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Effectiveness of Interactive Text Message Service at the Thailand National Quitline: A Randomized Controlled Trial

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Abstract

Background: Automatic instant messaging systems are currently a well-known smoking reduction tool for public health. However, smokers' engagement is lacking, as many prefer to communicate with experts during the quitting period so they can receive advice on dealing with the consequences of nicotine abstinence. Therefore, this study aimed to assess the effectiveness of an interactive text messaging service at the Thailand National Quitline.

Method: The study was conducted as a randomized controlled trial. A total of 314 smokers were eligible, 153 of whom were randomly assigned to receive two-way short messages encouraging them to quit smoking. After the date of quitting, ThaiBulkSMS (SMS gateway provider) sent out 49 messages to them over 6 months. The remaining 161 participants received traditional counseling to quit smoking for approximately 30 min. Data were analyzed by descriptive statistics, a chi-squared test, and the Friedman test.

Results: Both groups were similar in terms of their descriptive characteristics and variables related to smoking ($p > 0.05$). The continuous abstinence rate (CAR) of the participants in the counseling group was significantly greater than that of participants in the SMS group at 3 and 6 months (43.5% vs 38.6%; 34.2% vs 28.1%; $p < .05$). Moreover, we found a statistically significant difference in the CAR at 3 and 6 months between the two groups at the .05 level (χ^2 -Friedman=1.34; $p < .05$).

Conclusion: The "interactive text message service" is an innovative intervention for Thai smokers who want to quit smoking.

Keywords: Text message, Cessation service, Quitline, Thailand

1. Introduction

Smoking is a major health concern and the leading cause of death for an estimated five million people worldwide annually, of which 80% of smoking-related deaths occur in men and 20% in women [1]. The World Health Organization (WHO) estimates that by 2030, eight million people will die each year due to tobacco-related diseases and more than 600,000 will die from exposure to secondhand smoke. Although tobacco consumption among the Thai population has been steadily decreasing, many smokers may already have chronic illnesses or are likely to develop future illnesses [2,3]. Smoking has

a negative economic impact, with studies estimating total economic losses at THB 74.88bn (US\$2.18, 95% CI US\$2.17 to US\$2.19bn) or 0.78% of Thailand's gross domestic product [4]. Therefore, health service units have implemented various policy tools for controlling tobacco consumption across the country [5,6]. Such methods include legislative measures to control the purchase and sale of tobacco, conducting smoking cessation campaigns, increasing the price of tobacco products, and placing warnings on cigarette packs. In addition, the National Tobacco Products Control Board has drafted the Third National Tobacco Control Action Plan 2022-2027 and submitted it to relevant agencies to prepare action and budget expenditure plans under the theme

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“Leading toward a sustainable smoke-free Thai society” [7].

Achieving a sustainable smoke-free Thai society is an important responsibility of the health sector. In the absence of professional help, the repeated attempts of many smokers to quit smoking are doomed to failure due to the lack of intention or motivation [8]. One proven effective tool that can be used to achieve smoking cessation is the telephone, which is convenient, easily accessible, and economical and can be accessed by all categories of people, such as those who are disabled or live in remote communities. The use of the telephone also reduces the need for people to travel for support or wait for services in clinics [9–11].

Furthermore, quitlines have been proven to be highly successful in helping individuals quit smoking [12]. Studies have reported that most smokers prefer a phone-based form of service over face-to-face conversations with a counselor because they prefer to remain anonymous [13]. Article 14 of the WHO Framework Convention on Tobacco Control (WHO FCTC), the world's first public health treaty on tobacco control, demands that parties related to the tobacco industry be primarily responsible for the treatment of tobacco use and dependence [3]. The WHO has recommended three types of clinical treatments to be included in any tobacco control program: “(a) tobacco cessation advice incorporated into primary healthcare services; (b) easily accessible and free quitlines; and (c) access to low-cost pharmacological therapy” (p. 30) [2].

To fulfill the obligation of Thailand under the WHO FCTC and the WHO's six “MPOWER strategies” of Monitor, Protect, Offer, Warn, Enforce, and Raise intended to assist those wishing to quit smoking, the Thailand National Quitline (TNQ) or Quitline 1600 was established in September 2008 and began its service on January 14, 2009 with the support of the Sangsukthai Foundation and the Office of Health Promotion Fund. Similar to quitlines in other countries, the TNQ provides reactive or proactive counseling or other information to callers to assist in smoking cessation. The counseling protocol of the TNQ is based on the transtheoretical model (TTM). The TTM categorizes the relationship between a smoker and the readiness to quit smoking according to 5 stages of change, 10 processes of change, pros and cons of changing, self-efficacy, and behavioral change [14]. The TNQ recognizes that every smoker is at a different level of readiness for quitting; thus, the information provided should be personalized to ensure behavioral change.

Automatic instant messaging systems have been well known to be used as tools to reduce smoking in the field of public health. These systems may be set up to meet the current guidelines for smoking cessation and even imitate several features of telephone counseling, such as creating a personalized quitting timetable and sending reminders about cessation goals [15]. Clinical trials and meta-analyses have provided evidence regarding the effectiveness of text messaging services for smoking cessation as stand-alone interventions. Scholars have found that smokers who received text messaging based intervention (TMI) were more likely than those who did not to quit smoking through various means, such as a 7-day point prevalence and continuous abstinence. As a form of assistance to face-to-face programs, a versatile phone-delivered TMI presents enormous potential to help induce change among smokers [16].

The TNQ has provided reactive and proactive tobacco cessation counseling for Thai smokers since 2009. Its service has continuously improved from traditional telephone counseling to cessation services. In 2016, the TNQ began offering the Short Message to Quit (SMS2Quit) service, which was considered effective. For example, it was reported that smokers with chronic diseases who received intensive counseling from TNQ were able to quit smoking and maintain abstinence continuously for 3 (27.5%) and 6 months (24.2%) [17]. However, the smokers exhibited limited interaction during counseling, as many of them wanted to communicate with experts during the quitting period and receive advice regarding dealing with the symptoms of nicotine deficiency. To improve the convenience, speed, and modernity of the service channel at a low cost, the service has been equipped with an automated system that can interact with individual service recipients. Therefore, developing and operating such services will be an innovative and beneficial way to assist smoking cessation.

2. Methods

This study constitutes a randomized controlled trial designed to compare an interactive short message service (SMS) with traditional telephone counseling for smoking cessation among smokers who called the TNQ.

2.1. Study sampling

The population comprised smokers who called the TNQ from February 1 to October 31, 2020. Eligible individuals included those who set the quit

date within 30 days and provided verbal consent for follow-up and research participation. Individuals who could not be contacted via telephone after three attempts or those who were using nicotine replacement therapy were excluded. A total of 314 smokers were eligible, 153 of whom were randomly assigned to receive interactive SMS and 161 received traditional counseling (see Fig. 1). The sample size was calculated using the p-value, 0.05; test power, 80%; and smoking cessation rate of the experimental group, 28%. The smoking cessation rate of the control group was 13% [18].

2.2. Respondents

Table 1 shows the characteristics of the participants. Both groups were found to be similar in terms of their descriptive characteristics and variables related to smoking ($p > 0.05$). Most of the

participants were males (89.8%), of whom 39.2% were in the age range of 25–44 years and 36.3% were under the age of 24 years. Approximately 32% of the participants were employed and 39.5% had an underlying disease. In terms of smoking status, more than half of the participants (55.1%) smoked manufactured cigarettes and 38.5% smoked fewer than 10 cigarettes per day. The majority of the participants had been smoking for less than 10 years (83.8%). Nearly half of the respondents were moderately addicted to nicotine (46.5%) with a high intention to quit (46.2%). However, the participants expressed only a moderate (48.4%) confidence in quitting.

2.3. Data collection

Data were collected from February 8, 2020, to April 30, 2021. Demographic data were collected

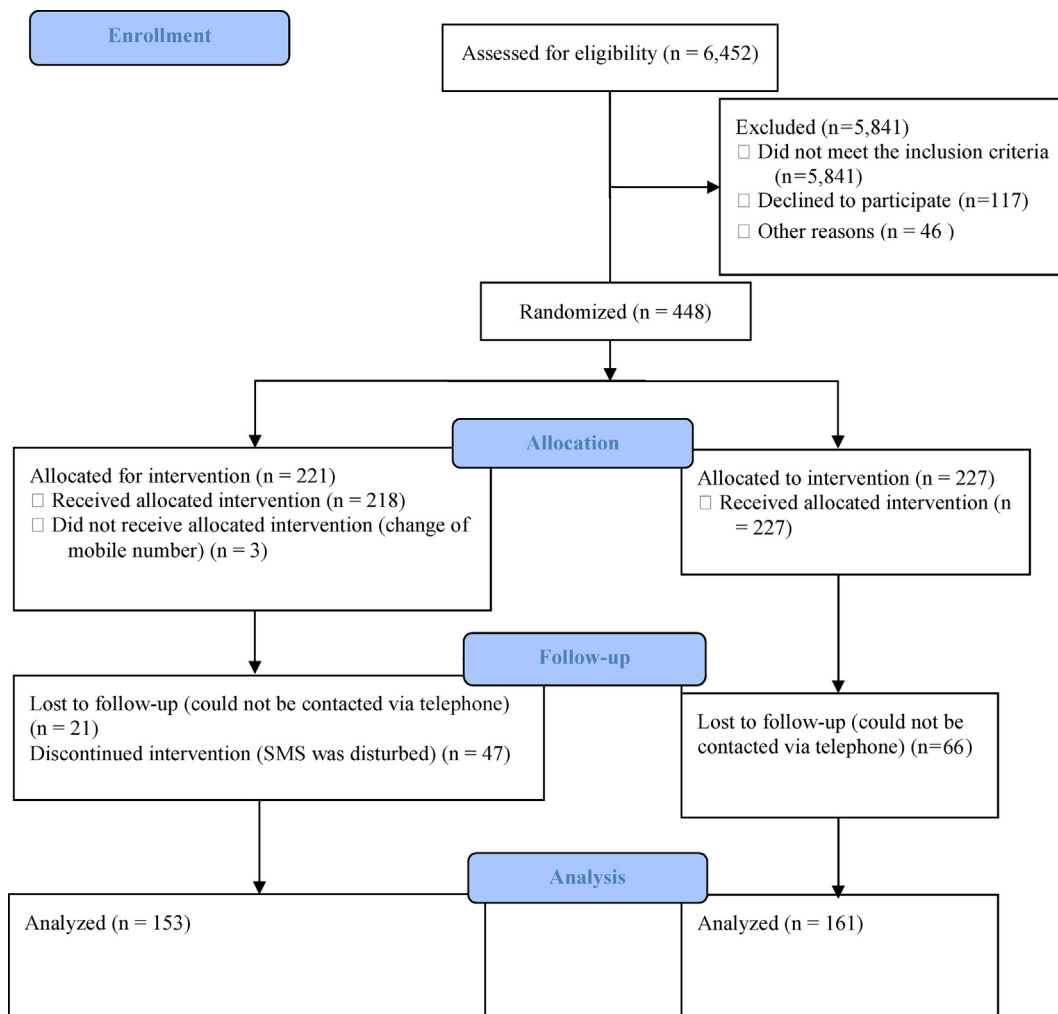


Fig. 1. CONSORT flow diagram.

Table 1. Participant characteristics.

	SMS group (n = 153)		Counseling group (n = 161)		p-value
	n	%	n	%	
Gender					.88 ^a
Male	137	89.5	145	90.1	
Female	16	10.5	16	9.9	
Mean age (SD)	33.13 (15.62)		34.07 (15.24)		.47 ^b
Health condition					.76 ^a
None	88	57.5	102	63.4	
Yes	65	42.5	59	36.6	
Allergy/asthma	16	24.6	18	30.5	
Diabetes mellitus	8	12.3	10	16.9	
Hypertension	30	46.1	32	54.2	
Cardiovascular diseases	21	32.3	18	30.5	
Types of cigarettes					.19 ^a
Manufactured cigarettes	80	52.3	93	57.8	
Hand-rolled cigarettes	27	17.6	15	9.3	
Manufactured & hand-rolled cigarettes	37	24.2	42	26.1	
Electronic cigarettes	9	5.9	11	6.8	
Number of cigarettes smoked per day					.18 ^b
Mean (SD)	17.05 (10.62)		17.37 (10.30)		
Level of nicotine dependence (Heaviness of Smoking Index [HIS])					.12 ^a
Low	68	44.4	40	24.8	
Moderate	54	35.3	92	57.1	
High	31	20.3	29	18.0	
Mean (SD)	2.85 (1.80)		3.27 (1.49)		.07 ^b
Intention to quit					.62 ^b
Mean (SD)	7.33 (1.98)		8.02 (1.71)		
Confidence to quit					.54 ^b
Mean (SD)	7.19 (1.76)		8.05 (1.64)		
Quit attempt					.08 ^a
Yes	66	43.1	90	55.9	
Never	87	56.9	71	44.1	

Notes:

^a Tested via χ^2 test.^b Tested via t-test.

from the TNQ records. Potential participants were then contacted by phone and informed about the study. The Quit Smoking Questionnaire was used to assess each participant's smoking status using the following question: "After your quit date, did you continuously abstain from smoking for at least 7 days?" If the answer was "yes," then the participants were asked, "Are you continuously abstaining for 3 or 6 months?" If the answer was "no," then the participants were asked whether they had made any attempt to quit after receiving the interactive text messages. In addition, they were instructed to indicate which of their previous attempts to quit had lasted the longest. Four items reached a Cronbach's alpha coefficient of 0.93 [17].

2.4. Procedures

The counseling group received counseling to quit smoking. According to the guidelines of the TNQ,

sessions of intensive counseling for smokers lasted for approximately 30 min. Counseling was provided to help smokers understand tobacco addiction, increase self-efficacy and confidence to quit, and set both a plan and a date to quit. If individuals set a quit date within a month after receiving counseling, they were offered follow-up calls at 7-day, 15-day, 1-month, 3-month, and 6-month intervals after the quit date.

The SMS group received two-way short messages encouraging them to quit smoking. The messages were under the TTM. After the date of quitting, ThaiBulkSMS (SMS gateway provider) sent out 49 messages over 6 months to the participants in the SMS group. These messages fell into the following two categories:

- 1) Messages of advice and encouragement to help smokers quit and encourage them to interact with a counselor. Automatically sent messages are transmitted for 21 consecutive days,

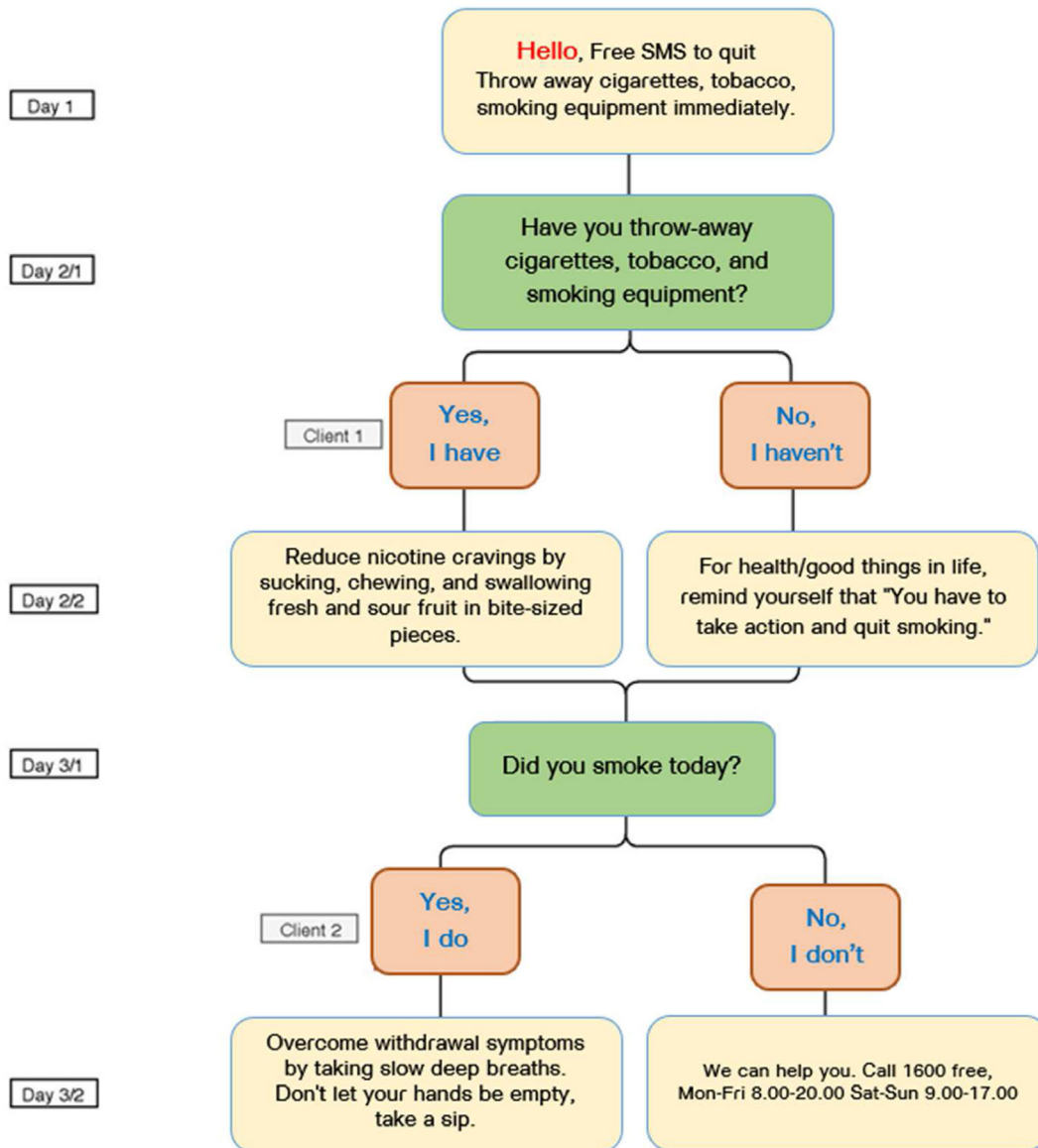


Fig. 2. Example of interactive text message service.

comprising a total of 37 messages (34 messages sent by ThaiBulkSMS and 3 messages sent back by smokers).

- 2) A message for relapse prevention provides advice and encouragement to prevent relapse. ThaiBulkSMS sends this message after the subscriber receives 37 interactive messages per month, for a total of 12 messages over 6 months (Fig. 2).

The scale content validity index (S-CVI) was calculated by dividing the number of experts who gave a rating of either 3 or 4 by the total number of experts. The experts included five professionals with at least 2 years of experience in counseling/smoking

cessation services, such as experienced registered nurses, psychologists, or social workers, and those who had passed the counselor's training program for smoking cessation, which is equal to 20 h of lessons on theories and competency-based clinical practice. Additionally, the experts were asked to clarify their reasons in case they did not agree with any of the SMS. Following the experts' review, the S-CVI was found to be 0.88. The minimum criterion to achieve S-CVI was set at >0.80 [19].

2.5. Data analysis

Demographic data and smoking characteristics were analyzed and described according to

frequency, mean, and standard deviation using IBM SPSS Statistics, version 22.0 (IBM Corp., Armonk, NY, USA). A Chi-square test was used to calculate “quit attempt” and “continuous abstinence rate” (CAR) among the SMS and counseling groups. Additionally, the Friedman test was used for comparing the CAR within those groups.

Ethical Statement: The Ethics Review Committee for Research Involving Human Research Subjects, Health Sciences Group, Chulalongkorn University (COANo.111.1/62) approved the study.

3. Results

This trial presents information regarding the smoking cessation rate in smokers. Two variables were used: quit attempt and CAR at 3 and 6 months.

3.1. Quit attempt

A quit attempt is defined as an attempt to stop smoking that lasts for 1 day or 24 h [20]. Among the participants who were unable to stop smoking for at least 7 consecutive days, 56.8% never tried to quit for even 24 h, whereas 43.2% attempted to quit. The participants who received only counseling displayed a higher propensity of attempting to quit (55.9%) than those who received SMS messages (43.2%). The proportion of individuals attempting to quit smoking in the counseling and SMS groups was not significant at the .05 level (see Table 1).

3.2. Comparison of CAR at 3 and 6 months between both the groups

CAR is defined as the percentage of participants who showed continuous abstinence from smoking at 3 and 6 months. The CAR at 3 and 6 months for the participants in the counseling group was significantly greater than that in the SMS group (43.5% vs 38.6%; 34.2% vs 28.1%; $p = .00$). The within-group CAR comparison at 3 and 6 months showed statistically significant differences for both periods in both the groups (χ^2 -Friedman

test = 133.53 vs 102.16; $p = .00$). Moreover, the present study found a statistically significant difference in the CAR at 3 and 6 months between the two groups at the .05 level (χ^2 -Friedman=1.34, $p < .05$) (see Table 2).

4. Discussion

In this study, the participants in the SMS and counseling groups showed similar characteristics in terms of gender, age, health condition, smoking status, smoking history, intention to quit, and attempts to quit. The results of the participants included in this trial can be generalized to the population of the entire country.

The current study indicates that interactive two-way SMS and counseling services successfully help smokers quit smoking. At the end of the research, the percentages of participants who successfully quit smoking at 3 and 6 months between the SMS and counseling groups were statistically significantly different at a p-value of .05.

The CAR at 3 and 6 months of the participants in the counseling group was significantly greater than that in the SMS group. This finding is somewhat surprising given that numerous studies have consistently documented the higher efficacy of text messaging programs in encouraging smoking cessation compared with traditional services [21,22]. This might be because phone counseling has a customization and personalization effect. All the participants set a quit date within 30 days, which falls in the preparation stage according to the theory of behavioral change process as per the TTM. At this stage, the person will begin to intentionally engage in that behavior within 30 days of making the decision to quit. In the case of smokers, they will begin to reduce the frequency of the problem behavior and try a new behavior after being given access to counseling services from public health personnel [23].

However, the participants reported finding interactive SMS somewhat helpful during the quitting process and explained that the messages from the program served as motivating and

Table 2. Continuous abstinence rate (CAR) at three and six months.

Group	CAR at 3 months	χ^2 test p-value	CAR at 6 months	χ^2 test p-value	χ^2 -Friedman test
	n (%)		n (%)		
SMS	59 (38.6)	.00 ^a	43 (28.1)	.00 ^a	133.53 ^b
Counseling	70 (43.5)		55 (34.2)	102.16 ^b	1.34 ^b

Notes:

^a Tested via χ^2 test.

^b p-value <.05.

informative reminders to encourage quitting. While most comments regarding interactive SMS were positive, several participants noted that the texts themselves could remind them of, and therefore trigger, smoking. Additionally, the participants showed little difficulty in receiving and responding to prompts using text messaging. This finding, which has been reported by another study as well [24], warrants further investigation. Text messages are provided as standard care for a telephone quitline in the United Kingdom; however, additional interventions (smoking cessation medicine and intensive counseling) were not found to significantly improve smoking cessation rates compared with standard care [25]. The current study was conducted in Thailand, a middle-income country where mHealth research is scarce. The study was implemented in a practical setting as an additional intervention to support the TNQ service.

Text messaging may be an ideal delivery mechanism for tailored intervention because it is inexpensive, most people already possess the existing hardware required for it, and the messages can be delivered almost instantaneously in real-world situations [26]. Furthermore, messages aimed at increasing the capability of smokers to quit and providing opportunities that support smoking cessation improved the smoking cessation rates among smokers who intended to quit. We believe that the current study demonstrates the utility of text messaging in aiding smoking cessation as well as that of other health research and intervention from a broader perspective. We anticipate that future work will capitalize on the unique potential of this growing technology. It is possible that as SMS becomes a more acceptable mode of communication among middle-aged and older adults, age may have a smaller moderating effect than it did in the past, although this remains an important area for future research.

The study has some limitations; for instance, self-reported abstinence rather than biochemically verified abstinence was considered the primary outcome. Self-reported smoking status is a commonly accepted outcome measure in population-based studies where the biochemical verification of abstinence is not feasible and misreporting abstinence is expected to be minimal given low demand characteristics [27].

The loss of follow-up is an important limitation in longitudinal studies. In this study, there were significantly fewer follow-ups in the standard care

group than in the SMS group. Other limitations include the loss of interactivity due to the lack of actions taken for the responses of possible participants to the messages (unidirectional messaging) and the unavailability of an automated messaging system.

5. Conclusion

This study suggests that an interactive text messaging approach is a feasible and acceptable intervention for providing smoking cessation support in Thailand. Interactive text messaging interventions could also be used in combination with initial face-to-face contacts within healthcare settings or via telephone quitlines. This combination could change how healthcare personnel interact with and use new technology, thereby saving time and potentially increasing the effectiveness of health and behavioral interventions that aim to have an impact on the population. This innovation should be implemented in a realistic setting as an additional intervention to support the TNQ service or as an alternative method to help smokers who want to quit.

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Conflict of interest

The authors have no conflicts of interest associated with the material presented in this paper.

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References

- [1] Reitsma MB, Kendrick PJ, Ababneh E, Abbafati C, Abbasi-Kangevari M, Abdoli A. Spatial, temporal, and demographic patterns in prevalence of smoking tobacco use and attributable disease burden in 204 countries and territories, 1990–2019: a systematic analysis from the Global Burden of Disease Study 2019. *Lancet* 2021 Jun 19;397(10292):2337–60. [https://doi.org/10.1016/S0140-6736\(21\)01169-7](https://doi.org/10.1016/S0140-6736(21)01169-7).
- [2] World Health Organization. Worldwide burden of disease from exposure to second-hand smoke [Cited 2021 March 11]. Available from: http://www.who.int/quantifying_ehimpacts/publications/shsarticle2010/en/. [Accessed 20 October 2021]. World Health Organization.

- [3] Aungkulanon S, Pitayarangsarit S, Bundhamcharoen K, Akalephan C, Chongsuvivatwong V, Phoncharoen R, et al. Smoking prevalence and attributable deaths in Thailand: predicting outcomes of different tobacco control interventions. *BMC Publ Health* 2019 Jul 23;19(1):984. <https://doi.org/10.1186/s12889-019-7332-x>.
- [4] Komonpaisarn T. Economic cost of tobacco smoking and secondhand smoke exposure at home in Thailand. *Tobacco Control* [Cited 2021 May 13]. Available from: <http://doi.org/10.1136/tobaccocontrol-2020-056147>.
- [5] Bundhamcharoen K, Aungkulanon S, Makka N, Shibuya K. Economic burden from smoking-related diseases in Thailand. *Tobac Control* 2016 Sep;25(5):532–7. <https://doi.org/10.1136/tobaccocontrol-2015-052319>.
- [6] Amul GGH, Tan GPP, van der Eijk Y. A systematic review of tobacco industry tactics in southeast Asia: lessons for other low- and MiddleIncome regions. *Int J Health Pol Manag* 2021 Jun 1;10(6):324–37. <https://doi.org/10.34172/ijhpm.2020.97>.
- [7] Department of Disease Control. Draft of third national tobacco control action plan BE 2022 to 2027 [Cited 2021 May 13]. Available from: <https://ddc.moph.go.th/brc/news.php?news=15693&deptcode=brc> [in Thai].
- [8] Duaso MJ, Bakshi S, Mujika A, Purssell E, While AE. Nurses' smoking habits and their professional smoking cessation practices. A systematic review and meta-analysis. *Int J Nurs Stud* 2017 Feb;67:3–11. <https://doi.org/10.1016/j.ijnurstu.2016.10.011>.
- [9] Ho LLK, Li WHC, Cheung AT, Xia W, Wang MP, Cheung DYT, et al. Impact of COVID-19 on the Hong Kong Youth Quitline service and quitting behaviors of its users. *Int J Environ Res Pub Health* 2020 Nov 13;17(22):8397. <https://doi.org/10.3390/ijerph17228397>.
- [10] Krebs P, Sherman SE, Wilson H, El-Shahawy O, Abrams LL, Zhao X, et al. Text2Connect: a health system approach to engage tobacco users in quitline cessation services via text messaging. *Transl Behav Med* 2020 Feb 3;10(1):292–301. <https://doi.org/10.1093/tbm/ibz033>.
- [11] Russo ET, Reid M, Taher R, Sharifi M, Shah SN. Referral strategies to a tobacco quitline and racial and/or ethnic differences in participation. *Pediatrics* 2018 Jan;141(Suppl 1):S30–9. <https://doi.org/10.1542/peds.2017-1026G>.
- [12] McQueen A, Roberts C, Garg R, Caburnay C, Fu Q, Gordon J, et al. Specialized tobacco quitline and basic needs navigation interventions to increase cessation among low income smokers: study protocol for a randomized controlled trial. *Contemp Clin Trials* 2019 May;80:40–7. <https://doi.org/10.1016/j.cct.2019.03.009>.
- [13] Ahluwalia IB, Tripp AL, Dean AK, Mbulo L, Arrazola RA, Twentyman E, et al. Tobacco smoking cessation and quitline use among adults aged ≥ 15 years in 31 countries: findings from the Global Adult Tobacco Survey. *Am J Prev Med* 2021 Mar;60(3 Suppl 2):S128–35. <https://doi.org/10.1016/j.amepre.2020.04.029>.
- [14] Prochaska JO, DiClemente CC. Stages and processes of self-change of smoking: toward an integrative model of change. *J Consult Clin Psychol* 1983 Jun;51(3):390–5. <https://doi.org/10.1037//0022-006x.51.3.390>.
- [15] Pollak KI, Lyna P, Gao X, Noonan D, Bejarano Hernandez S, et al. Efficacy of a texting program to promote cessation among pregnant smokers: a randomized control trial. *Nicotine Tob Res* 2020 Jun 12;22(7):1187–94. <https://doi.org/10.1093/ntr/ntz174>.
- [16] Scott-Sheldon LA, Lantini RC, Jennings EG, Thind H, Rosen RK, Salmoirago-Blotcher E, et al. Text messaging-based interventions for smoking cessation: a systematic review and meta-analysis. *JMIR Mhealth Uhealth* 2016 May 20;4(2):e49. <https://doi.org/10.2196/mhealth.5436>.
- [17] Rojnawee S, Yunibhand J, Khongtor O. Effectiveness of Thailand National Quitline services: a gender analysis. *J Nurs Sci Chulalong Univ* 2019;31:1–14 [in Thai].
- [18] Whalley LJ, Fox HC, Deary IJ, Starr JM. Childhood IQ, smoking, and cognitive change from age 11 to 64 years. *Addict Behav* 2005 Jan;30(1):77–88. <https://doi.org/10.1016/j.addbeh.2004.04.014>.
- [19] Polit DF, Beck CT, Owen SV. Is the CVI an acceptable indicator of content validity? Appraisal and recommendations. *Behav Sci* 2019 May 7;9(5):50. <https://doi.org/10.3390/bs9050050>.
- [20] Hughes JR, Callas PW. Definition of a quit attempt: a replication test. *Nicotine Tob Res* 2010 Nov;12(11):1176–9. <https://doi.org/10.1093/ntr/ntq165>.
- [21] Liao Y, Wu Q, Kelly BC, Zhang F, Tang YY, Wang Q, et al. Effectiveness of a text-messaging-based smoking cessation intervention ('Happy Quit') for smoking cessation in China: a randomized controlled trial. *PLoS Med* 2018 Dec 18;15(12):e1002713. <https://doi.org/10.1371/journal.pmed.1002713>.
- [22] do Amaral LM, Ronzani TM, Cruvinel E, Richter K, Oliveira Andrade RD, Lanzieri IO, et al. Text messaging interventions to support smoking cessation among hospitalized patients in Brazil: a randomized comparative effectiveness clinical trial. *BMC Res Notes* 2022 Mar 26;15(1):119. <https://doi.org/10.1186/s13104-022-06002-6>.
- [23] Prochaska JO, Norcross JC, Saul SF. Generating psychotherapy breakthroughs: transtheoretical strategies from population health psychology. *Am Psychol* 2020 Oct;75(7):996–1010. <https://doi.org/10.1037/amp0000568>.
- [24] Abrams LC, Carroll P, Boal AL, Mendel J, Carpenter KM. Integrated phone counselling and text messaging services at quitlines: an acceptability study. *J Smok Cessat* 2016;11(1):5–11. <https://doi.org/10.1017/jsc.2014.11>.
- [25] Ferguson J, Docherty G, Bauld L, Lewis S, Lorgelly P, Boyd KA, et al. Effect of offering different levels of support and free nicotine replacement therapy via an English national telephone quitline: randomised controlled trial. *BMJ* 2012 Mar 23;344. <https://doi.org/10.1136/bmj.e1696>.
- [26] Berkman ET, Dickenson J, Falk EB, Lieberman MD. Using SMS text messaging to assess moderators of smoking reduction: validating a new tool for ecological measurement of health behaviors. *Health Psychol* 2011 Mar;30(2):186–94. <https://doi.org/10.1037/a0022201>.
- [27] SRNT Subcommittee on Biochemical Verification. Biochemical verification of tobacco use and cessation. *Nicotine Tob Res* 2002 May;4(2):149–59. <https://doi.org/10.1080/14622200210123581>.