

A Pragmatic Randomized Controlled Trial of a Smartphone-Based Self-Management Support Program on

Quality of Life in Patients with Chronic Obstructive Pulmonary Disease

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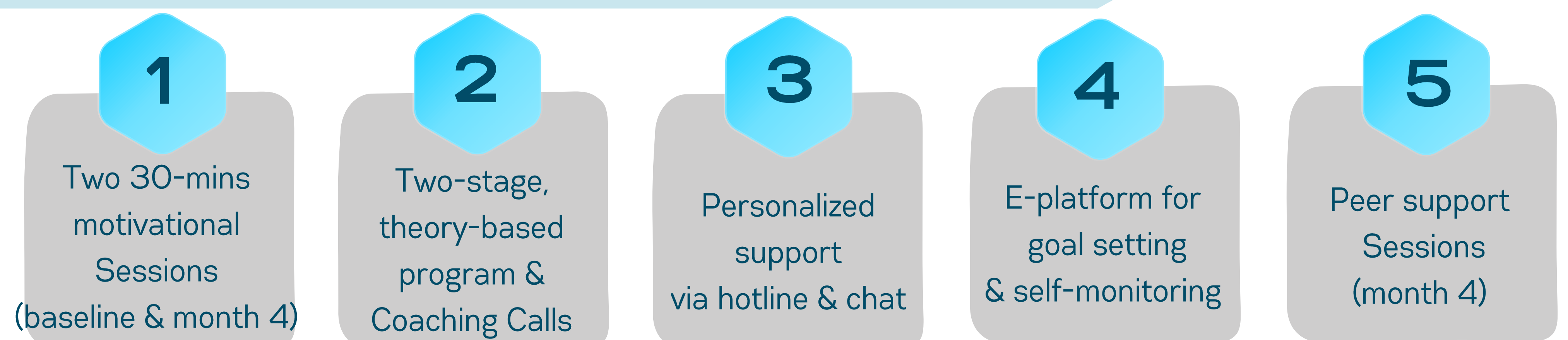
OBJECTIVE

- Chronic Obstructive Pulmonary Disease (COPD) significantly impairs quality of life (QOL) due to persistent respiratory symptoms, functional limitations, and psychological burden.
- This study evaluates a smartphone-based self-management support program (3S-C) designed to enhance patient engagement, promote self-care, and improve QOL through personalized, technology-enabled support.

METHODS

- This 12-month, two-arm pragmatic randomized controlled trial recruited COPD patients from four hospitals.
- The 3S-C program was developed based on patient needs, frontline healthcare professionals' input, and refinement from a pilot study. Participants were randomized to either the 3S-C intervention or a control group receiving general hygiene information (GHI).

The 3S-C intervention included:



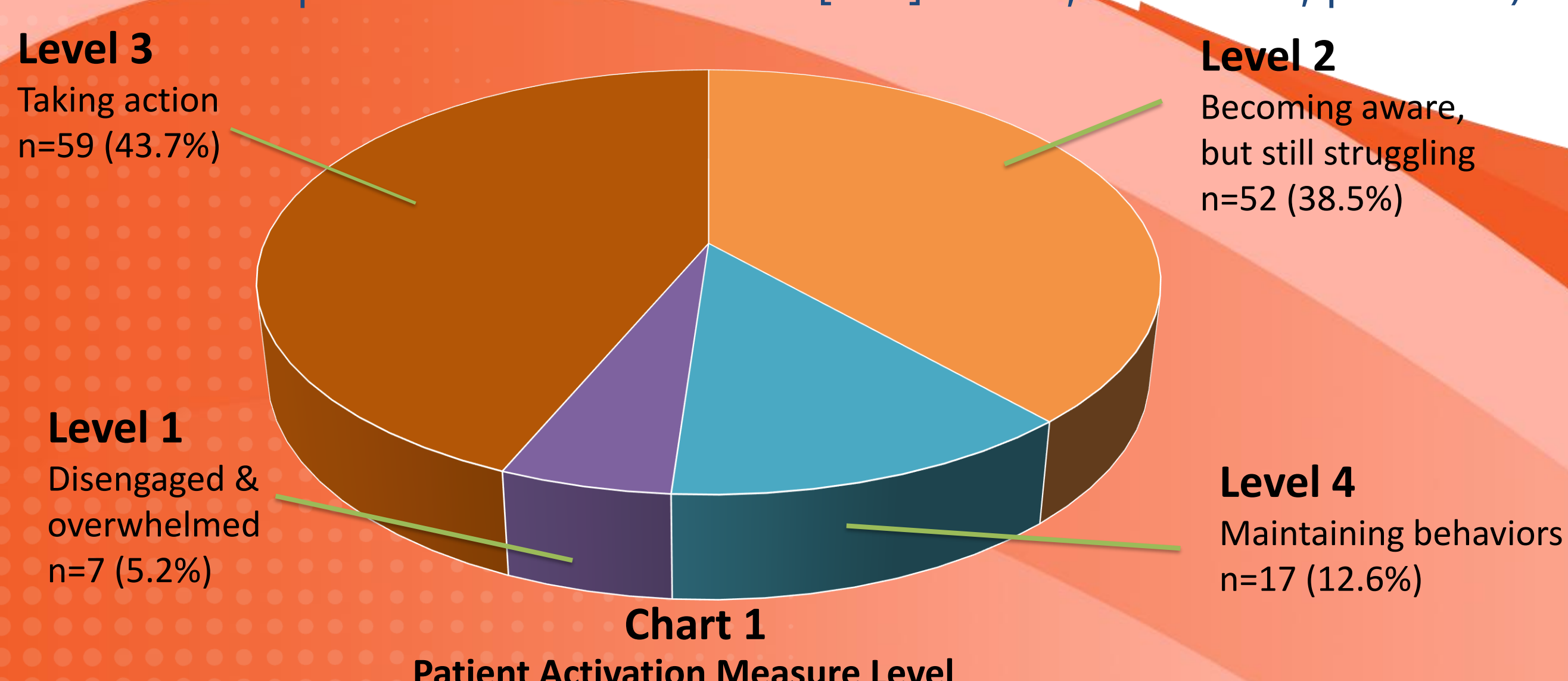
The GHI group: received a similar delivery format & frequency, focusing on general personal, sleep, and dietary

OUTCOMES

The primary outcome was QOL measured by the COPD Assessment Test. Secondary outcomes included patient activation and self-efficacy, health behaviors (medication adherence, physical activity, smoking), clinical outcomes (dyspnea, exacerbations, sleep quality, mood), physical performance (exercise capacity, activity level, grip strength), social support, and satisfaction with care.

RESULTS

- 135 COPD patients (mean age 70 years, 98.5% male, 81.5% married, 85.2% living with family, 64.4% with secondary education or above) were included.
- At baseline, nearly half (43.7%) of participants had low activation levels (Patient Activation Measure Level 2 or below), Becoming aware, but still struggling (38.5%), Maintaining behaviors and pushing further (12.6%), and Disengaged and overwhelmed (5.2%). (Chart 1)
- Higher activation was associated with better QOL (SGRO total score, $r = -0.183$, $p < 0.05$), fewer negative emotions including anxiety ($r = -0.222$, $p < 0.05$) and depression ($r = -0.251$, $p < 0.005$), greater happiness ($r = 0.355$, $p < 0.001$), stronger family support ($r = 0.305$, $p < 0.001$), and better EQ-5D health status especially in self-care, usual activities, pain/discomfort and anxiety/depression ($p < 0.05$).
- Engagement with the intervention was high, with strong responses to video messages and game-based components. Participants reported positive experiences with focus group discussions, inhaler technique training, sharing of daily activities, smartwatch and HA Go usage, sleep-related content, and gamified exercise. (Self-Efficacy for Managing Chronic Disease [SEMCD] score, $t = -4.845$, $p < 0.001$; Acceptance of Illness Scale [AIS] score, $t = 4.248$, $p < 0.001$)



QOL Key correlations with PAM score

Outcome (QOL)	r (Pearson)	p-value (2-tailed)	N
SGRQ Total score	-0.183	.034*	134
SGRQ Impact score	-0.141	.104	134
SGRQ Activity score	-0.231	.007*	135
SGRQ Symptoms score	-0.002	.984	135
Total CAT score	-0.244	.116	135
ISI (Insomnia)	-0.003	.977	135

Table 1. Higher PAM score was associated with better respiratory-specific QOL. Table 1 shows significant negative correlation with the St George's Respiratory Questionnaire total score ($r = -0.183$, $p = .034$, $N = 134$) and with the SGRQ Activity subscale ($r = -0.231$, $p = .007$, $N = 135$), but was not significantly associated with CAT ($r = -0.244$, $p = .116$) or insomnia severity (ISI) ($r = -0.003$, $p = .977$, $N = 135$).

Family & Friend Support related correlations with PAM score

Outcome (QOL)	r (Pearson)	p-value (2-tailed)	N
MSPSS Family	0.305	<.001*	135
MSPSS Friend	0.170	.049*	135
MSPSS Total	0.283	.001*	135

Table 3. Higher PAM score was associated with stronger perceived social support, including family support ($r = .305$, $p < .001$), friend support ($r = .170$, $p = .049$), and total MSPSS score ($r = .283$, $p = .001$).

SEMCD Score & AIS Score (Independent sample T Test)

Outcome	Equal variances	t	df	p	Mean difference	95% CI
SEMCD score	Assumed	-4.845	133	$p < 0.001$	-1.34218	-1.89016 to -0.79420
AIS score	Assumed	-4.248	133	$p < 0.001$	-4.667	-6.839 to -2.494

Table 5. COPD patients in higher PAM group had significantly higher self-efficacy and illness acceptance than those in the lower PAM group. The SEMCD score was higher in the higher PAM group by 1.34 points ($t = -4.845$, $p < .001$), and the AIS score was higher by 4.67 points ($t = -4.248$, $p < .001$); both differences were statistically significant.

Emotions Key correlations with PAM score

Outcome (Emotion)	r (Pearson)	p-value (2-tailed)	N
SHS	0.355	<.001*	135
GAD	-0.222	.010*	135
PHQ	-0.251	.003*	135

Table 2. Higher PAM score was associated with greater happiness and lower psychological distress. Table 2 showing positive correlation with subjective happiness ($r = .355$, $p < .001$) and negative correlations with anxiety (GAD: $r = -0.222$, $p = .010$) and depression (PHQ: $r = -0.251$, $p = .003$).

EQ-5D related correlations with PAM score

Outcome (QOL)	r (Pearson)	p-value (2-tailed)	N
Mobility	-0.195	.095	135
Self-Care	-0.170	.024*	135
Usual Activities	-0.221	.010*	135
Pain / Discomfort	-0.144	.049*	135
Anxiety / Depression	-0.187	.030*	135

Table 4. Higher PAM score was associated with better EQ-5D health status, including lower scores for self-care ($r = -0.170$, $p = .024$), usual activities ($r = -0.221$, $p = .010$), and anxiety or depression ($r = -0.187$, $p = .030$), however, the association with mobility was weaker and not statistically significant ($r = -0.195$, $p = .095$).

CONCLUSION

The 3S-C program shows promise as a complementary care approach for COPD patients, enhancing self-management capacity and enabling more personalized support from healthcare providers.