Health Communication via Line and Thai Seniors: Impacts of Content Type and Message Framing on Audiences' Responses
การสื่อสารเชิงสุขภาพผ่านแอปพลิเคชันไลน์และผู้สูงอายุไทย: ผลกระทบของข้อความและการกำหนดกรอบข้อความต่อการตอบสนองของผู้สูงอายุไทย

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Abstract

This research investigated health communication via LINE targeting the Thai seniors. Using a mixed-method research (content analysis and survey), the study aimed to identify emerging themes of content type and message framing, and to find out their influences on Thai senior citizens' cognitive, affective, and behavioral responses. Content analysis of 31 health messages in two LINE official accounts revealed three types of content (informative, narrative, and mix), and three types of message framing (gain-framed, loss-framed, and mix-framed). Content analysis results led to the development of a survey questionnaire. Participants are 303 Thai senior citizens purposively recruited from Thai senior schools and senior clubs. Among nine proposed research hypotheses being tested by the Structural Equation Model (SEM), all except hypothesis 6 were supported. Its analysis results suggested that a mix of informational and narrative messages was more persuasive. Gain-framed messages were more persuasive than loss-framed messages. In terms of three response types, Thai senior citizens'cognitive responses were found

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to have a direct effect on their behavioral and affective responses, together with an indirect effect on behavioral responses as mediated by their affective responses.

Keywords: *Line Application, Thai Senior, Health Communication, Content Type, Message Framing*

บทคัดย่อ

งานวิจัยนี้ศึกษาการสื่อสารเชิงสุขภาพที่ส่งผ่านแอปพลิเคชันไลน์ ซึ่งมีกลุ่มเป้าหมายเป็นผู้สูงอายุชาวไทย โดยใช้การวิจัยแบบผสม (การวิเคราะห์ตัวบทและการวิจัยเชิงสำรวจ) การวิจัยนี้มุ่งค้นพบชนิดของข้อความและการกำหนดกรอบข้อความในสารเชิงสุขภาพ ตลอดจนทดสอบอิทธิพลของกลยุทธ์สารเชิงสุขภาพต่อการตอบสนองทางความคิด ความรู้สึก และพฤติกรรมของผู้สูงอายุชาวไทย จากการวิเคราะห์ตัวบทของสารเชิงสุขภาพ 31 ชิ้น พบชนิดของข้อความ 3 ชนิด (ข้อมูล การเล่าเรื่อง และแบบผสม) และการกำหนดกรอบข้อความ 3 ประเภท (แบบทำตามได้ประโยชน์ แบบเสียประโยชน์ และแบบผสม) ผลการวิเคราะห์ตัวบทนำไปสู่การสร้างแบบสอบถามของการวิจัยเชิงสำรวจ โดยมีผู้ร่วมการวิจัยเป็นผู้สูงอายุชาวไทยจำนวน 303 คน ซึ่งได้รับการเลือกอย่างเฉพาะเจาะจงจากโรงเรียนผู้สูงอายุและชมรมผู้สูงอายุ จากสมมติฐานการวิจัย 9 ข้อที่ทดสอบด้วยโมเดลสมการโครงสร้างพบว่า สมมติฐานทุกข้อยกเว้นข้อที่ 6 ได้รับการสนับสนุน ผลการวิเคราะห์บ่งชี้ว่าชนิดข้อความแบบผสมทั้งข้อมูลและการเล่าเรื่องมีผลต่อการโน้มน้าวมากกว่า โดยการกำหนดกรอบข้อความแบบทำตามได้ประโยชน์มีผลต่อการโน้มน้าวมากกว่าการกำหนดกรอบข้อความแบบเสียประโยชน์ สำหรับการตอบสนอง 3 ประเภท พบว่า การตอบสนองทางความคิดของผู้สูงอายุชาวไทยส่งผลทางตรงต่อการตอบสนองทางพฤติกรรมและการตอบสนองทางความรู้สึก และส่งผลทางอ้อมต่อการตอบสนองทางพฤติกรรมผ่านการตอบสนองทางความรู้สึก

คำสำคัญ: *แอปพลิเคชันไลน์ ผู้สูงอายุชาวไทย การสื่อสารเชิงสุขภาพ ชนิดของข้อความ การกำหนดกรอบข้อความ*

Introduction

Senior people become a significant age group and have a great impact on our society (United Nations Department of Economic and Social Affairs, 2015). The National Economic and Social Development Board (NESDB) showed the rising number of Thai senior citizens aged over 60, and by 2021, Thailand's population will become a full-fledged aging society (Chaitrong, 2017). The Thai senior citizens tend to have lower physical and cognitive capabilities that can restrict their use of digital technology and social media. Older users of social media have less functionality of social media due to lower skill levels with limited ability towards technological complexity to process complex information (Thackeray, Crookston, & West, 2013). Hence, senior citizens tend to believe in health information they received from their friends and relatives. One of the most popular social media platforms Thai senior people used for communicating and sharing useful content regarding health information and health-related activities is LINE application (Brand Buffet, 2018; Positioning, 2018; Rattiya, 2018).

To this day, there are conflicting results in social media research and health outcomes showing both positive and negative sides. Due to the lack of gatekeeper in social media, studies showed an increasing rate of inaccurate health

information that created negative outcomes (Health & Trend, 2016), whereas people who have a high level of interactive message exchanges can contribute persuasive outcomes in favorable ways to users and can affect users' attitudes and beliefs (Oh & Sundar, 2015). In addition, many studies have focused largely on popular social media such as Facebook, Twitter, and Youtube, but a few on LINE, and each of them showed their varying impacts on health outcomes (Bounsanga, Voss, Crum, & Hung, 2016).

The above health communication scenario revealed a knowledge gap on message strategy via LINE and their impact on the seniors, especially Thai citizens. Accordingly, this study aimed to achieve two research objectives: (1) to investigate strategies of health messages sent via LINE to Thai senior citizens, and (2) to examine whether and how different health message strategies sent via LINE influence Thai senior citizens' cognitive, affective, and behavioral responses.

Literature Review and Research Hypotheses

Message strategy refers to strategies of online health messages (content type & message framing) via LINE among Thai senior citizens. Among various modalities of message strategy, content type and message framing are the modalities that have been studied by many communication researchers.

Content types is an important factor for persuading an audience (Pettigrew, Miller-Day, Krieger, & Hecht, 2011). There are two major types of online health message: medical informational and narrative messages (De Wit, Das, & Vet, 2008). The informational messages use statistical evidence, abstract data, facts, and evidence, which were found having a persuasive impact on health behavior (Greene & Brinn, 2003), while narrative messages present personal information based on individual experiences (e.g., specific situations, appealing details, characters, and stories). Both were a powerful strategy for changing beliefs and motivating behavior change with less counter-arguing (Niederdeppe, Shapiro, & Porticella, 2011).

Message framing is a useful and persuasive communication strategy for promoting health campaigns that can motivate people to change their belief and behaviors (Lueck, 2017; Rothman, Bartels, Wlaschin, & Salovey, 2006). Sherman, Updegraff, and Mann (2008) stated that health messages should be framed for different group of people in order to change health behavior. There are two major framing in health message. Firstly, gain-framed messages present benefits of engaging in health behavior. Readers perceive benefits and positive outcomes that influence health behavior responses. Secondly, loss-framed messages present negative consequences or problems if one does not engage in health behavior, Readers perceive risk and threat, then they change their belief and behavior (Quick & Bates, 2010; Sherman et al., 2008). O'Keefe and Jensen (2007) and Heather, Wei, and Amy (2012) showed a mixed-framed message, and presented both gain and loss framed message for health-related activities.

The Health Belief Model (HBM) has been developed and used as a model to explain the relationship between health beliefs to predict health behaviors. The HBM provides key of health beliefs, which is a useful framework for understanding people's differences in beliefs that lead toward each person's health behaviors

(Shojaei, Farhadloo, Aein, & Vahedian, 2016). In terms of cognitive responses based on the HBM, Glanz, Rimes, and Viswanath (2008) showed that the relationship between individuals' four main beliefs include perceived threats, benefits, barriers, and self-efficacy which lead to behaviors as indicated by the HBM. Health message strategies can influence audiences' responses in attention, self-awareness, belief, and behavior. For example, audiences exposed to gain-framed message perceived benefit and increasing self-efficacy that can influence their belief and/or health behavior responses. The followings literature reviewed various effects of messages on audiences:

Cognitive effects and health belief: The content of messages, both informational and narrative message exchange can produce persuasive effects. De Graaf et al. (2017) found that informational messages have more impact on health behavior than narrative messages. Some researchers showed that using health contents in narrative form by sharing individual experiences, rather than being informational, influence the audience's attention, belief, and behaviors (De Wit et al., 2008; Miller & Pole, 2010; Wang, Walther, Pingree, & Hawkins, 2008; Zillmann & Brosius, 2000). The effectiveness of message framing is able to influence cognitive responses, which is a factor mediating the relationship between message strategies and behavioral responses (Latimer and colleagues, 2008). Miller and Pole (2010), and Trammell and Keshelashvili (2005) stated that narrative message is a strategy to get attention, and to stimulate self-awareness from readers. Miller and Pole (2010) also stated this increases reader's self-awareness, which can be used to create effective health behavior. Neubaum and Krämer (2015) found that personalized health messages can influence readers' beliefs and attitudes. Accordingly, the first research hypothesis proposed that:

H1: Health message strategies sent via LINE have a direct effect on Thai senior citizens' cognitive responses.

As mentioned earlier, several researchers found that informational messages have a persuasive impact on health behavior. The narrative form on online health contents showed an influence on an audience's attention, belief, and behaviors. In addition to Lueck (2017), Rothman et al. (2006) stated that message framing can be used for persuading individuals' health behaviors to change his/her beliefs and practices. As a result, the second research hypothesis proposed that:

H2: Health message strategies sent via LINE have a direct effect on Thai senior citizens' behavioral responses.

Beliefs have been playing an important role that shows a relationship between socialization and behaviors (Abraham & Sheeran, 2005). Everyone has his/her own belief, thus each person's beliefs shape his/her individual behaviors. Bandura (1997) and Latimer and colleagues (2008) indicated that cognition is an important factor, which included self-efficacy, perceived benefit, and outcome expectancies, and it influenced behavioral responses especially for health activities. One of the important factors that a person needs for a behavior change to occur is when a person believes that change will have benefits more than barriers for them (Corcoran, 2007; Glanz et al., 2008). Based on the above rationale, the third research hypothesis proposed that:

H3: Thai senior citizens' cognitive responses have a direct effect on their behavioral responses.

Many researchers stated that perception of risk can influence individuals' belief and behavior, but they showed mixed results (Rimal, Bose, Brown, Mkandawire, & Folda, 2009; Rimal & Juon, 2010). According to Loewenstein, Weber, Hsee, and Welch (2001), risk is related to emotions and individuals' emotional responses are related to risk perception, such as worry, and fear. Corcoran (2007) also said that a person must feel there is a risk for a behavior change to occur. Thus, the fourth hypothesis proposed that:

H4: Thai senior citizens' cognitive responses have a direct effect on their affective responses.

Ruiz and Sicilia (2004) proposed that cognitive and affective can work independently as well as together for a better outcome on behavior intention. Loewenstein et al. (2001) stated that people responded to risk perception, which included behavioral responses from direct emotional influences. After seeing health problem and the benefit of action to prevent illness, people will make their decision of action (Glanz et al., 2008). Accordingly, the fifth research hypothesis proposed that:

H5: Thai senior citizens' cognitive responses have an indirect effect on behavioral responses as mediated by their affective responses.

Affective effects: Affective refers to emotionality. Health messages with personal narratives of experiences might help readers better understand mental, emotional, and physical illnesses (Miller & Pole, 2010). Personalized narrative message of content is a strategy to get attention, self-awareness, affection, and create the impression of intimacy from readers (Miller & Pole, 2010; Trammell & Keshelashvili, 2005). As a result, the sixth research hypothesis proposed that:

H6: Health message strategies sent via LINE have a direct effect on Thai senior citizens' affective responses.

Neubaum and Krämer (2015) mentioned an advantage of emotionalized content to persuasion that could be used to change people's attitudes based on affective messages that are more influential than rational messages. Emotional persuasive message involves reader's understanding and sharing feeling on writers' story. Affective refers to reactions of an individual to others' expression of feeling and experiences (Shen, 2010; Smith, 2006), while cognitive refers to a reader's taking another person's perspective by sharing cognitive, as a person imagines oneself in the same situation of another person (Shen, 2010). Both affective and cognitive are related and overlap with each other. Based on this linkage between persuasive health messages and audiences' belief and emotion, the seventh research hypothesis proposed that:

H7: Health message strategies sent via LINE have an indirect effect on Thai senior citizens' affective responses as mediated by their cognitive responses.

Persuasive messages with cognitive and affective responses can influence readers' perception to action (Shen, 2010; Wang et al., 2008). Moreover, personal story tells about a person's own experience of diseases and explains how to get treatment (Neubaum & Krämer, 2015). Their study showed that readers perceived severity of illness but at the same time

they had more positive attitude and increased their self-efficacy toward practicing health behavior. The results of personal narratives and positive attitudes created an affection and communication with readers to perform positive health behavior (Neubaum & Krämer, 2015). Thus, the eighth research hypothesis proposed that:

H8: Health messages strategies sent via LINE have an indirect effect on Thai senior citizens' behavioral responses as mediated by their cognitive and affective responses.

Miller and Pole (2010), Neubaum and Krämer (2015), and Wang et al. (2008) stated that health messages with individual experiences can provide a personal and emotional tone that can affect readers' belief and behavior. Expression of personal experiences and emotions can create a mutual feeling of intimacy, and thoughts that can affect readers' feeling, attitude, belief, and behavior (Neubaum & Krämer, 2015). Therefore, the ninth research hypothesis proposed that:

H9: Thai senior citizens' affective responses have a direct effect on their behavioral responses.

Figure 1 presented the conceptual model of this study describing the hypothesized direct effects of health message strategies via LINE on senior audiences' cognitive, affective, and behavioral responses, and indirect effects of their cognitive responses on behavioral responses through affective responses.

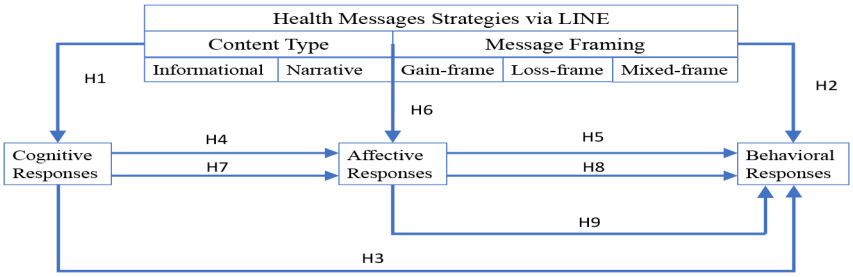


Figure 1 Conceptual framework

Methodology

This study used mixed methods, combining both content analysis and survey. As for content analysis, the target text was health messages sent via LINE. Among official accounts of senior groups identified from LINE search engines' official account, Young Happy and O-lunla Club were found as the most active accounts among the Thai seniors. Thirty-one health messages sent via these two official accounts during September 8, 2018 - March 9, 2019 were then analyzed to identify the category of health message strategies. The inclusion criteria used for content analysis were texts, picture with texts, health topics/issues, health living, discussion of diseases, persuasion to join health activities. Exclusion criteria were messages that contained the attached links, and those selling health products.

The content analysis instrument included materials for assessment to be used was content analysis of health messages sent via LINE official accounts. Health messages in LINE were examined based on the proposed themes, in terms of two message strategies (content type and message framing). These emerging themes were then labeled and used in developing a questionnaire for the second phase of the study.

The last step was the inter-coder reliability process proposed by Holsti's (1969), in which more than 30 percent of the sampled health messages on the LINE official accounts, or 11 health messages, were coded by two coders together with the researcher. Their coding results were consistent with at 81.82 percent. Therefore, the instrument reliability was higher than the 80% acceptable level.

As for the survey research in the second phase, the target population was Thai senior citizens who were 60 years old and over, who have used LINE for a minimum of 6 months. The participants were selected using the cluster sampling by inviting them to participate in this project through the association for senior citizens, club for seniors, and schools for Thai senior citizens. The samples of this study were 303 Thai senior citizens who participated in the face-to-face survey. Calculated by G*power 3.1, the suggested sample size was 138 samples, and this number met the criterion of sample size required for the structural paths analysis.

A self-administered questionnaire was used as research instrument for this survey. Each part of the questionnaire had at least a minimum of three questions in order to ensure reliability. The questionnaire consisted of five parts:

1) *Personal information*: Participants were asked about age, gender, education, family income, duration of LINE use, communication topics on LINE messages, and general health status.

2) *Frequency of receiving health messages based on message type and message framing*: This variable was measured on a 6-point Likert scale, in which the respondents rated the frequency of reading a particular message type (informational vs narrative messages vs mixed type) and a particular message frame (gain-framed vs loss-framed messages vs mixed framed messages) of health messages via LINE. The scale ranged from 1) Never to 6) Most frequently. In case that the subjects identified the high level of gain and loss, they were considered as receiving the mixed-framed message.

3) *Cognitive responses*: Four dimensions of this variable, 1) self-awareness, 2) perceived risk, 3) perceived benefits, and 4) self-efficacy, were measured by using the 5-point Likert scale, in which the respondents rated the degree of change in terms of their cognitive responses of health message from 1) strongly disagree to 5) strongly agree.

4) *Affective responses*: Two dimensions of this variable, 1) fear and 2) sympathy, were measured by using the 5-point Likert scale, in which the respondents rated the degree of change in terms of their affective responses from 1) strongly disagree to 5) strongly agree. For this study, affective responses were counted when audiences felt there was a risk or shared feeling with the message sender.

5) *Behavioral responses*: This variable was measured on a 5-point Likert scale, in which the respondents rated the degree of change in terms of their behavioral responses from 1) strongly disagree to 5) strongly agree. For this study, behavioral responses were an action in a form of sharing, forwarding, sending health information message via LINE, or engaging in health activities.

The Index of Item-Objective Congruence was conducted by five communication scholars to make sure the content was valid for measurement. Cronbach's alpha was used to provide an evaluation of reliability, in which the questionnaire

was pretested with 35 Thai senior citizens. Based on the pretest results, an adjusted version of the questionnaire was used for data collection. Variance-Based Structural Equation Modeling (VB-SEM), Partial Least Squares (PLS) methods was used as the statistical analysis method to test those hypotheses. No Exploratory Factor Analysis (EFA) was conducted as VB-SEM, PLS can estimate the complex model (both reflective and formative measurement model) as it is one of the advanced statistics to analyze and calculate the relationship between many variables.

Results

Results of content analysis: The content analysis of 31 health messages gathered from two LINE official accounts called "Young Happy," and "O-lun-la Club" revealed six emerging themes -- three themes of content type and three themes of message framing.

As for the content type, the first emerging theme was *informative message*. Health messages presented statistical data/images, showing a summary of the number of people who passed away or got sick from unhealthy behavior, or the number of patients who used medicine, treatment, or deceased. For example, a health message presented information and evidences from global news warning senior ladies to be aware of taking too much calcium, or showing senior women who are dead due to calcium overly intake.

The second emerging theme was *narrative message*, a health message telling LINE users real stories and experiences of people. For example, health messages presented success stories of senior citizens, by using personal tone in storytelling techniques about long living of people who are over 100 years old. The third emerging theme was a mix of both informative and narrative message. As an example, the technique of shying away from depression in senior people, was pursuing health messages that presented facts and information regarding depressed senior citizens. This health message used personal tone to describe depression sickness, symptoms, factors, and reasons of unhealthy behavior. This message told readers the techniques to get away from depression, and explained why the reader should follow their suggestions and followed healthy behavior.

As for the message framing, the first emerging theme was *gain-framed message*. This health message promoted benefit/advantages of engaging in healthy behavior. For example, exercising in water/pool was safe because it reduced injuries. The second emerging theme was loss-framed message. Health message about PM 2.5 presented information about problems with fearful and negative outcomes of PM 2.5 on people. It showed the risks of the elderly getting sick. For example, there was a message presenting negative consequences such as lung cancer, and other respiratory issues that could be prevented by wearing a mask. The third emerging theme was mix-framed message. For example, healthy food messages promoted benefits of eating five healthy foods (oats, banana, potato, dark chocolate, & berries) to reduce high-blood pressure, while presenting the risk of high-blood pressure and health-diseases.

To summarize, the content analysis of 31 health messages on the LINE official accounts found three themes of content type: mix of both informative and narrative messages (n = 12), narrative messages (n = 11), and informative

messages (*n* = 8). As for three themes of message frame, gain-framed messages (*n* = 18) were found the most, followed by mix-framed messages (*n* = 12), whereas loss-framed message (*n* = 1) was hardly found.

Results on survey: A total of 303 Thai senior citizens participated in the survey. Their age ranged from 60 to 85 years, with the average age was 67.36 years. For gender, 233 participants, or three quarters of the participants, were female (76.90%) while 70 participants were male (23.10%). For education level, over half of the participants mainly had lower than a bachelor's degree (57.80%), followed by a bachelor's degree (32.70%), and a master's degree or above (9.60%). The largest group of participants reported having family monthly income of less than 15,000 Thai Baht (32.70%), followed by 15,000 - 29,999 Thai Baht (26.40%), 30,000 - 44,999 Thai Baht (19.80%), 45,000 - 59,999 Thai Baht (11.20%), and 60,000 Thai Baht or above (9.90%), respectively.

As for LINE usage, the participants had been using LINE mostly for more than 24 months (65.30%), followed by more than 12-18 months (12.90%), 12 months (11.20%), and more than 18-24 months (10.60%), respectively. For average time spent per day, they used LINE between 30 minutes to 1 hour (31.00%) the most, followed by less than 30 minutes (17.50%), more than 3 hours per day on average (14.90%), more than 1 - 1.5 hours (12.50%), more than 1.5 - 2 hours (12.20%), more than 2 - 2.5 hours (5.90%), and more than 2.5 - 3 hours (5.90%), respectively.

In terms of users' health status, the participants indicated high-blood pressure (31.90%), followed by other health status (25.40%), osteoporosis in the elderly (16.50%), diabetes (12.50%), heart disease/stroke (6.20%), obesity (4%), cancer (2.70%), and malnutrition (0.70%), respectively. Exercise/obesity was the number one health topic that they frequently communicated via LINE (22.50%), followed by high-blood pressure (16.50%), nutrition/diet (15.00%), osteoporosis in the elderly (12.60%), diabetes (11.90%), heart disease/stroke (9.70%), cancer (7.90%), and other health topics (3.90%), respectively.

In terms of health message strategy regarding content type, the Thai senior citizens "sometimes" received narrative messages ($\bar{x}$ = 2.11, S.D. = 1.00) and informational messages ($\bar{x}$ = 1.85, S.D. = 1.07) per week. In terms of message framing, the participants "sometimes" received loss-framed messages as health messages via LINE per week ($\bar{x}$ = 1.99, S.D. = 1.05), while they "often" received gain-framed messages per week ($\bar{x}$ = 2.54, S.D. = 1.02).

As for user's responses, the participants' cognitive responses after they received health messages via LINE were reported. Four dimensions of cognitive responses were examined. First, the participants experienced high level of cognitive self-awareness ($\bar{x}$ = 4.20, S.D. = 0.55), cognitive threat risk ($\bar{x}$ = 3.51, S.D. = 0.83), cognitive benefit ($\bar{x}$ = 3.78, S.D. = 0.72), and cognitive self-efficacy ($\bar{x}$ = 3.73, S.D. = 0.73). In terms of participants' affective responses after they received health messages via LINE. Two dimensions of affective responses were examined. First, the participants experienced moderate level of affective fear ($\bar{x}$ = 3.35, S.D. = 0.99), and high level of affective sympathy ($\bar{x}$ = 3.87, S.D. = 0.69). For participants' behavioral responses after they received health messages via LINE, they experienced high level of behavioral responses ($\bar{x}$ = 3.83, S.D. = 0.62).

Results on hypothesis testing: To test the nine research hypotheses, VB-SEM or PLS-SEM was used as it could help a new study to focus on construct's prediction and theory exploration. Moreover, it supported both reflective and formative model (Hair, Hult, Ringle, & Sarstedt, 2014). In this study, the statistics for analyzing results that researcher used were (1) internal consistency reliability, (2) convergent validity, (3) discriminant validity, (4) f^2 effect sizes, (5) coefficients of determination (R^2), and (6) size and significance of path coefficients, to identify construct validity and reliability.

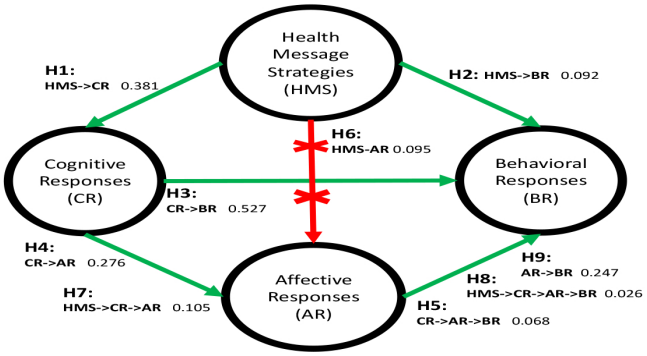
For an analysis of instrument reliability and validity and VB-SEM model testing, this study used the PLS-SEM technique to analyze the acquired data. The results showed that the data passed the standard of kurtosis and skewness which means the equation of framework model was ready to be analyzed. The researcher also examined the followings: loadings, composite reliability (CR), Cronbach's Alpha, average variance extracted (AVE), and discriminant validity by using the Heterotrait-Monotrait (HTMT) criterion (Figure 2).

The results revealed that the observed variables and latent variables passed the quality criteria of reliability and validity (see Figure 2). However, sub-latent variable cognitive threat risk reflecting latent variable cognitive responses was found to be below the standardized value (0.70). Thus, cognitive threat risk was taken off the model. Then, the results were re-analyzed and found that every observed variable and latent variable passed the quality criteria. According to the results, the loading (L) of Beh4 with a value of 0.57 was lower than 0.07, and the indicators reliability (L^2) of Beh4 with a value of 0.32 was lower than 0.50. However, the value of Beh4's based on AVE, CR, and Alpha was well above the suggested threshold value criterion. Therefore, Beh4 was kept in order to maintain the value of content validity.

In terms of AVE, composite reliability (CR) and Cronbach's Alpha were well above the required minimum level of the criterion value. For discriminant validity, this study used the HTMT criterion. The results showed all pairwise values of the HTMT which were below 0.90, and that was well under relevant threshold level (Henseler, Ringle, & Sarstedt, 2015). Therefore, statistical assumptions of the measurement quality of reliability and validity of the variables were met. The results reported all variables having sufficient quality for the hypotheses to be analyzed in the structure/framework model.

Latent Variables		I Indicators	Convergent Validity			Internal Consistency Reliability		Discriminate Validity
2nd order	1st order		L>0.70 Loading	L^2>0.50 Indicator reliability	AVE>0.50 Average Variance Extracted	CR 0.60-0.90 Composite Reliability	Alpha 0.60-0.90 Cronbach's Alpha	HTMT Heterotrait-Monotrait
CR	CSA	CSA1	0.84	0.71	0.75	0.9	0.83	Yes
		CSA2	0.89	0.79				
		CSA3	0.88	0.77				
	CBF	CBF1	0.82	0.68	0.74	0.89	0.82	Yes
		CBF2	0.88	0.78				
		CBF3	0.87	0.75				
	CSE	CSE1	0.87	0.76	0.78	0.91	0.86	Yes
		CSE2	0.9	0.81				
		CSE3	0.87	0.76				
AR	AF	AF1	0.88	0.77	0.82	0.93	0.89	Yes
		AF2	0.93	0.86				
		AF3	0.91	0.83				
	AS	AS1	0.77	0.59	0.65	0.85	0.73	Yes
		AS2	0.84	0.71				
		AS3	0.8	0.64				
	BR	Beh1	0.75	0.56	0.55	0.88	0.83	Yes
		Beh2	0.82	0.67				
		Beh3	0.77	0.59				
		Beh4	0.57	0.32				
		Beh5	0.81	0.66				
		Beh6	0.7	0.49				

Figure 2 Graphically presented results of hypothesis testing



Hypothesis	Path-Coefficients	T-value	P-value	Hypothesis Testing Results
H1: HMS->CR	0.381	5.890	0.000	Supported
H2: HMS->BR	0.092	2.029	0.043	Supported
H3: CR->BR	0.527	9.953	0.000	Supported
H4: CR->AR	0.276	4.127	0.000	Supported
H5: CR->AR->BR	0.068	3.081	0.002	Supported
H6: HMS->AR	0.095	1.412	0.158	Not supported
H7: HMS->CR->AR	0.105	2.964	0.003	Supported
H8: HMS->CR->AR->BR	0.026	2.390	0.017	Supported
H9: AR->BR	0.247	5.420	0.000	Supported

Figure 3 Result summary for reliability and validity of reflective measurement model (left) Results of hypothesis testing (right)

The results of hypotheses testing confirmed the first hypothesis. The health message strategies (HMS) had a direct effect with a medium effect size on the cognitive responses (CR) (t = 5.890, p = 0.000, Path Coefficient = 0.381, f^2 = 0.170). Regarding the effects between variables, HMS had a direct effect on CR at .381 with no indirect path at the 0.01 significance level.

The second hypothesis was confirmed. The health message strategies (HMS) had a direct effect with a small effect size on the behavioral responses (BR) (t = 2.029, p = 0.043, Path Coefficient = 0.092, f^2 = 0.014). The result on path coefficients of determination (R-squared) presented that HMS was the only variable that yielded a direct effect on BR (beta = R) at 0.092 at the 0.05 significance level.

The third hypothesis was confirmed as well. The cognitive responses (CR) had a direct effect with large effect size on the behavioral responses (BR) (t = 9.953, p = 0.000, Path Coefficient = 0.527, f^2 = 0.420) at the 0.01 significance level. The fourth hypothesis was also confirmed. The cognitive responses (CR) had a direct effect with a small effect size on the affective responses (AR) (t = 4.127, p = 0.000, Path Coefficient = 0.276, f^2 = 0.073) at the 0.01 level (DE = 0. 276). Moreover, the fifth hypothesis was confirmed. The cognitive responses (CR) had an indirect effect on behavioral responses (BR) as mediated by affective responses (AR), t = 3.081, p = 0.002, Path Coefficient = 0.068, at the 0.05 significance level.

However, the sixth hypothesis was not supported since the relationship between health message strategies (HMS) and affective responses (AR) was found not significant. That is, the health message strategies (HMS) had no direct effect on the affective responses (AR) (t = 1.412, p = 0.158, Path Coefficient = 0.095, f^2 = 0.009), and the total effects was .200 at the 0.01 significance level.

The seventh hypothesis was confirmed. The health message strategies (HMS) had an indirect effect on affective responses (AR) as mediated by cognitive responses (CR) (t = 2.964, p = 0.003, Path Coefficient = 0.105). The eighth hypothesis was also confirmed. The health message strategies (HMS) had an indirect effect on behavioral responses (BR) as mediated by cognitive responses (CR) and affective responses (AR), t = 2.390, p = 0.017, Path Coefficient = 0.026.

The ninth hypothesis was also confirmed. The affective responses (AR) had a direct effect with a medium effect size on behavioral responses (BR) at the 0.01 significance level (DE = 0.247) without indirect path effect (t = 5.420, p = 0.000, Path Coefficient = 0.247, f^2 = 0.104).

Discussions

A mix of both informative and narrative messages was the most popular strategy found in LINE official accounts for persuading Thai seniors' citizens. This result is consistent with the study by Greene and Brinn (2003) who found that the effective online health messages used both informational and narrative messages. Hence, the mix of both informative and narrative types of online health messages strategies is an important factor for health communication strategy.

In terms of message frames, gain-framed and mix-framed messages exerted higher effectiveness than loss-farmed ones. This confirmed the findings of Lithopoulos, Bassett-Gunter, Martin Ginis, & Latimer-Cheung (2017) that indicated the combined impact of both content types and message frame in one health message. Hence, a mixed message strategy could be an effective strategy for persuading Thai seniors' citizens via LINE.

The findings confirmed that the health message strategies had a direct effect on Thai senior citizens' cognitive and behavioral response, with an indirect effect on their affective responses as mediated by cognitive responses, and on their behavioral responses as mediated by cognitive and affective responses. These results provided additional insights into the previous research findings that communicators share information with emotional tones, and appeal makes readers involved in the creation of affective responses (Miller & Pole, 2010; Neubaum & Krämer, 2015; Shen, 2010). Many effective narrative health messages designed with emotions in health messages come with serious topics such as cancer, stroke, and heart disease that can create affective responses (McQueen, Kreuter, Kalesan, & Alcaraz, 2011; Neubaum & Krämer, 2015; Yoo, Kreuter, Lai, & Fu, 2014).

This result reveals that cognitive responses yielded a higher influence than affective responses, which reinforced previous research findings showing that the health campaigns that used emotional appeal were not always successful (Shen, 2010). Besides, an indirect effect of health message strategies on affective responses as mediated by cognitive responses may stem from the fact that links of video clips attached in the content on LINE message were not examined this study, and that may reduce the occurrence opportunity of its direct effect on Thai senior citizens' affective responses. Moreover, the findings of an indirect effect of cognitive responses on behavioral responses as mediated by their affective responses also confirmed the linear relationship between cognition, affection, and behavior as proposed by the Hierarchy of Effect Model (Glanz et al., 2008).

Affective responses were also found to have a direct effect on behavioral responses without indirect path. This finding confirmed and added evidence on the past research findings that Thai senior citizens received health messages via LINE with expression of personal experiences and emotion, and that have a direct effect on their behavioral responses.

This study contributed to the body of knowledge by revealing significant mediators and factors from LINE health messages that influence Thai senior audiences' behaviors. Findings also revealed the new body of knowledge that an effect of health messages on audiences' responses is not always linear as various independent variables and mediating variables also influence senior citizens' responses. Findings on health messages via LINE showed that LINE could be one of the very important influences on Thai seniors' health behaviors, and that it should be used as an effective channel for health communication promotion targeting the Thai senior citizens.

Limitations of the Study

This study used mostly Thai senior citizens living in Bangkok (127 out of 303) with average age 67.35 years and the majority was females (76.9%) to examine the influences of health messages in LINE on their cognitive, affective, and behavioral responses. There were a small number of respondents from other regions. Besides, the sample was selected from a school of Thai seniors and senior clubs. Therefore, there may be a limitation of this finding in terms of generalization to other regions of Thai populations and even to other countries. Moreover, due to non-random selection of the participants, the findings may be limited in terms of generalization. It should be noted that the majority of the samples received health messages through their friends, family, and LINE official accounts. This study may yield different effects of a health message on LINE via other types of sources.

Implications for Further Application

This research findings can be used for scholars, communication practitioners, health organizations, policy makers and governmental offices, and Thai senior citizens. To compare similarities and differences across senior citizens regarding the use of social media on health messages and their responses, future studies may consider using an equal proportion of samples in three senior age ranges: 1) early age 60-69 years, 2) middle age 70-79 years, 3) latest age at 80 and over. For scholars, this study will contribute to the body of knowledge on the use of significant mediators and influential factors between health message strategies and Thai senior citizens' behavioral responses. This study also showed that combining both content types and message frames in one message is an effective persuasive health communication strategy on LINE for influencing Thai seniors' responses.

As for communication practitioners, they might consider LINE as beneficial for disseminating health information and health activities to Thai senior citizens, as they have a positive attitude toward LINE. LINE was found to be a good medium for health information, with communication practitioners suggested to consider health context on LINE as a channel for communicating effective health behavior with Thai senior citizens. The World Health Organization (WHO) (2015) also suggested digital health strategies on creating healthy aging for senior people by providing useful information and technical support on a digital platform for them to learn and exchange information/ experience. Hence, LINE would be a good

supporter for Thai senior citizens to digitally learn useful information on health services/ programs, and effectively interact with their friends and family via digital media. According to World Health Organization (2015), the digital health plan strategies can help senior people to achieve healthy living by developing and ensuring compliance in information and technologies. Thus, communication practitioners for health education and organizations may design an appropriate health message targeting Thai senior citizens for generating desirable cognitive, affective, and behavioral responses. Furthermore, communication practitioners might study and examine LINE's functions and services as a trustworthy communication tool to share health information. Communication practitioners can also provide digital education and social media knowledge/skills for Thai senior citizens through new digital communication platforms.

Findings of this study are also useful for health organizations working on health online message campaigns, such as the Ministry of Public Health, hospitals, and health care organizations, to promote and get Thai senior citizens' attention and positively affect their beliefs. Two strategies in terms of content types and gain-framed message are recommended when they want to communicate more effectively to their audience. As Thai senior citizens have consumed health information and news heavily via LINE, health organizations should use LINE to promote accurate health information, and provide more services and communication on LINE.

The finding of this study also benefits policy makers and governmental offices and LINE or social media corporations to improve quality of health information and to effectively deal with inaccurate health messages. Governmental offices should build media literacy skills for Thai citizens to be able to evaluate the quality of health messages on social media by themselves. As for policy makers, health communication policies should be created for filtering inaccurate health information on social media in Thailand. These implications can help reduce inaccurate health information and could improve the communication education and services of health information and citizens' lifestyle. In this aspect, LINE would be a good supporter for Thai senior citizens to access and share useful information and health services/ programs. Last but not least, this study is beneficial to Thai senior citizens who are using LINE or other social media to have an awareness of health information and responsibility before they create, send, or share health messages. This also benefits Thai senior citizens by taking an active role in monitoring inaccurate information and evaluating the quality of health messages on social media.

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