, an emotionally intelligent AI chatbot (Wysa) and a portfolio of customised resources, hotlines and self-care exercises. Youth mindline was launched in 2022 to support the mental health and wellbeing of young people. In addition to the key features mentioned above, youth mindline also provides an online community forum (let’s talk) where young people can participate in and connect with mental health professionals, peer supporters and like-minded youths in a moderated space. For this impact evaluation of mindline.sg, the objectives were to conduct a longitudinal evaluation trial for mindline.sg using pre- and post-intervention assessments.

STUDY DESIGN

The study used a randomized controlled trial design, where participants assigned to the control group received a mental health information pamphlet, and participants assigned to the intervention group were recommended activities to do on the mindline.sg website on a weekly basis. Intervention group participants received reminders via a Telegram chatbot. The entire study was conducted online with no in-person visits required. Participants filled out questionnaires prior to the intervention phase, 4 weeks after baseline, and then 8 weeks after baseline.

Mental health symptoms were assessed using the 21-item Depression, Anxiety, and Stress Scales (DASS-21), which is a shortened screening instrument developed by Lovibond and Lovibond (1995). Attitudes toward seeking help from a mental health professional were assessed using MHSAS, which was developed by Hammer, Parent, and Spiker (2018). Mental health literacy was assessed using MHLS (O’Connor and Casey, 2015). Emotional regulation difficulties was measured using DERS-18 (Victor and Klonsky, 2016). Subjective wellbeing was measured using the Cantril Ladder (Cantril, 1965) and the WHO-5 Well-Being Index (Topp et al., 2015). Health-related quality of life was measured using the EQ-5D-5L scale which consists of five dimensions: mobility, selfcare, usual activities, pain/discomfort, and anxiety/depression, with 5 levels of problem severity (Herdman et al., 2011). Resilience was assessed using the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003). Workplace costs was measured using the World Health Organization Health and Work Performance Questionnaire (HPQ; Kessler et al., 2003). Finally, mental health and social service utilization and mindline platform usage was collected by self-reported measures.

FINDINGS

A total of 242 participants were randomised to either the control (n=116) or intervention (n=126) condition. The sample was predominantly young adults, with a mean age of 25.67 years (SD=4.43), and largely female (69.7%), reflecting the target population of university-affiliated young adults in Singapore. The majority identified as Chinese (90.9%), consistent with Singapore’s national demographic composition, and most resided in HDB public housing flats (71.3% combined across flat types). In terms of employment, nearly half the sample were students (47.9%), with a substantial proportion employed full-time (43.4%).

The two groups were well-matched across most demographic characteristics, with no statistically significant differences observed in age (p=0.606), race (p=0.597), housing type (p=0.703), gender (p=0.752), or employment status (p=0.096). A statistically significant difference was observed in highest education level (p=0.030), with the intervention group containing a higher proportion of pre-tertiary participants (48.4% vs. 32.8%) and the control group containing more undergraduates (57.8% vs. 38.9%); this imbalance was controlled for in subsequent analyses as a covariate.

Critically, all baseline clinical measures were comparable between groups, including DASS-21 depression (10.98 vs. 11.46, p=0.444), anxiety (8.90 vs. 8.52, p=0.466), and stress (13.45 vs. 13.81, p=0.541) subscales, as well as WHO wellbeing (p=0.768), Cantril ladder life satisfaction (p=0.250), mental health literacy (MHLS, p=0.604), emotional dysregulation (DERS, p=0.512), stigma attitudes (MHSAS, p=0.543), and resilience (Connor-Davidson, p=0.927), confirming that randomisation achieved adequate balance on the primary outcome-relevant measures at baseline.

Table 1. Demographics of Participants

		Control	Intervention	Total	Test
Sample Size	N	116	126	242	
Age	Age (years)	25.82 (4.22)	25.52 (4.63)	25.67 (4.43)	0.606
Race	Chinese	106 (91.4%)	114 (90.5%)	220 (90.9%)	0.597
	Malay	1 (0.9%)	3 (2.4%)	4 (1.7%)	
	Indian	5 (4.3%)	7 (5.6%)	12 (5.0%)	
	Other	4 (3.4%)	2 (1.6%)	6 (2.5%)	
Housing Type	HDB Flat: 1–2 room	2 (1.7%)	0 (0.0%)	2 (0.8%)	0.703
	HDB Flat: 3-room	11 (9.5%)	16 (12.7%)	27 (11.2%)	
	HDB Flat: 4-room	35 (30.2%)	33 (26.2%)	68 (28.1%)	
	HDB Flat: 5-room and/or executive flats	35 (30.2%)	38 (30.2%)	73 (30.2%)	
	Condominium and/or private apartments	22 (19.0%)	29 (23.0%)	51 (21.1%)	
	Landed property	7 (6.0%)	7 (5.6%)	14 (5.8%)	
Gender	Hostel/Student dorms	4 (3.4%)	3 (2.4%)	7 (2.9%)	0.752
	Male	35 (31.2%)	37 (29.4%)	72 (30.3%)	
	Female	77 (68.8%)	89 (70.6%)	166 (69.7%)	
Employment status	Student	47 (40.5%)	69 (54.8%)	116 (47.9%)	0.096
	Employed full-time	60 (51.7%)	45 (35.7%)	105 (43.4%)	
	Employed part-time	3 (2.6%)	4 (3.2%)	7 (2.9%)	
	Unemployed	6 (5.2%)	8 (6.3%)	14 (5.8%)	
	Secondary	0 (0.0%)	1 (0.8%)	1 (0.4%)	
Highest level of education	Pre-tertiary	38 (32.8%)	61 (48.4%)	99 (40.9%)	0.030
	Undergraduate Degree	67 (57.8%)	49 (38.9%)	116 (47.9%)	
	Postgraduate Degree	10 (8.6%)	15 (11.9%)	25 (10.3%)	
	Other	1 (0.9%)	0 (0.0%)	1 (0.4%)	
	Cantril Ladder	5.99 (1.48)	6.22 (1.37)	6.11 (1.43)	0.250
Baseline	WHO-5	13.24 (3.82)	13.39 (3.75)	13.31 (3.77)	0.768
	DASS-21 - Depression	10.98 (4.77)	11.46 (4.91)	11.23 (4.84)	
	DASS-21 - Anxiety	8.90 (4.31)	8.52 (3.61)	8.70 (3.96)	
	DASS-21 - Stress	13.45 (4.90)	13.81 (4.27)	13.64 (4.58)	
	MHSAS	4.70 (0.95)	4.62 (0.98)	4.66 (0.97)	
	MHLS	116.61 (12.78)	115.71 (11.96)	116.15 (12.35)	
	DERS-18	43.96 (10.60)	42.95 (11.24)	43.45 (10.91)	
	CD-RISC	24.41 (5.95)	24.34 (5.19)	24.38 (5.57)	

FINDINGS

Table 2. Intention-to-Treat Mixed-Effect Model

Predictors	(1) WHO-5 b (SE)	(2) Cantril Ladder b (SE)	(3) Depression b (SE)	(4) Anxiety b (SE)	(5) Stress b (SE)
Main Effects					
Time = 1 (vs. Time = 0)	0.32 (0.39)	-0.09 (0.11)	-1.97** (0.71)	-1.74** (0.59)	-2.52*** (0.71)
Time = 2 (vs. Time = 0)	0.66 (0.39)	0.39*** (0.11)	-1.91** (0.71)	-2.45*** (0.59)	-2.38*** (0.71)
Intervention (vs. Control)	-0.01 (0.56)	0.22 (0.20)	0.65 (0.92)	-0.44 (0.75)	0.31 (0.93)
Time × Intervention Interaction					
Time = 1 × Intervention	0.16 (0.54)	0.17 (0.16)	-0.56 (0.98)	-0.31 (0.81)	-0.02 (0.98)
Time = 2 × Intervention	0.56 (0.54)	0.02 (0.16)	-1.23 (0.98)	-0.22 (0.81)	-1.02 (0.98)

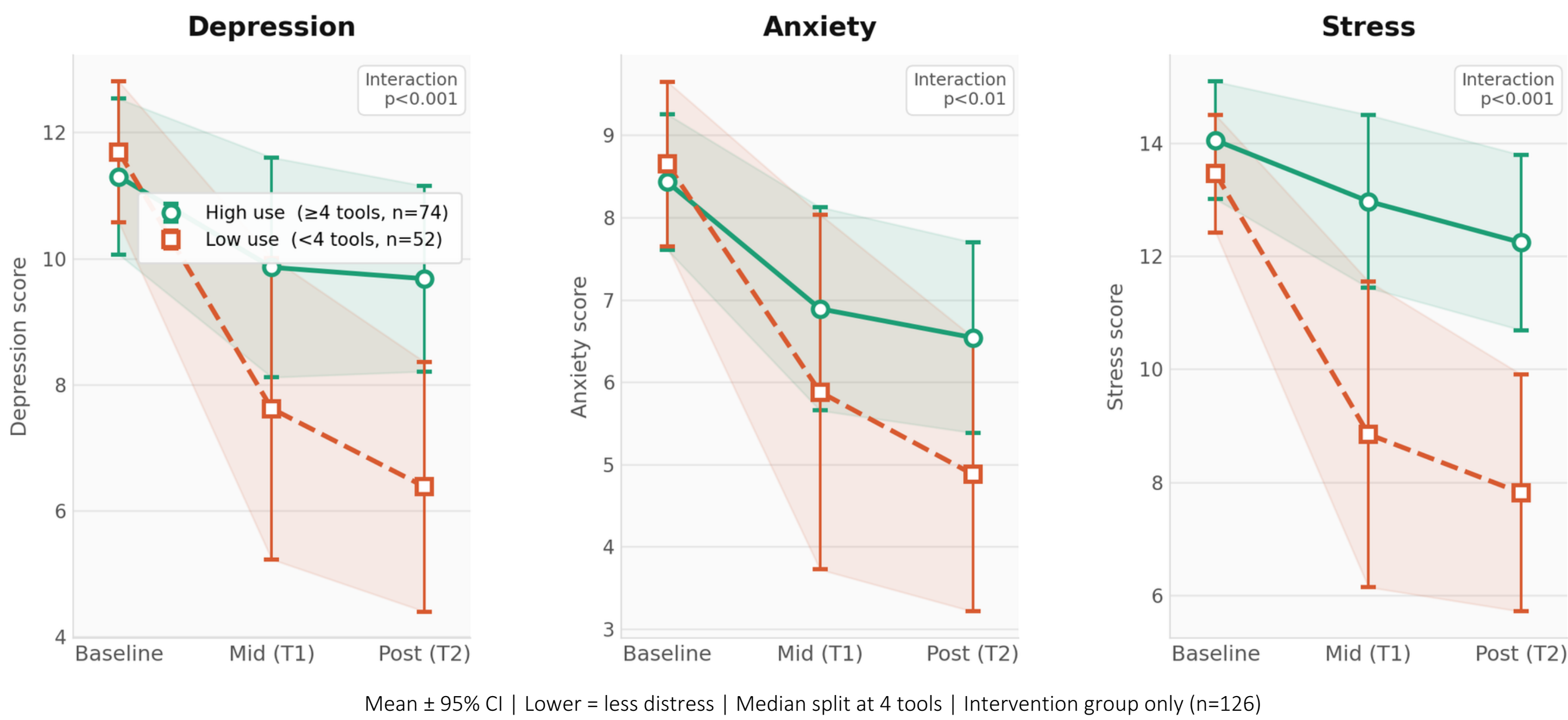
However, no significant Time × Intervention interaction effects were found for any outcome, indicating that app users did not improve significantly more than controls. These findings suggest that while participants in both conditions experienced meaningful reductions in psychological distress over the 8-week study period, the intervention did not produce differential gains beyond those observed in the control group.

Table 3. Per-Protocol Mixed Effect Model

Predictor	WHO-5	Cantril	Depression	Anxiety	Stress
Time 1	-0.29 (0.48)	-0.14 (0.14)	-4.42*** (0.74)	-3.35*** (0.62)	-5.07*** (0.74)
Time 2	1.12* (0.48)	0.32* (0.14)	-5.47*** (0.74)	-3.90*** (0.62)	-5.11*** (0.74)
Actual use	-0.42	-0.13	-0.25	0.45	0.30
Time 1 x Use	1.01 (0.58)	0.19 (0.17)	3.71*** (0.97)	2.48** (0.81)	4.36*** (0.97)
Time 2 x Use	-0.26 (0.58)	0.12 (0.17)	5.00*** (0.97)	2.30** (0.81)	3.78*** (0.97)

Per-protocol participants showed significant interaction effects for depression, anxiety and stress at both T1 and T2. WHO-5 and Cantril showed significant overall T1 improvements, but not significant per-protocol interaction effects.

Figure 1. DASS-21 Subscale Trajectories by Platform Engagement



Both high and low usage platform users showed reductions in depression, anxiety, and stress scores over the 8-week intervention period. However, the pattern of improvement differed meaningfully between groups. High usage users (≥4 tools, n=74) showed steady, consistent improvements across all three subscales from baseline through mid-point and post-intervention. Low usage users (<4 tools, n=52) showed more variable trajectories, with larger reductions by post-intervention particularly on depression and stress. Per-protocol mixed-effects models confirmed significant Time × Use interaction effects for all three DASS-21 subscales (depression p<0.001, anxiety p<0.01, stress p<0.001), indicating that actual platform engagement meaningfully moderated the trajectory of psychological distress over time.

DISCUSSION

The primary intention-to-treat analysis found no significant Time x Intervention interaction for any outcome, meaning the use of mindline.sg did not produce differential improvements in mental distress or wellbeing beyond the control condition. Broad improvements across both intervention and control conditions may reflect natural symptom remission over the 8-week period. The per-protocol analysis restricted to intervention group participants revealed significant Time × Use interaction effects for all three DASS-21 subscales at both time points, confirming that actual platform engagement moderated the trajectory of psychological distress. By post-intervention, higher-use participants showed meaningfully greater reductions in depression (β = 5.00, p < .001), anxiety (β = 2.30, p < .01), and stress (β = 3.78, p < .001) compared to lower-use counterparts. WHO-5 and Cantril Ladder scores did not show significant use interactions, suggesting that engagement with mindline.sg had a more pronounced effect on symptom reduction than on broader wellbeing. This suggests that mindline.sg may be effective when used as intended, but low engagement may limit its impact. Future evaluations would benefit from objective engagement metrics, longer follow-up periods, and a more diverse sample to better understand what drives sustained use and who engages with the platform.

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